ARMSTRONG FENTON ASSOCIATES

PROJECT:

Ashbourne Strategic Housing Development

Environmental Impact Assessment Report - Volume III

Appendices

CLIENTS:

Arnub Ltd. & Aspect Homes (ADC) Ltd.

DATE:

September 2022

Planning & Development Consultants

Chapter 4 ‘Biodiversity’ - Appendices

Appendix 5.1.

Protected Sites for Nature Conservation in the Vicinity of the Proposed Development

European sites in the vicinity of the proposed development are listed below in Table 1, along with their qualifying/special conservation interests, reference to the most recent conservation objectives document, and their location relative to the proposed development site.

Other nationally protected sites for nature conservation in the vicinity of the proposed development are listed below in Table 2, along with the nature conservation interests for which they are designated, and their location relative to the proposed development site.

Table 1. European sites in the vicinity of the proposed development.

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
Special Area of Conservation (SAC)	
Malahide Estuary SAC [000205] 1140 Mudflats and sandflats not covered by seawater at low tide 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) 1410 Mediterranean salt meadows (Juncetalia maritimi) 2120 Shifting dunes along the shoreline with Ammophila arenaria (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)* S.I. No. 91/2019 - European Union Habitats (Malahide Estuary Special Area Of Conservation 000205) Regulations 2019 NPWS (2013) Conservation Objectives: Malahide Estuary SAC 000205. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 12.6km south east of the proposed development.
Rogerstown Estuary SAC [000208] 1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) 1410 Mediterranean salt meadows (Juncetalia maritimi) 2120 Shifting dunes along the shoreline with Ammophila arenaria (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)* S.I. No. 286/2018 - European Union Habitats (Rogerstown Estuary Special Area of Conservation 000208) Regulations 2018 NPWS (2013) Conservation Objectives: Rogerstown Estuary SAC 000208. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 13.1km east of the proposed development
Rye Water Valley/Carton SAC [001398] 7220 Petrifying springs with tufa formation (Cratoneurion)* 1014 Narrow-mouthed Whorl Snail Vertigo angustior 1016 Desmoulin's Whorl Snail Vertigo moulinsiana S.I. No. 494/2018 - European Union Habitats (Conservation of Wild Birds (Rye Water Valley/Carton Special Area of Conservation 001398)) Regulations 2018. NPWS (2021) Conservation objectives for Rye Water Valley/Carton SAC [001398]. Generic Version 1.0. Department of Housing, Local Government and Heritage.1	Located c. 15.5km south west of the proposed development

1 The versions of the conservation objectives documents referenced in this table are the most recent published versions at the time of writing

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
South Dublin Bay SAC [000210] 1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 Salicornia and other annuals colonising mud and sand 2110 Embryonic shifting dunes S.I. No. 525/2019 - European Union Habitats (South Dublin Bay Special Area of Conservation 000210) Regulations 2019 NPWS (2013) Conservation Objectives: South Dublin Bay SAC 000210. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 22.7km south east of the proposed development
North Dublin Bay SAC [000206] 1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) 1395 Petalwort Petalophyllum ralfsii 1410 Mediterranean salt meadows (Juncetalia maritimi) 2110 Embryonic shifting dunes 2120 Shifting dunes along the shoreline with Ammophila arenaria (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes) 2190 Humid dune slacks S.I. No. 524/2019 - European Union Habitats (North Dublin Bay Special Area of Conservation 000206) Regulations 2019 NPWS (2013) Conservation Objectives: North Dublin Bay SAC 000206. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 20.7km south east of the proposed development
Special Protection Area (SPA)	
Malahide Estuary SPA [004025] A005 Great Crested Grebe Podiceps cristatus A046 Light-bellied Brent Goose Branta bernicla hrota A048 Shelduck Tadorna tadorna A054 Pintail Anas acuta A067 Goldeneye Bucephala clangula A069 Red-breasted Merganser Mergus serrator A130 Oystercatcher Haematopus ostralegus A140 Golden Plover Pluvialis apricaria A141 Grey Plover Pluvialis squatarola A143 Knot Calidris canutus A149 Dunlin Calidris alpina A156 Black-tailed Godwit Limosa limosa A157 Bar-tailed Godwit Limosa lapponica A162 Redshank Tringa totanus A999 Wetland and Waterbirds S.I. No. 285/2011 - European Communities (Conservation of Wild Birds (Malahide Estuary Special Protection Area 004025)) Regulations 2011. NPWS (2013) Conservation Objectives: Malahide Estuary SPA 004025. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 12.7km south east of the proposed development

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
Rogerstown Estuary SPA [004015] A043 Greylag Goose Anser anser A046 Brent Goose Branta bernicla hrota A048 Shelduck Tadorna tadorna A056 Shoveler Anas clypeata A130 Oystercatcher Haematopus ostralegus A137 Ringed Plover Charadrius hiaticula A141 Grey Plover Pluvialis squatarola A143 Knot Calidris canutus A149 Dunlin Calidris alpina alpina A156 Black-tailed Godwit Limosa limosa A162 Redshank Tringa totanus A999 Wetlands S.I. No. 271/2010 - European Communities (Conservation of Wild Birds (Rogerstown Estuary Special Protection Area 004015)) Regulations 2010. NPWS (2013) Conservation Objectives: Rogerstown Estuary SPA 004015. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 14km east of the proposed development
North Bull Island SPA [004006] A046 Light-bellied Brent Goose Branta bernicla hrota A048 Shelduck Tadorna tadorna A052 Teal Anas crecca A054 Pintail Anas acuta A056 Shoveler Anas clypeata A130 Oystercatcher Haematopus ostralegus A140 Golden Plover Pluvialis apricaria A141 Grey Plover Pluvialis squatarola A143 Knot Calidris canutus A144 Sanderling Calidris alba A149 Dunlin Calidris alpina A156 Black-tailed Godwit Limosa limosa A157 Bar-tailed Godwit Limosa lapponica A160 Curlew Numenius arquata A162 Redshank Tringa totanus A169 Turnstone Arenaria interpres A179 Black-headed Gull Chroicocephalus ridibundus A999 Wetlands & Waterbirds S.I. No. 211/2010 - European Communities (Conservation of Wild Birds (North Bull Island Special Protection Area 004006)) Regulations 2010. NPWS (2015) Conservation Objectives: North Bull Island SPA 004006. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 20.7km south east of the proposed development
South Dublin Bay and River Tolka Estuary SPA [004024] A046 Light-bellied Brent Goose Branta bernicla hrota A130 Oystercatcher Haematopus ostralegus A137 Ringed Plover Charadrius hiaticula A141 Grey Plover Pluvialis squatarola A143 Knot Calidris canutus A144 Sanderling Calidris alba A149 Dunlin Calidris alpina A157 Bar-tailed Godwit Limosa lapponica A162 Redshank Tringa totanus A179 Black-headed Gull Chroicocephalus ridibundus	Located c. 19.1km south east of the proposed development

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
A192 Roseate Tern Sterna dougallii A193 Common Tern Sterna hirundo A194 Arctic Tern Sterna paradisaea A999 Wetland and Waterbirds S.I. No. 212/2010 - European Communities (Conservation of Wild Birds (South Dublin Bay and River Tolka Estuary Special Protection Area 004024)) Regulations 2010. NPWS (2015) Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	

Table 2 Nationally protected sites in the vicinity of the proposed development.

Designated Site Name [Code] and its nature conservation features	Location Relative to the Proposed Development Site
proposed Natural Heritage Area (pNHA)	
Royal Canal pNHA [002103] The site is designated for its canal which is a man-made waterway linking the River Liffey at Dublin to the River Shannon near Tarmonbarry. The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods.	12.8km South of the proposed development site
Liffey Valley pNHA [000128] The site is important for its diversity of habitats within, ranging from terrestrial to aquatic. A number of rare and threatened plant species, such as Scrophularia umbrosa, Hypericum hirsutum and Lamiastrum caleobdolon have been recorded from the site.	13.8km south of the proposed development site
Santry Demesne pNHA [000178] The site is designated for its remnants of a former demesne woodland, which is of ecological interest as it occurs in area where a little of the original vegetation has survived. However, the site's primary importance is that it contains a legally protected plant species, Hypericum hirsutum, which is protected under the Flora Protection Order, 2015.	13.5km south east of the proposed development site
Feltrim Hill pNHA [001208] The site is designated for its example of a knoll-reef dating from the Carboniferous period. The site was previously known to contain two rare species, Scilla verna and Geranium columbinum.	14.4km south east of the proposed development site
Malahide Estuary pNHA [000205] The site is designated under similar conservation objectives as its SAC and SPA designations. Refer to Malahide Estuary SAC [000205] and SPA [004025]	12.6km east south east of the proposed development site
Rogerstown Estuary pNHA [000208] The site is designated under similar conservation objectives as its SAC and SPA designations. Refer to Ireland's Eye SAC [002193] and SPA [004117]	13km east of the proposed development site

Designated Site Name [Code] and its nature conservation features	Location Relative to the Proposed Development Site
Bog of the Ring pNHA [001204] The site is designated for its rare example of a marsh in Co. Dublin. The site is used by a number of Red- and Amber-listed bird species, such as whooper swan Cygnus cygnus in the winter, and skylark Alauda arvensis in the summer.	13.3km north east of the proposed development site
Cromwells Bush Fen pNHA [001576] The site is designated for its diversity of wetland habitats in transition, that are unusual to the locality. It also holds a diversity of wetland wader and duck species.	13.4km north of the proposed development site

Appendix 5.2

Desk Study Fauna Records

Desktop records of protected, rare, or other notable fauna species are listed below in Table 1. In relation to amphibian, reptile and mammal species those which are protected under the Wildlife Acts, the Habitats Directive and/or are listed as threatened (Vulnerable to Critically Endangered) on the relevant national Red Lists are included. In the case of bird species, only those species listed in Annex I of the Birds Directive or on the Birds of Conservation Concern in Ireland (BoCCI) Red List are included in the table below. For invertebrate species, those which are listed as threatened (Vulnerable to Critically Endangered) on the relevant national Red List are included.

Table 1 Records of protected, red-listed or notable fauna from the desktop study in the vicinity of the study area.

Common Name/ Scientific Name	Legal Status2	Red List Status3	Source
Amphibians			
Common frog Rana temporaria	HD_V, WA	Least concern	NBDC online database record
Smooth newt Triturus vulgaris	WA	Least concern	NBDC online database recor
Mammals (Terrestrial)			
Badger	WA	Least concern	NBDC online database record
Otter Lutra lutra	HD_II & IV, WA	Least concern	NBDC online database record
Brown long-eared bat Plecotus auritus	HD_IV, WA	Least concern	BCI database record NBDC online database record
Daubenton's bat Myotis daubentonii	HD_IV, WA	Least concern	BCI database record NBDC online database record
Leisler's bat Nyctalus leisleri	HD_IV, WA	Least concern	BCI database record NBDC online database record
Soprano pipistrelle Pipistrellus pygmaeus	HD_IV, WA	Least concern	BCI database record NBDC online database record
Common pipistrelle Pipistrellus pipistrellus	HD_IV, WA	Least concern	BCI database record NBDC online database record
Hedgehog Erinaceus europaeus	WA	Least concern	NBDC online database record
Irish hare Lepus timidus subsp. hibernicus	HD_V, WA	Least concern	NBDC online database record
Pine marten Martes martes	HD_V, WA	Least concern	NBDC online database record

2 HD_II/IV/V = Habitats Directive Annexes II/IV/V; WA = Wildlife Acts; BD_I/II/III = Birds Directive Annex I/II/III; OSPAR = Convention for the protection of the marine environment of the North-east Atlantic 1992

3 Mammal Red-list from Marnell, F., Kingston, N. & Looney, D. (2009) Ireland Red List No. 3: Terrestrial Mammals and Marnell, F., Looney, D. & Lawton, C. (2019) Ireland Red List No. 12: Terrestrial Mammals.

Birds from Gilbert, G., Stanbury A., & Lewis L. (2021) Birds of Conservation Concern in Ireland 2020-2026. Irish Birds 43: 1-22.

Amphibians, reptiles and fish from King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., Fitzpatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish.

Non-Marine Molluscs from Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. & Regan, E.C. (2009) Ireland Red List No. 2 – Non-Marine Molluscs.

Butterflies from Regan, E.C., Nelson, B., Aldwell, B., Bertrand, C., Bond, K., Harding, J., Nash, D., Nixon, D., & Wilson, C.J. (2010) Ireland Red List No. 4 – Butterflies.

Moths from Allen, D., O'Donnell, M., Nelson, B., Tyner, A., Bond, K.G.M., Bryant, T., Crory, A., Mellon, C., O'Boyle, J., O'Donnell, E., Rolston, T., Sheppard, R., Strickland, P., Fitzpatrick, U., & Regan, E. (2016) Ireland Red List No. 9: Macro-moths (Lepidoptera).

Damselflies and dragonflies from Nelson, B., Ronayne, C. & Thompson, R. (2011) Ireland Red List No.6: Damselflies & Dragonflies (Odonata).

Water beetles from Foster, G. N., Nelson, B. H. & O Connor, Á. (2009) Ireland Red List No. 1 – Water beetles.

Common Name/ Scientific Name	Legal Status2	Red List Status3	Source
Red deer Cervus elaphus	WA	Least concern	NBDC online database record
Red squirrel Sciurus vulgaris	WA	Least concern	NBDC online database record
Pygmy shrew Sorex minutus	WA	Least concern	NBDC online database record
Irish Stoat Mustela erminea subsp. hibernica	WA	Least concern	NBDC online database record
Birds			
Barn owl Tyto alba	WA	Red	NBDC online database record
Black-headed gull Larus ridibundus	WA	Amber	NBDC online database record
Corncrake Crex crex	BD_I, WA	Red	NBDC online database record
Curlew Numenius arquata	BD_II (II), WA	Red	NBDC online database record
Golden plover Pluvialis apricaria	BD_I, II (II), III (III), WA	Red	NBDC online database record
Goldeneye Bucephala clangula	BD_II (II), WA	Red	NBDC online database record
Grey wagtail Motacilla cinerea	WA	Red	NBDC online database record
Herring gull Larus argentatus	WA	Amber	NBDC online database record
Lapwing Vanellus vanellus	BD_II (II), WA	Red	NBDC online database record
Meadow pipit Anthus pratensis	WA	Red	NBDC online database record
Pintail Anas acuta	BD_II (I), III (II), WA	Amber	NBDC online database record
Pochard Aythya ferina	BD_II (I), III (II), WA	Red	NBDC online database record
Redshank Tringa totanus	WA	Red	NBDC online database record
Tufted duck Aythya fuligula	BD_II (I), III (II), WA	Amber	NBDC online database record
Wigeon Anas penelope	BD_II (I), III (II), WA	Amber	NBDC online database record
Woodcock Scolopax rusticola	BD_II (I), III (III), WA	Red	NBDC online database record
Yellowhammer Emberiza citrinella	WA	Red	NBDC online database record
Barn swallow Hirundo rustica	WA	Amber	NBDC online database record
Greylag goose Anser anser	BD_II (I), BD_III (II), WA	Amber	NBDC online database record
Coot Fulica atra	BD_II (I), BD_III (II), WA	Amber	NBDC online database record
Hen harrier Circus cyaneus	BD_I, WA	Amber	NBDC online database record
Kestrel Falco tinnunculus	BD_I, WA	Amber	NBDC online database record
Kingfisher Alcedo atthis	BD_I, WA	Amber	NBDC online database record

Common Name/ Scientific Name	Legal Status2	Red List Status3	Source
Linnet Carduelis cannabina	WA	Amber	NBDC online database record
Little egret Egretta garzetta	BD_I, WA	Green	NBDC online database record
Merlin Falco columbarius	BD_I, WA	Amber	NBDC online database record
Sandpiper Actitis hypolecuos	WA	Amber	NBDC online database record
Snipe Gallinago gallinago	BD_II(I), BD_III (III), WA	Amber	NBDC online database record
Starling Sturnus vulgaris	WA	Amber	NBDC online database record
Teal Anas crecca	BD_II (I), BD_III (II), WA	Amber	NBDC online database record
Peregrine Falco peregrinus	BD_I, WA	Green	NBDC online database record
Whooper swan Cygnus cygnus	BD_I, WA	Amber	NBDC online database record
Invertebrates			
White-clawed crayfish Austropotamobius pallipes	HD_II & V, WA	Endangered	NBDC online database record
Wall butterfly Lasiommata megera	none	Endangered	NBDC online database record
Andrena (Melandrena) nigroaenea	none	Vulnerable	NBDC online database record
Andrena semilaevis	none	Vulnerable	NBDC online database record
Great yellow bumble bee Bombus distinguendus	none	Endangered	NBDC online database record
Large red tailed bumble bee Bombus lapidarius	None	Near threatened	NBDC online database record
Moss Carder-bee Bombus muscorum	None	Near threatened	NBDC online database record
Red-tailed carder bee Bombus ruderarius	None	Vulnerable	NBDC online database record

Appendix 5.3

Examples of Valuing Important Ecological Features

International Importance:
'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. Proposed Special Protection Area (pSPA). Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). Features essential to maintaining the coherence of the Natura 2000 Network.[4] Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. Resident or regularly occurring populations (assessed to be important at the national level)[5] of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). Biosphere Reserve (UNESCO Man & The Biosphere Programme). Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). Biogenetic Reserve under the Council of Europe. European Diploma Site under the Council of Europe. Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 1988).[6]

National Importance:
Site designated or proposed as a Natural Heritage Area (NHA). Statutory Nature Reserve. Refuge for Fauna and Flora protected under the Wildlife Acts. National Park. Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. Resident or regularly occurring populations (assessed to be important at the national level)[7] of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Site containing 'viable areas'[8] of the habitat types listed in Annex I of the Habitats Directive
County Importance:

4 See Articles 3 and 10 of the Habitats Directive

5 It is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

6 Note that such waters are designated based on these waters' capabilities of supporting salmon (Salmo salar), trout (Salmo trutta), char (Salvelinus) and whitefish (Coregonus)

7 It is suggested that, in general, 1% of the national population of such species qualifies as a nationally important population. However, a smaller population may qualify as nationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

8 A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

Area of Special Amenity.[9] Area subject to a Tree Preservation Order. Area of High Amenity, or equivalent, designated under the County Development Plan. Resident or regularly occurring populations (assessed to be important at the County level)[10] of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance. County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan, if this has been prepared. Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (higher value):
Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; Resident or regularly occurring populations (assessed to be important at the Local level)[11] of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (lower value):
Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; Sites or features containing non-native species that are of some importance in maintaining habitat links.

9 It should be noted that whilst areas such as Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity are often designated on the basis of their ecological value, they may also be designated for other reasons, such as their amenity or recreational value. Therefore, it should not be automatically assumed that such sites are of County importance from an ecological perspective.

10 It is suggested that, in general, 1% of the County population of such species qualifies as a County important population. However, a smaller population may qualify as County important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

11 It is suggested that, in general, 1% of the local population of such species qualifies as a locally important population. However, a smaller population may qualify as locally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

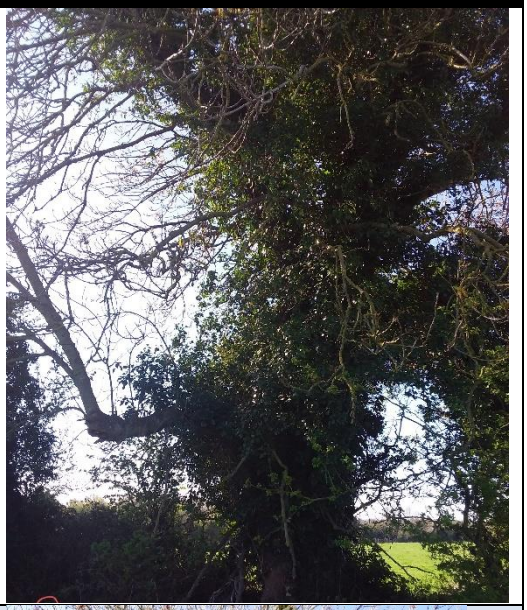
Appendix 5.4

Trees with potential roost features within the proposed development site

Tree no.12	Tree type & condition	Tree status	Suitability	PRF feature	Plate
0432	Ash (Fraxinus excelsior) Mature tree	Retained	Low	Dense ivy stems covering main stem and peripheral branches. Limited assessment due to ivy	
528	Ash (Fraxinus excelsior)	Retained	Low	Dense ivy, likely more features obscured from view	

12 Tree number, type and condition corresponds with the project arborist report (The Tree File, 2021)

Tree no.12	Tree type & condition	Tree status	Suitability	PRF feature	Plate
528	Ash (Fraxinus excelsior) Large multi-stemmed mature specimen along hedgerow	Removed	Low	Dense ivy across main stem and branches	
531	Ash (Fraxinus excelsior) Large mature specimen along hedgerow, deadwood in crown	Retained	Low	Dense ivy across main stem and branches, likely other features present	
534	Ash (Fraxinus excelsior) Mature, well-established tree	Retained	Low	A number Dense ivy mainly on stem	

Tree no.12	Tree type & condition	Tree status	Suitability	PRF feature	Plate
535	Ash (Fraxinus excelsior) Mature tree	Retained	Moderate	Dense ivy across whole of tree, large knothole on limb of tree, fractures near top of crown	
536	Ash (Fraxinus excelsior) Mature tree	Retained	Low	Dense ivy across main stem and branches, likely other features present	
537	Ash (Fraxinus excelsior) Mature tree	Retained	Low	Dense ivy with lots of deadwood. Likely other features obscured.	

Chapter 5 'Land, Soils & Geology' - Appendices

Appendix 5.1.

Preliminary Ground Investigation Results

PROPOSED HOUSING
DEVELOPMENT
ASHBOURNE
COUNTY MEATH

DBFL
CONSULTING ENGINEERS

CONTENTS

APPENDICES

REPORT ON A SITE INVESTIGATION
FOR A PROPOSED HOUSING DEVELOPMENT
AT
CHERRY LANE ASHBOURNE

FOR

ARNUB LTD / ASPECT HOMES LTD

DBFL
CONSULTING ENGINEERS

Report No. 24190 **August 2022**

I Introduction

A new housing development is proposed for a greenfield site located at Cherry Lane in Ashbourne, County Meath.

An investigation of sub soil conditions in the area of the new development has been carried out by IGSL for DBFL Consulting Engineers on behalf of the developers.

The site investigation included the following elements.

*	Cable Percussion Boreholes	2 nr.
•	Rotary Core Holes	2 nr
•	Trial Pits	7 nr.
•	Heavy Duty Dynamic Probes	7 nr.
•	BRE Digest Percolation Tests	7 nr.
•	Geotechnical Laboratory Testing	
•	Environmental and Chemical Laboratory Testing	

This report includes all factual data available from field and laboratory operations and discusses these findings relative to foundation and infrastructural design for the proposed new development.

II Fieldwork

This major housing development is to take place on a site located in Ashbourne, County Meath. The site is extensive with ground level variations from 67.5 to 78.0 OD recorded.

The site and exploratory locations are noted on the drawings enclosed in Appendix VII and were marked out by IGSL on site. All locations were referenced to National Grid and OD levels were established. Commencing surface was generally topsoil.

Two boreholes were completed at one major structure as noted on the site plan. Over the remainder of the site seven locations were selected for Trial Pit / Percolation and Dynamic Probe assessment, widely spaced over the site area.

The various elements of the investigation are detailed in the following paragraphs. All field works were supervised by an experienced geotechnical engineer who carefully recorded stratification, took photographs as necessary, recovered samples and prepared detailed records.

Close liaison was maintained throughout with Consulting Engineer and Civic Authorities. All appropriate documentation was submitted and approved prior to site commencement. Each location was scanned electronically (CAT) to ensure that existing services were not damaged. A shallow trial pit was also opened by hand at the exploratory borehole / corehole locations to confirm this.

Statutory HSE safety precautions relating to COVID 19 were observed, with working areas restricted to IGSL personnel only, to ensure safety of the general public.

Boreholes

Boreholes were 200mm diameter and were constructed using conventional 200mm diameter cable percussion equipment. Holes were referenced BH01 and BH02. A trial pit was opened at each borehole location to 1.00 metre deep to ensure that underground services were not damaged.

Detailed geotechnical records are contained in Appendix I to this report - the records give details of stratification, sampling, in-situ testing and groundwater. Note is also taken of any obstructions to normal boring requiring the use of the heavy chisel for advancement. In general it was not possible to recover undisturbed samples because of the granular nature of the strata encountered and the presence of cobbles and boulders and shallow bedrock.

At BH01 topsoil overlies firm grey and black gravelly silty CLAY which continues to 2.50 metres. Very stiff black gravelly CLAY with cobbles and occasional boulders continues from 2.50 to 5.20 metres. A boulder obstruction at 5.20 prevented advancement. Water ingress was noted at 1.80 metres and a standpipe was installed to monitor ground water variations.

BH02 encountered firm to stiff gravelly CLAY below topsoil, with very stiff black gravelly CLAY encountered at 2.40 metres and continuing to refusal at 5.30 metres. This borehole was DRY and a standpipe was also installed.

The soils encountered represent glacial till or boulder clay deposition, the very stiff to hard gravelly CLAY below 2.50 metres is a black lodgement till, locally referred to as BLACK BOULDER CLAY. The shallower gravelly brown boulder clay varies in strength from soft to firm to occasionally stiff.

Rotary Core Drilling

Rotary core drilling was employed at both borehole locations to advance investigation depth, establish bedrock horizon and recover representative rock core.

A Geo-405 drilling rig was used to core drill using triple tube core drilling technique and an air-mist coolant. Symmetrix open hole drilling (100mm diameter) was used through the overburden deposits.

Detailed drilling records are presented in Appendix II with accompanying core photographs. The records note Total and Solid Core Recovery (TCR / SCR) record Rock Quality Designation (RQD), present a fracture spacing log and provide a detailed geological description of the rock.

The equipment penetrated surface topsoil, firm to stiff brown and black gravelly clay (BOULDER CLAY). Very strong to medium strong medium bedded fine grained grey/black LIMESTONE was encountered in both locations with a thin weathered zone noted overlying the solid bedrock. 100% core recovery was recorded in the bedrock in both locations.

The rotary core findings are summarised in the following table.

Hole No.	Overburden	Weathered Rock	Solid LIMESTONE	Standpipe
RC01	0 – 5.50	5.50 – 6.00	6.00 – 9.00	0 – 9.00
RC02	0 – 6.85	6.85 – 7.50	7.50 – 9.00	

Standard Penetration tests were performed in both locations to confirm overburden strength.

Trial Pits

Trial Pits were scheduled at seven locations and referenced TP01 to TP07.

A JCB excavator was used under engineering supervision. Detailed records for each location are presented in Appendix III. These records note the soil stratification and record sampling, stability and ground water details. Each location was CAT scanned to ensure that underground services were not damaged.

Topsoil was noted in each location generally overlying brown or brown grey gravelly CLAY, varying from soft to firm in consistency. Stiff to hard dark grey or black gravelly CLAY was noted in several locations at depths between 1.50 and 2.50 metres. Excavations were terminated between 2.50 and 3.00 metres. No ground water was observed during the investigation period.

One major variation to the general trend was noted at TP04 where a stratum of slightly clayey GRAVEL was penetrated from 0.20 to 2.20 metres. Cobbles and boulders were observed in this excavation.

TRIAL PIT SUMMARY

Ref No.	Soft to Firm gravelly CLAY	Stiff gravelly CLAY	GRAVEL
TP01	0.30 – 1.60	1.60 – 2.50	
TP02	0.30 – 1.00	1.00 – 3.00	
TP03	0.20 – 2.60		
TP04			0.20 – 2.20
TP05	0.80 – 2.60	2.60 – 3.00	
TP06	0.40 – 2.60	2.60 – 3.10	
TP07	0.30 – 3.00		

HD Dynamic Probes

Heavy Duty Dynamic Probes were carried out at each of the trial pit locations and referenced DP01 to DP07.

Probing was in accordance with the heavy-duty probe specification of BS 1377: Part 9: 1990. In these tests, the soil resistance is measured in terms of the number of drop-hammer blows required to drive the test probe through each 100 mm increment of penetration. Probing is terminated when the blow count exceeds 25/100mm to avoid damage to the apparatus. Where loose material is present a single blow count may drive the apparatus in excess of 100mm. In this instance blow counts of zero may be recorded. Individual probe records are contained in Appendix IV.

A Probe resistance of $N_{100} < 2$ is indicative of soft or weak material, unsuitable as founding medium. A probe resistance of $N_{100}=4$ is indicative of firm to stiff soils, with an allowable bearing pressure of 100 kPa.

A stiff or dense zone has been noted at surface in a number of locations with relatively shallow probe refusal recorded (1.20 to 1.60 metres). This may partly reflect very dry weather conditions at the time of the investigation.

The probe results are summarised in the following table.

Ref No.	**Soft $N_{100} < 2$**	**Depth to Firm Soils $N_{100} > 4$**	**Final Refusal Depth**
DP01	0 – 1.60	1.70	2.00
DP02		0.30	1.60
DP03		0.30	1.20
DP04		0.30	1.20
DP05	0 – 1.80	2.60	3.40
DP06	0 – 2.40	2.50	3.60
DP07		0.30	1.20

BRE Digest 365 Soakaway

Infiltration testing was scheduled at each trial pit location and was carried out in accordance with BRE Digest 365 'Soakaway Design'. The stratification in each location is noted on the respective Trial Pit record. Tests are referenced SA01 to SA07.

To obtain a measure of the infiltration rate of the sub-soils, water was poured into a test pit, and a record taken of the fall in water level against time. The test was carried over two cycles following initial soakage. Designs are based on the slowest infiltration rate, which is calculated from the final cycle.

The results are summarised as follows;

Ref No.	Infiltration Rate (f) Metres/ Minute	
SA01	0.00031	
SA02	8.9E-05	
SA03	0.00076	
SA04	0.00057	
SA05	0.00029	
SA06	0.00000	* Water Level Rose
SA07	0.00017	

III. Testing

In Situ

Standard penetration tests were carried out at approximate 1.00 metre intervals in the geotechnical Boreholes and in each rotary hole to measure relative in-situ soil strength. N values are noted in the right hand column of the boring / drilling records, representing the blow count required to drive the standard sampler 300mm into the soil, following initial seating blows. Where full test penetration was not achieved the blow count for a specific penetration is recorded, or refusal is indicated where appropriate. The results of the tests are summarised as follows:

STRATUM	**N VALUES**		**COMMENT**
	BH01	BH02	
Brown Gravelly CLAY			
1.00 m BGL	10	24	Firm / Stiff
2.00 m BGL	11	14	Firm
Black gravelly CLAY			
3.00 m BGL	51	35	Very Stiff
4.00 m BGL	49	53	Hard
> 5.00 m BGL	>50	>50	Hard

Limited penetration of SPT apparatus was noted in the lower hard black boulder clay.

Laboratory

A programme of laboratory testing was scheduled following completion of site operations. Geotechnical soil and rock testing was carried out by IGSL in its INAB-Accredited laboratory. Chemical and environmental testing was carried out in the UK by EUROFINS Ltd. The test programme included the following elements:

Liquid and Plastic Limits / Moisture Content	IGSL
PSD Grading by Wet Sieve and Hydrometer	IGSL
Point Load Tests	IGSL
Sulphate / Chloride / pH	EUROFINS
RILTA Suite Environmental / Ground Water Suite	EUROFINS

All laboratory data is presented in Appendices VIa and VIb and individual tests are discussed briefly as follows:

Index Properties / Moisture Content

Samples from the overburden deposits had Index Properties and Natural Moisture Contents established. The results consistently plot in the CL zone of the standard classification indicative of sensitive clay matrix soil (typical of glacially deposited boulder clay).

Natural Moisture Contents range from 7.2 to 23%, the higher values are generally associated with the upper brown gravelly CLAY. Lower moisture contents were recorded in the black boulder clay stratum.

Grading

Wet Sieve analysis has been carried out on two samples of the gravelly CLAY stratum. The grading curves consistently confirm material smoothly graded from the fine clay to coarse gravel fraction. The grading pattern is again typical of glacial till or boulder clay.

Point Load Tests

Sub samples of the recovered LIMESTONE core have been selected for Diametrial Testing in The Point Load Apparatus. A total of 8 tests were performed and equivalent UCS values have been calculated. Rock strength (UCS) varies from 56 to 92 MPa with an average value of 72 MPa. The results confirm the high strength of the limestone bedrock.

Chemical

Two samples were sent for analysis to BRE Chemical Suite parameters. Sulphate concentrations (SO4 2:1 extract) of < 0.010 g/l were established with pH values of 9.2 and 9. Low Chloride concentrations (< 0.010 g/l) were also determined.

No special precautions are necessary to protect foundation concrete from sulphate or chloride aggression. A sulphate design class of DS-1 (ACEC Classification for Concrete) is indicated for concentrations less than 0.5 g/l.

RILTA Environmental Suite

Two samples of the soils from the site were sent to EUROFINS environmental laboratory and testing was carried out in accordance with RILTA requirements to establish Landfill Waste Acceptance Criteria (WAC).

All samples fall into the INERT Category with no elevated levels of contamination recorded. No traces of ASBESTOS were noted during routine screening.

Material excavated during this development can be safely disposed of either on the site or to a suitably licensed INERT Landfill facility. No issues arise as to safety of site personnel

IV. Discussion:

A major new housing development is to be carried out on this site at Ashbourne. An investigation of ground conditions has been carried out by IGSL for D.B.F.L. Consulting Engineers on behalf of the two developers.

The investigation consisted of conventional Boreholes, Rotary Core Holes and Trial Pits, with supplementary Dynamic Probes and Percolation Tests.

Geotechnical and Environmental laboratory testing has also been carried out to confirm soil parameters.

STRATIFICATION

The stratification pattern is typical of the Ashbourne and Meath / Dublin area where GLACIAL TILL or BOULDER CLAY forms the overburden with underlying strong LIMESTONE noted at approximately 7.00 metres BGL.

The overburden comprises upper brown or grey brown BOULDER CLAY or ABLATION TILL extending from about 0.50 metres to 2.50 metres BGL. This layer can vary significantly in both strength and composition. Strength can range from soft to stiff, while composition can typically vary from gravelly CLAY or gravelly SILT to clay or silt bound sandy GRAVEL. Isolated bands of granular soil can randomly occur as typified in TP04. Trial excavations in this stratum were generally DRY. Water ingress was however noted in BH01at 1.80 metres BG.

Below the upper brown boulder clay a stratum of very stiff to hard grey-black or black gravelly CLAY is noted. This is BLACK BOULDER CLAY or LODGEMENT TILL and was encountered in both boreholes and in several trial pits generally between about 1.70 and 2.50 metres.

LIMESTONE bedrock has been noted at 7.00 metres BGL in the area of BH01 and BH02 with 3.00 metres of solid core recovered.

The strength and behavioural characteristics of the glacial till in the general area are very well documented and the limited laboratory information from this investigation is consistent with the published data.

This investigation comprised two boreholes / coreholes located at a major structure and seven widely separated locations examined by trial pit and dynamic probe with infiltration characteristics determined by soakaway test.

This report will comment on the findings at the individual locations and indicate allowable bearing pressures available at specific depths.

STRUCTURE AT BH01/BH02

In both borehole locations very stiff black boulder clay has been noted at about 2.50 metres BGL below generally FIRM upper brown boulder clay.

The allowable bearing pressures available in this area on both the upper and lower boulder clay are summarised as follows:

	BH01	**BH02**	
Ground Level (OD)	75.81	72.28	
ABP 100 kN/sq/m.	74.50	71.20	Brown B. Clay
ABP 250 kN/sq.m.	73.30	69.50	Black B. Clay

The allowable bearing pressure in the black boulder clay will increase with penetration depth, 300 kPa is indicated by SPT values in excess of N=40.

TRIAL PIT LOCATIONS SUMMARY DATA

An allowable bearing pressure of 100 kP has been assumed for traditional two storey house construction. The depth to achieve this and permit construction of traditional reinforced strip or pad foundations has been assessed from both Trial Pit data and Heavy-Duty Dynamic Probes and is summarised as follows.

Location	**O.D. Level**	**Founding Depth / OD for 100 kPa.**		**Comment**
TP01	72.37	1.60	70.7	Grey black boulder clay
TP02	72.82	0.50	72.3	Brown Boulder clay
TP03	73.96	0.50	73.5	Poss. weakening @ 73 OD
TP04	78.08	0.50	77.5	Dense Gravel
TP05	71.95	2.50	69.3	Black Boulder clay
TP06	67.42	2.50	64.9	Black Boulder clay
TP07	68.23	0.50	67.7	Poss. weakening @ 67 OD

Given the wide spacing of the trial pits, the variation in ground level and the variation in soil strength and founding depth it is difficult to provide a simplified consistent allowable bearing pressure for the site as a whole.

It is likely that extensive site works will be required involving cut and fill operations, construction of roadways etc.

Further investigation is strongly recommended, ideally using Dynamic Probing at specific houses or groups of houses.

SETTLEMENT

Settlement of foundations placed on the upper brown boulder clay using an allowable bearing pressure of 100 kPa will be of the order of 10 to15 mm. Settlement should be uniform.

Settlement of foundations placed on the hard black boulder clay under 250 kPa loading will be very low (< 5mm)

GROUND WATER

Trial Pit excavations were dry throughout. Water ingress was noted in the boreholes at about 5.00 metres BGL. Standpipes were installed in the boreholes with standing water levels rising to within 2.50 metres of surface.

Water ingress to shallow foundation excavations is not expected, however isolated water bearing gravel pockets or zones can randomly occur.

PERCOLATION

Tests were carried out at the seven trial pit locations with results generally reflection low soil permeability. The results are typical of the local glacial till with one failure recorded.

FOUNDATION CONCRETE

Low Sulphate and Chloride concentrations and near neutral pH values indicate that no special precautions are required to protect foundation below ground concrete from deterioration.

ENVIRONMENTAL

IGSL/JC
August 2022

Summary

The greenfield site is an extensive one with ground levels varying from 67 to 78 metres OD.

The stratification over the development area , comprises GLACIAL TILL or BOULDER CLAY presenting as brown gravelly CLAY overlying black gravelly CLAY. The pattern is typical of Ashbourne, County Meath and North County Dublin, and the characteristics of the glacial soils are well documented.

Brown Boulder CLAY

Below topsoil and superficial material, brown gravelly CLAY has been noted extending from about 0.50 to 2.00 metres. The deposit varies in strength and in composition and foundation recommendations at the specific exploratory locations has been presented in the main report. This suggests that founding depths for conventional housing may range from 0.50 to 2.50 metres, assuming an allowable bearing pressure of 100 Kpa.

Black Boulder Clay

The base black lodgement till is very stiff to hard and suitable for foundation support with an allowable bearing pressure increasing from 200 to 300 kPa with penetration. The hard black clay has been noted at depths between about 1.50 and 2.50 metres. It is readily identified on site and can be difficult to excavate. It is recommended as founding medium for multi storey development or for structures incorporating basements.

Additional Works

We would recommend considering additional site investigation when preliminary site works (cut and fill operations) have been completed.

House specific investigation using heavy duty dynamic probing will accurately establish allowable bearing pressures and recommend foundation depths at individual houses or close groups of houses.

This technique is widely adopted for a high percentage of large-scale housing developments.

Appendix I Boring Records

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**BOREHOLE NO.**	**BH01**
		SHEET	Sheet 1 of 1
CO-ORDINATES	706,400.77 E 751,393.21 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	75.81	**BOREHOLE DEPTH (m)**	5.20
			DATE COMMENCED 19/07/2022
			DATE COMPLETED 21/07/2022
CLIENT	Arnub Ltd and Aspect Homes(ADC)	**SPT HAMMER REF. NO.**	**BORED BY** P.Thomas
ENGINEER	DBFL Consluting Engineers	**ENERGY RATIO (%)**	**PROCESSED BY** F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		75.71	0.10						
	Soft to firm grey/brown sandy SILT/CLAY with occasional gravel				AA175377	B	1.00		N = 10 (1, 2, 2, 2, 3, 3)	
1			74.41	1.40						
	Firm black sandy SILT/CLAY with some gravel				AA175378	B	2.00		N = 11 (2, 2, 2, 3, 3, 3)	
2			73.31	2.50						
	Very stiff to hard black sandy gravelly silty CLAY with occasional cobbles				AA175379	B	3.00		N = 51 (10, 7, 11, 15, 14, 11)	
3										
4					AA175380	B	4.00		N = 49 (9, 10, 10, 11, 14, 14)	
5			70.61	5.20	AA175381	B	5.00		N = 50/75 mm (25, 33, 50)	
	Obstruction End of Borehole at 5.20 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.9	3.2	1.5	
4.8	5.2	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
1.80	1.80	No	2.50	20	Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
21-07-22	5.20	1.00	5.20	50mm SP

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
21-07-22	5.20	Nil	1.20	End of BH

REMARKS CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 24190.GPJ IGSL.GDT 3/8/22

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**BOREHOLE NO.**	**BH02**
		SHEET	Sheet 1 of 1
CO-ORDINATES	706,449.56 E 751,466.48 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	72.28	**BOREHOLE DEPTH (m)**	5.30
		DATE COMMENCED	21/07/2022
		DATE COMPLETED	21/07/2022
CLIENT	Arnub Ltd and Aspect Homes(ADC)	**SPT HAMMER REF. NO.**	
ENGINEER	DBFL Consluting Engineers	**ENERGY RATIO (%)**	
		BORED BY	P.Thomas
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		72.18	0.10						
1	Stiff grey/brown sandy SILT/CLAY with occasional gravel		71.08	1.20	AA175382	B	1.00		N = 24 (3, 5, 5, 6, 6, 7)	
2	Firm grey/brown sandy SILT/CLAY with frequent gravel		69.88	2.40	AA175383	B	2.00		N = 14 (2, 2, 3, 3, 3, 5)	
3	Very stiff to hard black/dark brown sandy silty gravelly CLAY with occasional cobbles				AA175384	B	3.00		N = 35 (3, 5, 6, 9, 9, 11)	
4					AA175385	B	4.00		N = 53 (5, 9, 12, 14, 12, 15)	
5			66.98	5.30	AA175386	B	5.00		N = 50/75 mm (25, 36, 50)	
	Obstruction End of Borehole at 5.30 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.8	5	1	
5.1	5.3	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
21-07-22	5.30	1.00	5.30	50mm SP

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Standing 2hrs on access to site .CAT scanned location and hand dug inspection pit carried out .

Sample Legend

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 24190.GPJ IGSL.GDT 3/8/22

Appendix II Rotary Core Logs Photographs

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24190

CONTRACT Cherry Lane, Ashbourne, Co.Meath

DRILLHOLE NO RC01
SHEET Sheet 1 of 1

CO-ORDINATES

GROUND LEVEL (mOD)

CLIENT

ENGINEER Glanbrind

RIG TYPE Geo405
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

DATE COMMENCED 22/07/2022
DATE COMPLETED 25/07/2022
DRILLED BY IGSL - AK
LOGGED BY D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of CLAY				
1									1.50			
2								SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly CLAY				
3												
4									4.50			
5								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey GRAVEL				
6	6.00								6.00			N = 50/27 mm (25, 50)
7		100	98	87				Very strong to medium strong, medium to thinly bedded, grey/dark grey/black, fine-grained, LIMESTONE (predominantely calci-siltite limestone with subordinate muddy limestone, local stylolites, localised chert formation), slightly weathered. Discontinuities are medium to closely spaced, smooth to locally rough, planar. Apertures are tight to locally moderately open, locally clay-smeared, locally calcite-veined (1-10mm thick). Dips are 20-30° & locally 70-80°.				
8	7.50	100	94	88								
9	9.00								9.00			
								End of Borehole at 9.00 m				

REMARKS

Hole cased 0.00-6.00m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
25-07-22	9.00	6.00	9.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
25-07-22	9.00	6.00	4.00	Water level recorded 5 mins after end of drilling.

IGSL RC FI 10M 24190.GPJ IGSL.GDT 29/7/22

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24190

CONTRACT Cherry Lane, Ashbourne, Co.Meath

DRILLHOLE NO RC02
SHEET Sheet 1 of 1

CO-ORDINATES
GROUND LEVEL (mOD)
CLIENT
ENGINEER Glanbrind

RIG TYPE Geo405
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

DATE COMMENCED 25/07/2022
DATE COMPLETED 26/07/2022
DRILLED BY IGSL - AK
LOGGED BY D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of CLAY				
1									1.50			
2								SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly CLAY				
3												
4												
5									5.00			
6								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey GRAVEL				N = 49 (9, 9, 13, 10, 13, 13)
7	7.50								6.85			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	7.50			N = 50/38 mm (25, 50)
8		100	99	81				Very strong to medium strong, medium to thinly bedded, grey/dark grey/black, fine-grained, LIMESTONE (predominantely calci-siltite limestone with subordinate muddy limestone, local stylolites, localised chert formation), slightly weathered. Discontinuities are medium to closely spaced, smooth to locally rough, planar. Apertures are tight to locally moderately open, locally clay-smeared, locally calcite-veined (1-20mm thick). Dips are 20-30° & locally 70-80°.				
9	9.00							End of Borehole at 9.00 m	9.00			

REMARKS
Hole cased 0.00-6.00m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

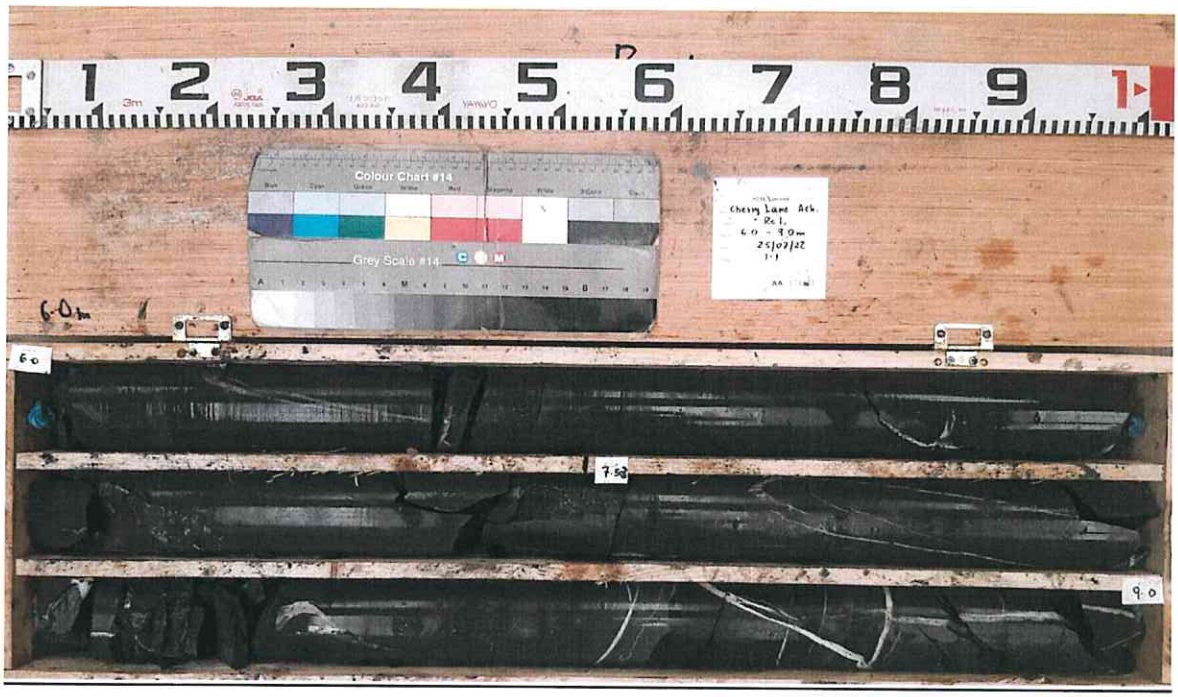
Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
26-07-22	9.00	7.50	8.20	Water level recorded 5 mins after end of drilling.

IGSL RC FI 10M 24190.GPJ IGSL.GDT 29/7/22

RC01 Box 1 of 1 – 6.00-9.00m



RC02 Box 1 of 1 – 7.50-9.00m

Appendix III Trial Pit Records

TRIAL PIT RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**TRIAL PIT NO.**	**TP01**
		SHEET	Sheet 1 of 1
LOGGED BY	T.M	**CO-ORDINATES**	706,377.65 E 751,588.82 N
		DATE STARTED	25/07/2022
		DATE COMPLETED	25/07/2022
CLIENT	Arnub Ltd and Aspect Homes(ADC) LTD	**GROUND LEVEL (m)**	72.37
		EXCAVATION METHOD	JCB
ENGINEER	DBFL Consluting Engineers		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 Topsoil		0.30	72.07						
Firm to stiff greyish brown silty gravelly CLAY.gravel is medium to coarse grained and subrounded					AA137825	B	0.50		
1.0 Soft to firm dark grey gravelly CLAY with high cobble content and boulders		1.00	71.37		AA137826	B	1.20		
Stiff dark grey gravelly CLAY with high cobble content and boulders		1.60	70.77		AA137827	B	1.70		
2.0 Obstruction on boulders End of Trial Pit at 2.50m		2.50	69.87						
3.0									
4.0									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Stopped due to obstruction from boulders

TRIAL PIT RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**TRIAL PIT NO.**	**TP02**
		SHEET	Sheet 1 of 1
LOGGED BY	T.M	**CO-ORDINATES**	706,659.95 E 751,478.08 N
		DATE STARTED	25/07/2022
		DATE COMPLETED	25/07/2022
CLIENT	Arnub Ltd and Aspect Homes(ADC) LTD	**GROUND LEVEL (m)**	72.82
ENGINEER	DBFL Consluting Engineers	**EXCAVATION METHOD**	JCB

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	Topsoil									
	Firm to stiff brown sandy gravelly CLAY with cobbles		0.30	72.52		AA137834	B	0.50		
1.0	Stiff dark brown sandy gravelly CLAY with high cobble content .Cobbles are angular -subangular		1.00	71.82		AA137835	B	1.30		
2.0						AA137836	B	2.30		
3.0	End of Trial Pit at 3.00m		3.00	69.82						
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Maximum required depth reached

IGSL TP LOG 24190.GPJ IGSL.GDT 3/8/22

TRIAL PIT RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**TRIAL PIT NO.**	**TP03**
		SHEET	Sheet 1 of 1
LOGGED BY	T.M	**CO-ORDINATES**	706,467.65 E 751,427.90 N
		DATE STARTED	25/07/2022
		DATE COMPLETED	25/07/2022
CLIENT	Arnub Ltd and Aspect Homes(ADC) LTD	**GROUND LEVEL (m)**	73.96
		EXCAVATION METHOD	JCB
ENGINEER	DBFL Consluting Engineers		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 Topsoil		0.20	73.76						
Firm to stiff brown silty sandy gravelly CLAY.gravel is medium to coarse grained and subangular					AA137831	B	0.50		
1.0 Soft to firm dark brown silty sandy gravelly CLAY with high cobble content		1.00	72.96		AA137832	B	1.20		
2.0					AA137833	B	2.00		
End of Trial Pit at 2.60m		2.60	71.36						
3.0									
4.0									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Stopped due to obstruction from boulders

IGSL TP LOG 24190.GPJ IGSL.GDT 3/8/22

TRIAL PIT RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**TRIAL PIT NO.**	**TP04**
		SHEET	Sheet 1 of 1
LOGGED BY	T.M	**CO-ORDINATES**	706,399.95 E 751,378.28 N
		DATE STARTED	26/07/2022
		DATE COMPLETED	26/07/2022
CLIENT	Arnub Ltd and Aspect Homes(ADC) LTD	**GROUND LEVEL (m)**	78.08
ENGINEER	DBFL Consluting Engineers	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 Topsoil		0.20	77.88						
Brown clayey sandy cobbly bouldery GRAVEL. Gravel is subrounded and medium to coarse grained					AA137828	B	0.50		
1.0					AA137829	B	1.30		
2.0 End of Trial Pit at 2.20m		2.20	75.88		AA137830	B	2.20		
3.0									
4.0									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Stopped due to obstruction from boulders

IGSL TP LOG 24190.GPJ IGSL.GDT 3/8/22

TRIAL PIT RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**TRIAL PIT NO.**	**TP05**
		SHEET	Sheet 1 of 1
LOGGED BY	T.M	**CO-ORDINATES**	706,465.30 E 751,254.17 N
		DATE STARTED	26/07/2022
		DATE COMPLETED	26/07/2022
CLIENT	Arnub Ltd and Aspect Homes(ADC) LTD	**GROUND LEVEL (m)**	71.95
		EXCAVATION METHOD	JCB
ENGINEER	DBFL Consluting Engineers		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (kPa)	Hand Penetrometer (kPa)
0.0 Topsoil		0.40	71.55						
Stiff dark brown to black silty sandy gravelly CLAY		0.80	71.15		AA137844	B	0.60		
Very soft dark brown to black silty sandy gravelly CLAY		1.90	70.05		AA137845	B	1.60		
Firm brownish black silty sandy gravelly CLAY with cobbles and boulders		2.60	69.35		AA137846	B	2.60		
Very stiff brownish black silty sandy gravelly CLAY with cobbles and boulders		3.00	68.95						
End of Trial Pit at 3.00m									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Maximum required depth reached

IGSL TP LOG 24190.GPJ IGSL.GDT 3/8/22

TRIAL PIT RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	TRIAL PIT NO.	TP06
		SHEET	Sheet 1 of 1
LOGGED BY	T.M	CO-ORDINATES	706,523.70 E 751,164.09 N
		DATE STARTED	26/07/2022
		DATE COMPLETED	26/07/2022
CLIENT	Amub Ltd and Aspect Homes(ADC) LTD	GROUND LEVEL (m)	67.42
ENGINEER	DBFL Consluting Engineers	EXCAVATION METHOD	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 Topsoil		0.40	67.02						
Very soft grey brown silty slighlty gravelly CLAY					AA137840	B	0.60		
					AA137841	B	1.50		
				(Slow)					
Very stiff dark brown silty sandy gravelly CLAY with high cobble content		2.60	64.82		AA137842	B	2.50		
End of Trial Pit at 3.10m		3.10	64.32		AA137843	B	3.00		

1.0
2.0
3.0
4.0

Groundwater Conditions
Wet

Stability
Moderate

General Remarks
Maximum required depth reached,hole collapsing

IGSL TP LOG 24190.GPJ IGSL.GDT 3/8/22

TRIAL PIT RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**TRIAL PIT NO.**	**TP07**
		SHEET	Sheet 1 of 1
LOGGED BY	T.M	**CO-ORDINATES**	706,590.04 E 751,075.86 N
		DATE STARTED	26/07/2022
		DATE COMPLETED	26/07/2022
CLIENT	Arnub Ltd and Aspect Homes(ADC) LTD	**GROUND LEVEL (m)**	68.23
ENGINEER	DBFL Consluting Engineers	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (kPa)	Hand Penetrometer (kPa)
0.0 Topsoil		0.30	67.93						
Firm to stiff brown silty sandy gravelly CLAY with cobbles and angular boulders.gravel is medium to coarse grained					AA137837	B	0.50		
1.0 Soft to firm brown to black silty sandy gravelly CLAY with high cobble content		1.10	67.13						
					AA137838	B	1.50		
					AA137839	B	2.50		
3.0 End of Trial Pit at 3.00m		3.00	65.23						
4.0									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Maximum required depth reached

IGSL TP LOG 24190.GPJ IGSL.GDT 3/8/22

Appendix IV Dynamic Probes

DYNAMIC PROBE RECORD

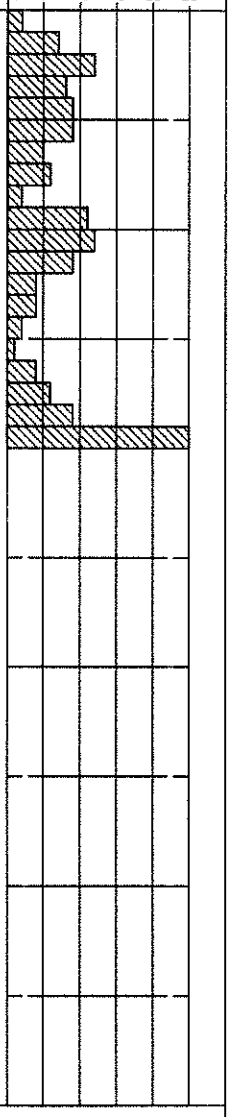
REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**PROBE NO.**	**DP01**
		SHEET	Sheet 1 of 1
CO-ORDINATES	706,377.65 E 751,588.82 N	**DATE DRILLED**	25/07/2022
GROUND LEVEL (mOD)	72.37	**DATE LOGGED**	25/07/2022
HAMMER MASS (kg)	50		
CLIENT	Arnub Ltd and Aspect Homes(ADC) LTD	**INCREMENT SIZE (mm)**	100
ENGINEER	DBFL Consluting Engineers	**FALL HEIGHT (mm)**	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water
0.0	.		0.00		
1.0					
2.0	End of Probe at 2.00 m			70.37	
3.0					
4.0					

Depth (m)	Probe Readings (Blows/Increment)
0.00	2
0.10	7
0.20	12
0.30	8
0.40	9
0.50	9
0.60	5
0.70	6
0.80	2
0.90	11
1.00	12
1.10	9
1.20	4
1.30	4
1.40	2
1.50	1
1.60	4
1.70	6
1.80	9
1.90	25

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24190.GPJ IGSL.GDT 3/8/22

DYNAMIC PROBE RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**PROBE NO.**	**DP02**
		SHEET	Sheet 1 of 1
CO-ORDINATES	706,659.95 E 751,478.08 N	**DATE DRILLED**	25/07/2022
GROUND LEVEL (mOD)	72.82	**DATE LOGGED**	25/07/2022
CLIENT	Arnub Ltd and Aspect Homes(ADC) LTD	**HAMMER MASS (kg)**	50
ENGINEER	DBFL Consluting Engineers	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.		0.00			0.00	3
						0.10	8
						0.20	9
						0.30	12
						0.40	9
						0.50	12
						0.60	12
						0.70	15
						0.80	11
1.0						0.90	13
						1.00	12
						1.10	11
						1.20	11
						1.30	13
						1.40	10
						1.50	25
	End of Probe at 1.60 m			71.22			
2.0							
3.0							
4.0							

Graphic Probe Record

0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24190.GPJ IGSL.GDT 3/8/22

DYNAMIC PROBE RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**PROBE NO.**	**DP03**
		SHEET	Sheet 1 of 1
CO-ORDINATES	706,467.65 E 751,427.90 N	**DATE DRILLED**	25/07/2022
GROUND LEVEL (mOD)	73.96	**DATE LOGGED**	25/07/2022
CLIENT	Arnub Ltd and Aspect Homes(ADC) LTD	**HAMMER MASS (kg)**	50
ENGINEER	DBFL Consluting Engineers	**INCREMENT SIZE (mm)**	100
		FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.		0.00			0.00	1
						0.10	8
						0.20	18
						0.30	21
						0.40	18
						0.50	18
						0.60	22
						0.70	22
						0.80	21
						0.90	19
1.0						1.00	23
						1.10	25
	End of Probe at 1.20 m			72.76			
2.0							
3.0							
4.0							

Graphic Probe Record

0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24190.GPJ IGSL.GDT 3/8/22

DYNAMIC PROBE RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**PROBE NO.**	**DP04**
		SHEET	Sheet 1 of 1
CO-ORDINATES	706,399.95 E 751,378.28 N	**DATE DRILLED**	25/07/2022
GROUND LEVEL (mOD)	78.08	**DATE LOGGED**	25/07/2022
HAMMER MASS (kg)	50		
CLIENT	Arnub Ltd and Aspect Homes(ADC) LTD	**INCREMENT SIZE (mm)**	100
ENGINEER	DBFL Consluting Engineers	**FALL HEIGHT (mm)**	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/increment)
0.0	.		0.00			0.00	1
						0.10	6
						0.20	11
						0.30	18
						0.40	16
						0.50	14
						0.60	20
						0.70	22
1.0						0.80	21
						0.90	20
						1.00	22
						1.10	25
	End of Probe at 1.20 m			76.88			
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24190.GPJ IGSL.GDT 3/8/22

DYNAMIC PROBE RECORD

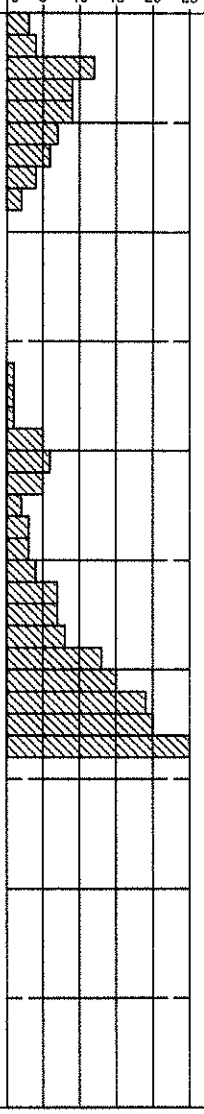
REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**PROBE NO.**	**DP05**
		SHEET	Sheet 1 of 1
CO-ORDINATES	706,465.30 E 751,254.17 N	**DATE DRILLED**	25/07/2022
GROUND LEVEL (mOD)	71.95	**DATE LOGGED**	25/07/2022
HAMMER MASS (kg)	50		
CLIENT	Arnub Ltd and Aspect Homes(ADC) LTD	**INCREMENT SIZE (mm)**	100
ENGINEER	DBFL Consluting Engineers	**FALL HEIGHT (mm)**	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water
0.0	.		0.00		
3.40	End of Probe at 3.40 m			68.55	

Depth (m)	Probe Readings (Blows/Increment)
0.00	3
0.10	4
0.20	12
0.30	9
0.40	9
0.50	7
0.60	6
0.70	4
0.80	2
0.90	0
1.00	0
1.10	0
1.20	0
1.30	0
1.40	0
1.50	0
1.60	1
1.70	1
1.80	1
1.90	5
2.00	6
2.10	5
2.20	2
2.30	3
2.40	3
2.50	4
2.60	7
2.70	7
2.80	8
2.90	13
3.00	15
3.10	19
3.20	20
3.30	25

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24190.GPJ IGSL.GDT 3/8/22

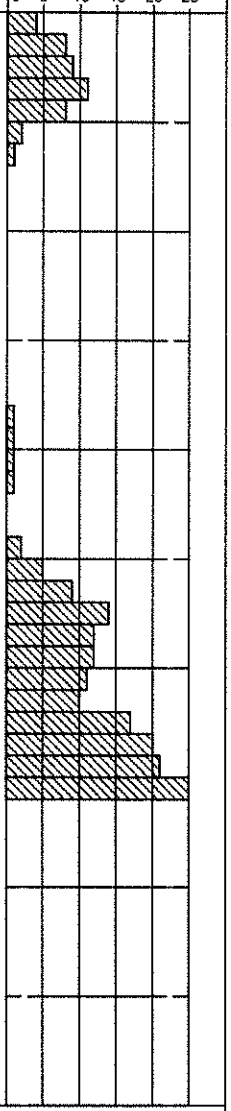
DYNAMIC PROBE RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**PROBE NO.**	**DP06**
		SHEET	Sheet 1 of 1
CO-ORDINATES	706,523.70 E 751,164.09 N	**DATE DRILLED**	25/07/2022
GROUND LEVEL (mOD)	67.42	**DATE LOGGED**	25/07/2022
HAMMER MASS (kg)	50		
CLIENT	Arnub Ltd and Aspect Homes(ADC) LTD	**INCREMENT SIZE (mm)**	100
ENGINEER	DBFL Consluting Engineers	**FALL HEIGHT (mm)**	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water
0.0	.		0.00		
	End of Probe at 3.60 m			63.82	

Depth (m)	Probe Readings (Blows/Increment)
0.00	4
0.10	8
0.20	9
0.30	11
0.40	8
0.50	2
0.60	1
0.70	0
0.80	0
0.90	0
1.00	0
1.10	0
1.20	0
1.30	0
1.40	0
1.50	0
1.60	0
1.70	0
1.80	1
1.90	1
2.00	1
2.10	1
2.20	0
2.30	0
2.40	2
2.50	5
2.60	9
2.70	14
2.80	12
2.90	12
3.00	11
3.10	10
3.20	17
3.30	20
3.40	21
3.50	25



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24190.GPJ IGSL.GDT 3/8/22

DYNAMIC PROBE RECORD

REPORT NUMBER 24190

CONTRACT	Cherry Lane Ashbourne	**PROBE NO.**	**DP07**
		SHEET	Sheet 1 of 1
CO-ORDINATES	706,590.04 E 751,075.86 N	**DATE DRILLED**	25/07/2022
GROUND LEVEL (mOD)	68.23	**DATE LOGGED**	25/07/2022
HAMMER MASS (kg)	50		
CLIENT	Arnub Ltd and Aspect Homes(ADC) LTD	**INCREMENT SIZE (mm)**	100
ENGINEER	DBFL Consluting Engineers	**FALL HEIGHT (mm)**	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.		0.00			0.00	2
						0.10	10
						0.20	13
						0.30	18
						0.40	14
						0.50	14
						0.60	16
						0.70	16
						0.80	17
1.0						0.90	19
						1.00	19
						1.10	25
	End of Probe at 1.20 m			67.03			
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24190.GPJ IGSL.GDT 3/8/22

Appendix V Percolation Tests

Soakaway Design f -value from field tests (F2C) IGSL

Contract: Ashbourne,Cherry Lane Contract No. 24190
Test No. SA01
Client Arnub Ltd and Aspect Homes(ACD) Ltd
Date: 25/07/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	Topsoil	Dry
0.30	1.00	Greyish brown silty gravelly CLAY	
1.00	1.80	Dark grey gravelly CLAY with high cobble content and boulders	

Notes:

Field Data

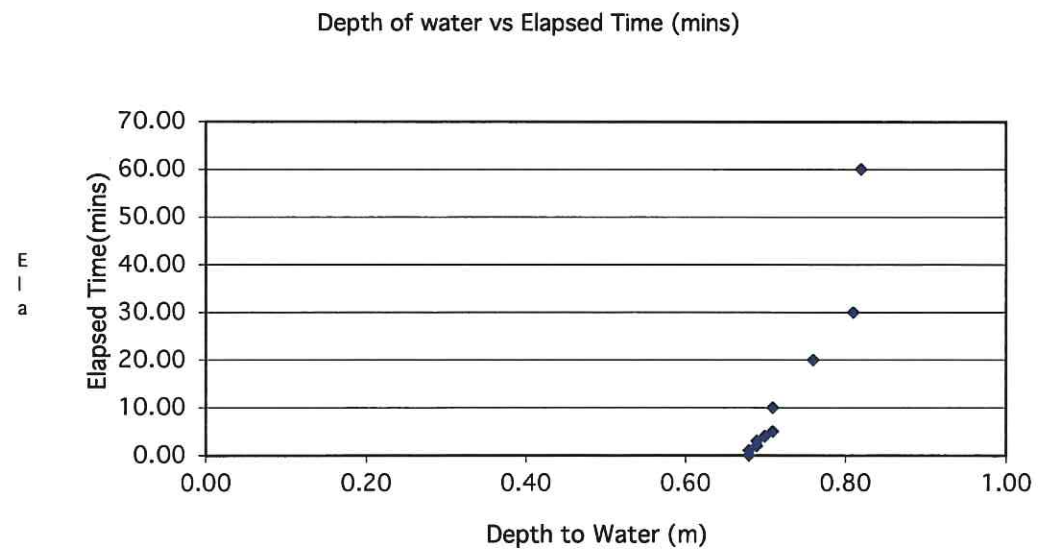
Depth to Water (m)	Elapsed Time (min)
0.68	0.00
0.68	1.00
0.69	2.00
0.69	3.00
0.70	4.00
0.71	5.00
0.71	10.00
0.76	20.00
0.81	30.00
0.82	60.00

Field Test

Depth of Pit (D)	1.80	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.65	m
Initial depth to Water =	0.68	m
Final depth to water =	0.82	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.66	m2
*Av. side area of permeable stratum over test perio	4.305	m2
Total Exposed area =	4.965	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00031 m/min or 5.17E-06 m/sec



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Ashbourne,Cherry Lane Contract No. 24190
Test No. SA02
Client Arnub Ltd and Aspect Homes(ACD) Ltd
Date: 25/07/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	Topsoil	Dry
0.30	1.00	Firm brown sandy gravelly CLAY with cobbles	
1.00	1.50	Firm to stiff dark brown sandy gravelly CLAY with cobbles	

Notes:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.48	0.00
0.48	1.00
0.49	2.00
0.49	3.00
0.49	4.00
0.49	5.00
0.50	10.00
0.50	20.00
0.51	30.00
0.53	60.00
0.54	90.00
0.56	120.00

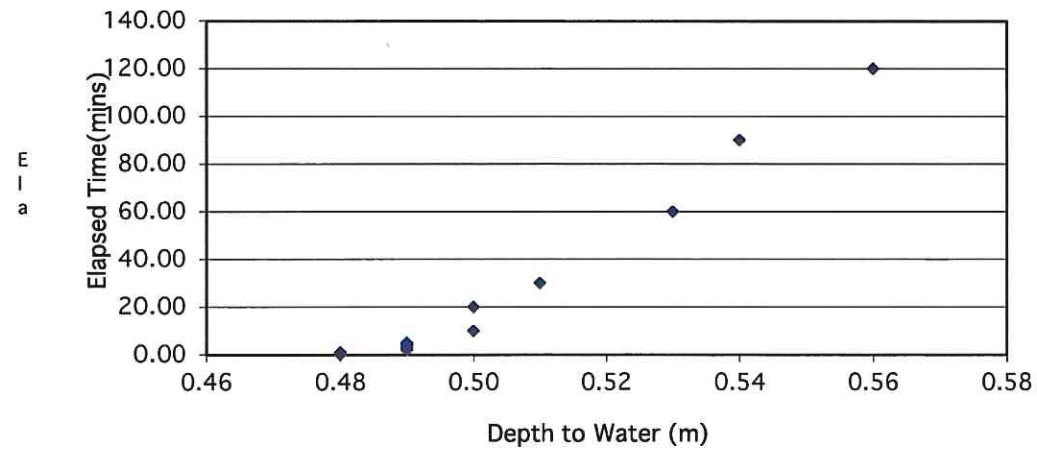
Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.37	m
Length of Pit (L)	1.60	m
Initial depth to Water =	0.48	m
Final depth to water =	0.56	m
Elapsed time (mins)=	120.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.592	m2
*Av. side area of permeable stratum over test perio	3.8612	m2
Total Exposed area =	4.4532	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 8.9E-05 m/min or 1.477E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Ashbourne,Cherry Lane Contract No. 24190
Test No. SA03
Client Arnub Ltd and Aspect Homes(ACD) Ltd
Date: 25/07/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Topsoil	Dry
0.20	1.00	Brown silty sandy gravelly CLAY	
1.00	1.50	Dark brown silty sandy gravelly CLAY with high cobble content	

Notes:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.70	0.00
0.71	1.00
0.73	2.00
0.75	3.00
0.77	4.00
0.79	5.00
0.84	10.00
0.86	20.00
0.88	30.00
0.94	60.00

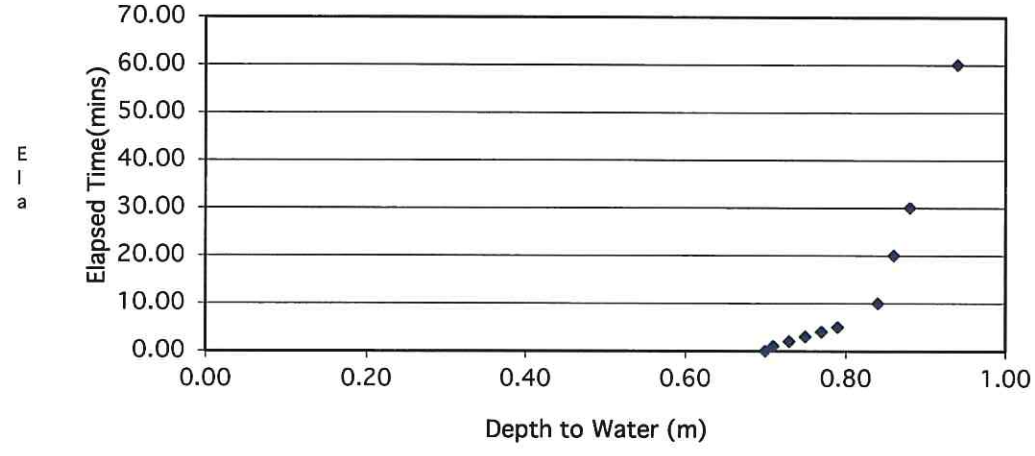
Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.55	m
Initial depth to Water =	0.70	m
Final depth to water =	0.94	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.62	m2
*Av. side area of permeable stratum over test perio	2.652	m2
Total Exposed area =	3.272	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00076 m/min or 1.263E-05 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Ashbourne,Cherry Lane Contract No. 24190
Test No. SA04
Client Arnub Ltd and Aspect Homes(ACD) Ltd
Date: 26/07/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Topsoil	Dry
0.20	1.50	Brown clayey sandy cobbly bouldery GRAVEL	

Notes:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.83	0.00
0.84	1.00
0.85	2.00
0.87	3.00
0.88	4.00
0.88	5.00
0.90	10.00
0.95	20.00
0.96	30.00
1.00	60.00
1.06	90.00

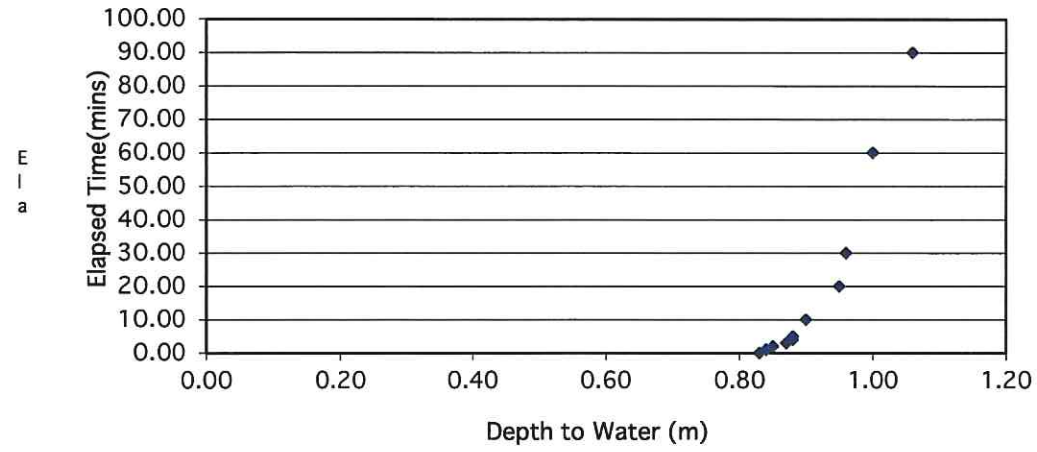
Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.60	m
Initial depth to Water =	0.83	m
Final depth to water =	1.06	m
Elapsed time (mins)=	90.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.64	m2
*Av. side area of permeable stratum over test perio	2.22	m2
Total Exposed area =	2.86	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00057 m/min or 9.531E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Ashbourne,Cherry Lane Contract No. 24190
Test No. SA05
Client Arnub Ltd and Aspect Homes(ACD) Ltd
Date: 26/07/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.40	Topsoil	Dry
0.40	1.50	Stiff dark brown to black silty sandy gravelly CLAY	

Notes:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.60	0.00
0.60	1.00
0.60	2.00
0.61	3.00
0.61	4.00
0.62	5.00
0.63	10.00
0.64	20.00
0.68	30.00
0.75	60.00
0.76	90.00

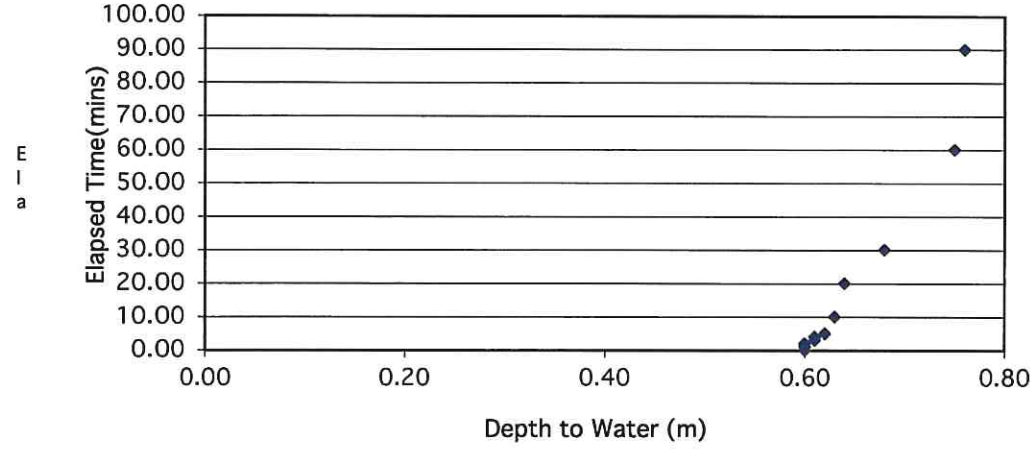
Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.50	m
Initial depth to Water =	0.60	m
Final depth to water =	0.76	m
Elapsed time (mins)=	90.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.6	m2
*Av. side area of permeable stratum over test perio	3.116	m2
Total Exposed area =	3.716	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00029 m/min or 4.784E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Ashbourne,Cherry Lane Contract No. 24190
Test No. SA06
Client Arnub Ltd and Aspect Homes(ACD) Ltd
Date: 26/07/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.40	Topsoil	
0.40	1.10	Grey brown silty slighlty gravelly CLAY	Seepage at 1.8m
1.10	1.80	Dark brown silty CLAY	

Notes: Seepage at 1.8m

Field Data

Depth to Water (m)	Elapsed Time (min)
1.00	0.00
1.00	1.00
1.00	2.00
0.99	3.00
0.99	4.00
0.99	5.00
0.98	10.00
0.96	20.00
0.94	30.00
0.92	60.00
0.92	90.00

Field Test

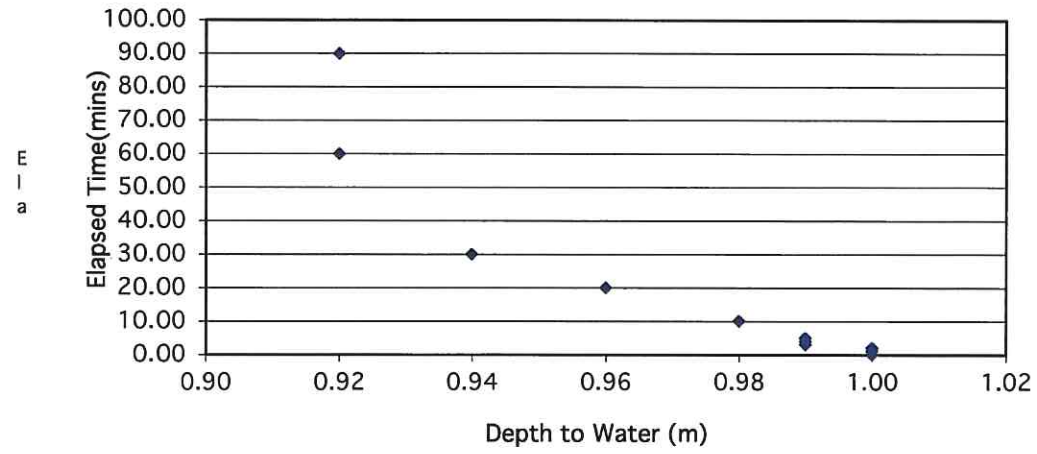
Depth of Pit (D)	1.80	m
Width of Pit (B)	0.37	m
Length of Pit (L)	1.60	m
Initial depth to Water =	1.00	m
Final depth to water =	0.92	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.592	m2
*Av. side area of permeable stratum over test perio	3.3096	m2
Total Exposed area =	3.9016	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec

Water level rose during test

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Ashbourne,Cherry Lane Contract No. 24190
Test No. SA07
Client Arnub Ltd and Aspect Homes(ACD) Ltd
Date: 26/07/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	Topsoil	Dry
0.30	1.10	Brown silty sandy gravelly CLAY with cobbles and angular boulders	
1.10	1.50	Brown to black silty sandy gravelly CLAY with high cobble content	

Notes:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.80	0.00
0.80	1.00
0.81	2.00
0.82	3.00
0.83	4.00
0.83	5.00
0.84	10.00
0.85	20.00
0.86	30.00
0.87	60.00
0.88	90.00

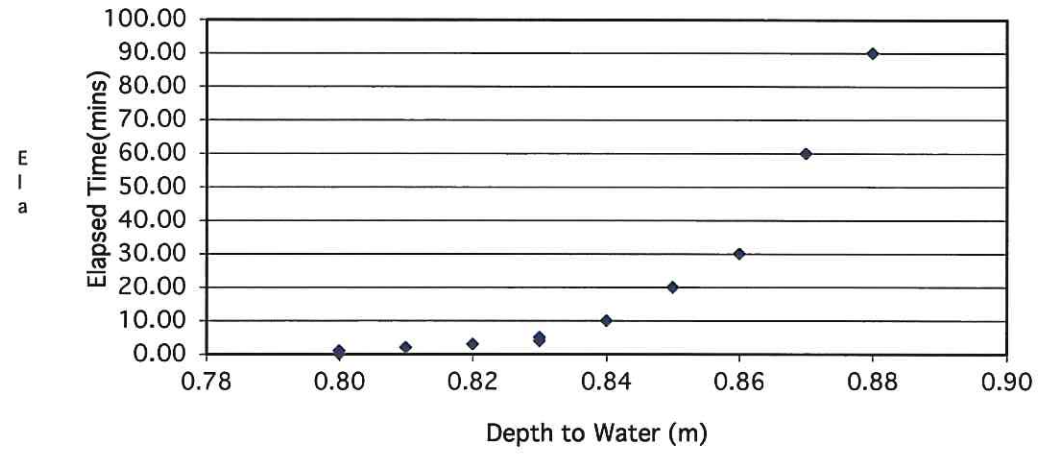
Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.60	m
Initial depth to Water =	0.80	m
Final depth to water =	0.88	m
Elapsed time (mins)=	90.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.64	m2
*Av. side area of permeable stratum over test perio	2.64	m2
Total Exposed area =	3.28	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00017 m/min or 2.891E-06 m/sec

Depth of water vs Elapsed Time (mins)



Appendix VI Laboratory Data

a. Geotechnical / Rock Tests

IGSL Ltd
Materials Laboratory
Unit J5, M7 Business Park
Newhall, Naas
Co. Kildare
045 846176

Test Report

Determination of Moisture Content, Liquid & Plastic Limits

Tested in accordance with BS1377:Part 2:1990, clauses 3.2, 4.3, 4.4 & 5.3**

Report No. **R137361** Contract No. 24190 Contract Name: Cherry Lane Ashbourne Meath

Customer DBFL

Samples Received: 11/08/22 Date Tested: 11/08/22

BH/TP*	Sample No.	Depth* (m)	Lab. Ref	Sample Type*	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Preparation	Liquid Limit Clause	Classification (BS5930)	Description
BH01	AA175378	2.0	A22/4516	B	13	33	17	16	53	WS	4.4	C L	Grey brown sandy gravelly CLAY
BH01	AA175380	4.0	A22/4517	B	7.2	25	14	11	31	WS	4.4	C L	Grey brown slightly sandy, gravelly, CLAY
BH02	AA175382	1.0	A22/4518	B	7.9	29	15	14	57	WS	4.4	C L	Brown sandy gravelly CLAY
BH02	AA175284	3.0	A22/4519	B	8.0	28	15	13	56	WS	4.4	C L	Grey brown slightly sandy, gravelly, CLAY
TP01	AA137826	1.2	A22/4520	B	16	31	17	14	60	WS	4.4	C L	Brown sandy gravelly CLAY
TP05	AA137845	1.6	A22/4521	B	21	38	21	17	77	WS	4.4	C I	Brown sandy gravelly CLAY
TP06	AA137841	1.5	A22/4522	B	23	28	15	13	95	WS	4.4	C L	Brown sandy gravelly CLAY

Preparation: WS - Wet sieved
AR - As received
NP - Non plastic

Liquid Limit Clause: 4.3 Cone Penetrometer definitive method
4.4 Cone Penetrometer one point method

Sample Type: B - Bulk Disturbed
U - Undisturbed

Remarks:
Results relate only to the specimen tested,in as received condition unless otherwise noted.
NOTE: **These clauses have been superceded by EN 17892-1 and EN17892-12.
Opinions and interpretations are outside the scope of accreditation. * denotes Customer supplied information.
This report shall not be reproduced except in fullwithout written approval from the Laboratory.

IGSL Ltd Materials Laboratory

Persons authorized to approve reports
H Byrne (Laboratory Manager)

Approved by | Date: 18/08/22 | Page: 1 of 1

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**

(note: Sedimentation stage not accredited)

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1331

particle size	% passing	
75	100	COBBLES
63	100	
50	71	GRAVEL
37.5	66	
28	64	
20	60	
14	57	
10	53	
6.3	49	
5	47	
3.35	43	
2	40	
1.18	36	SAND
0.6	33	
0.425	31	
0.3	29	
0.15	26	
0.063	23	SILT/CLAY
0.037	20	
0.027	18	
0.017	17	
0.010	15	
0.007	14	
0.005	13	
0.001	10	

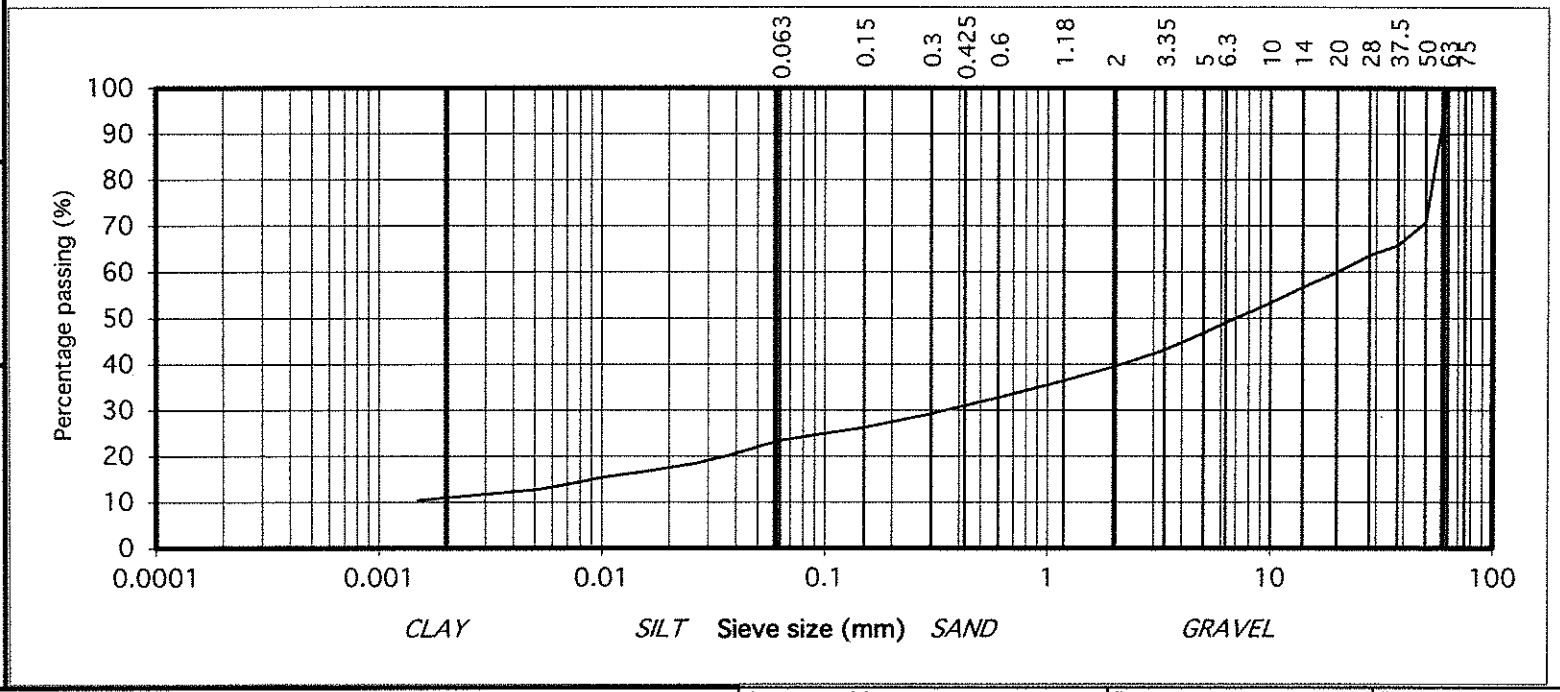
Contract No.	24190	Report No.	R137362	
Contract Name :	Cherry Lane Ashbourne Meath			
BH/TP* :	Bh01			
Sample No.*	AA175380	Lab. Sample No.		A22/4517
Sample Type:	B			
Depth* (m)	4m	Customer:	DBFL	
Date Received	11/08/2022	Date Testing started		11/08/2022
Description:	Grey brown slightly sandy, gravelly, CLAY			

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.

This report shall not be reproduced except in full without the written approval of the Laboratory.

Remarks

Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
	18/08/22	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

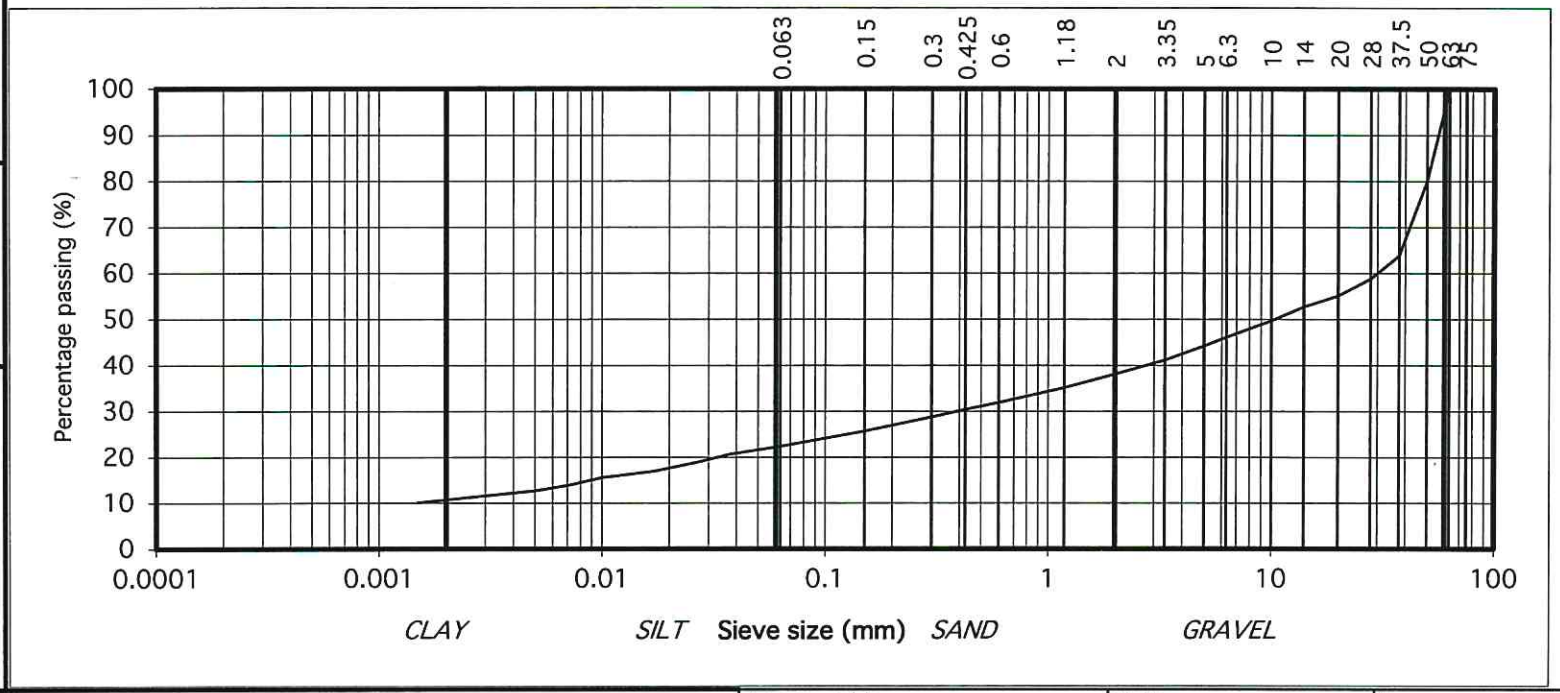
ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	80	GRAVEL
37.5	64	
28	59	
20	55	
14	53	
10	50	
6.3	46	
5	44	
3.35	41	
2	38	
1.18	35	SAND
0.6	32	
0.425	30	
0.3	29	
0.15	26	
0.063	22	SILT/CLAY
0.037	21	
0.027	19	
0.017	17	
0.010	16	
0.007	14	
0.005	13	
0.001	10	

Contract No.	24190	Report No.	R137363	
Contract Name :	Cherry Lane Ashbourne Meath			
BH/TP* :	Bh02			
Sample No.*	AA175384	Lab. Sample No.		A22/4520
Sample Type:	B			
Depth* (m)	3m	Customer:	DBFL	
Date Received	11/08/2022	Date Testing started		11/08/2022
Description:	Grey brown slightly sandy, gravelly, CLAY			

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
This report shall not be reproduced except in full without the written approval of the Laboratory.

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
	18/08/22	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA

Contract: Cherry Lane, Ashbourne, Co.Meath
Contract no. 24190
Date of test: 29/7/22

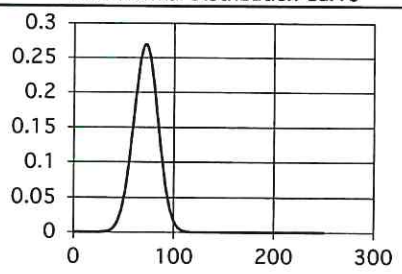
Sample Type: Core

RC No.	Depth m	D (Diameter) mm	P (failure load) kN	F	Is (index strength) Mpa	Is(50) (index strength) Mpa	*UCS MPa	Type	Orienation
RC01	6.2	78	16.0	1.222	2.63	3.21	64	d	//
	6.7	78	19.0	1.222	3.12	3.81	76	d	//
	7.6	78	20.0	1.222	3.29	4.02	80	d	//
	7.7	78	15.0	1.222	2.47	3.01	60	d	//
	8.5	78	14.0	1.222	2.30	2.81	56	d	//
RC02	7.9	78	23.0	1.222	3.78	4.62	92	d	//
	8.1	78	19.0	1.222	3.12	3.81	76	d	//
	8.7	78	17.0	1.222	2.79	3.41	68	d	//

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	8	8
Minimum	2.81	56
Average	3.59	72
Maximum	4.62	92
Standard Dev.	0.59	12
Upper 95% Confidence Limit	4.75	94.99
Lower 95% Confidence Limit	2.43	48.57

Comments:
*UCS taken as k x Point Load Is(50): k= 20

*UCS Normal Distribution Curve



Abbreviations

i	irregular
a	axial
b	block
d	diametral

approx. orientation to planes of weakness/bedding

U	unknown
P	perpendicular
//	parallel

Appendix VI Laboratory Data

b. Environmental and Chemical

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

Final Report

Report No.:	22-31079-1		
Initial Date of Issue:	23-Aug-2022		
Client	IGSL		
Client Address:	M7 Business Park Naas County Kildare Ireland		
Contact(s):	Darren Keogh		
Project	24190 Cherry Lane Ashbourne Meath (DBFL - Glanbrind)		
Quotation No.:	Q20-19951	**Date Received:**	15-Aug-2022
Order No.:		**Date Instructed:**	15-Aug-2022
No. of Samples:	4		
Turnaround (Wkdays):	7	**Results Due:**	23-Aug-2022
Date Approved:	23-Aug-2022		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Results - Leachate

Project: 24190 Cherry Lane Ashbourne Meath (DBFL - Glanbrind)

Client: IGSL				Chemtest Job No.:		22-31079	22-31079
Quotation No.: Q20-19951				Chemtest Sample ID.:		1487865	1487868
				Client Sample ID.:		175377	137831
				Sample Location:		BH1	TP3
				Sample Type:		SOIL	SOIL
				Top Depth (m):		1.00	0.50
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**		
pH	U	1010	10:1		N/A	8.1	8.2
Ammonium	U	1220	10:1	mg/l	0.050	< 0.050	0.087
Ammonium	N	1220	10:1	mg/kg	0.10	0.50	0.94
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010

Results - Soil

Project: 24190 Cherry Lane Ashbourne Meath (DBFL - Glanbrind)

Client: IGSL				Chemtest Job No.:	22-31079	22-31079	22-31079	22-31079
Quotation No.: Q20-19951				Chemtest Sample ID.:	1487865	1487866	1487867	1487868
				Client Sample ID.:	175377	175378	137826	137831
				Sample Location:	BH1	BH1	TP1	TP3
				Sample Type:	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.00	2.00	1.20	0.50
				Asbestos Lab:	DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
ACM Type	U	2192		N/A	-			-
Asbestos Identification	U	2192		N/A	No Asbestos Detected			No Asbestos Detected
Moisture	N	2030	%	0.020	14	10	9.8	3.0
pH (2.5:1)	N	2010		4.0		[A] 9.2	[A] 9.0	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40			[A] < 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010		[A] < 0.010	[A] < 0.010	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		[A] < 0.010	[A] < 0.010	
Total Sulphur	U	2175	%	0.010		[A] 0.16	[A] 0.11	
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Chloride (Water Soluble)	U	2220	g/l	0.010		[A] < 0.010	[A] < 0.010	
Nitrate (Water Soluble)	N	2220	g/l	0.010		< 0.010	< 0.010	
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50			[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 4.4			[A] 1.5
Ammonium (Water Soluble)	U	2220	g/l	0.01		< 0.01	< 0.01	
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.024	[A] 0.026	[A] 0.027	[A] 0.024
Arsenic	U	2455	mg/kg	0.5	8.3			12
Barium	U	2455	mg/kg	0	74			44
Cadmium	U	2455	mg/kg	0.10	1.2			2.0
Chromium	U	2455	mg/kg	0.5	13			14
Molybdenum	U	2455	mg/kg	0.5	3.6			4.5
Antimony	N	2455	mg/kg	2.0	< 2.0			2.4
Copper	U	2455	mg/kg	0.50	16			28
Mercury	U	2455	mg/kg	0.05	< 0.05			0.10
Nickel	U	2455	mg/kg	0.50	33			41
Lead	U	2455	mg/kg	0.50	12			17
Selenium	U	2455	mg/kg	0.25	0.77			1.7
Zinc	U	2455	mg/kg	0.50	53			57
Chromium (Trivalent)	N	2490	mg/kg	1.0	13			14
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50			< 0.50
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10			< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0

Results - Soil

Project: 24190 Cherry Lane Ashbourne Meath (DBFL - Glanbrind)

Client: IGSL				Chemtest Job No.:	22-31079	22-31079	22-31079	22-31079
Quotation No.: Q20-19951				Chemtest Sample ID.:	1487865	1487866	1487867	1487868
				Client Sample ID.:	175377	175378	137826	137831
				Sample Location:	BH1	BH1	TP1	TP3
				Sample Type:	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.00	2.00	1.20	0.50
				Asbestos Lab:	DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0			[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0			[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10			[A] < 10
Benzene	U	2760	µg/kg	1.0	[A] < 1.0			[A] < 1.0
Toluene	U	2760	µg/kg	1.0	[A] < 1.0			[A] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0			[A] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0			[A] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0			[A] < 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[A] < 1.0			[A] < 1.0
Naphthalene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Fluorene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Pyrene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Coronene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] < 0.20			[A] < 0.20
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010

Results - Soil

Project: 24190 Cherry Lane Ashbourne Meath (DBFL - Glanbrind)

Client: IGSL				Chemtest Job No.:	22-31079	22-31079	22-31079	22-31079
Quotation No.: Q20-19951				Chemtest Sample ID.:	1487865	1487866	1487867	1487868
				Client Sample ID.:	175377	175378	137826	137831
				Sample Location:	BH1	BH1	TP1	TP3
				Sample Type:	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.00	2.00	1.20	0.50
				Asbestos Lab:	DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10			< 0.10

Results - Single Stage WAC

Project: 24190 Cherry Lane Ashbourne Meath (DBFL - Glanbrind)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-31079						
Chemtest Sample ID:	1487865						
Sample Ref:							
Sample ID:	175377				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample Location:	BH1						
Top Depth(m):	1.00						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] < 0.20	3	5	6
Loss On Ignition	2610	U	%	3.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		9.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0050	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0005	0.0045	0.5	2	25
Barium	1455	U	0.005	0.051	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0011	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0074	0.074	0.5	10	30
Nickel	1455	U	0.0008	0.0080	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0008	0.0077	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.025	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.48	4.8	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	65	650	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	17	170	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	14

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24190 Cherry Lane Ashbourne Meath (DBFL - Glanbrind)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-31079						
Chemtest Sample ID:	1487868						
Sample Ref:							
Sample ID:	137831				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample Location:	TP3						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	[A] 0.53	3	5	6
Loss On Ignition	2610	U	%	2.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		9.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.010	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0004	0.0039	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0020	0.020	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0026	0.026	0.5	10	30
Nickel	1455	U	0.0009	0.0086	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0006	0.0064	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.025	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.33	3.3	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	60	600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	16	160	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	3.0

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1487865		175377	BH1		A	Amber Glass 250ml
1487865		175377	BH1		A	Plastic Tub 500g
1487866		175378	BH1		A	Amber Glass 250ml
1487866		175378	BH1		A	Plastic Tub 500g
1487867		137826	TP1		A	Amber Glass 250ml
1487867		137826	TP1		A	Plastic Tub 500g
1487868		137831	TP3		A	Amber Glass 250ml
1487868		137831	TP3		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurement by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

Test Methods

SOP	Title	Parameters included	Method summary
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

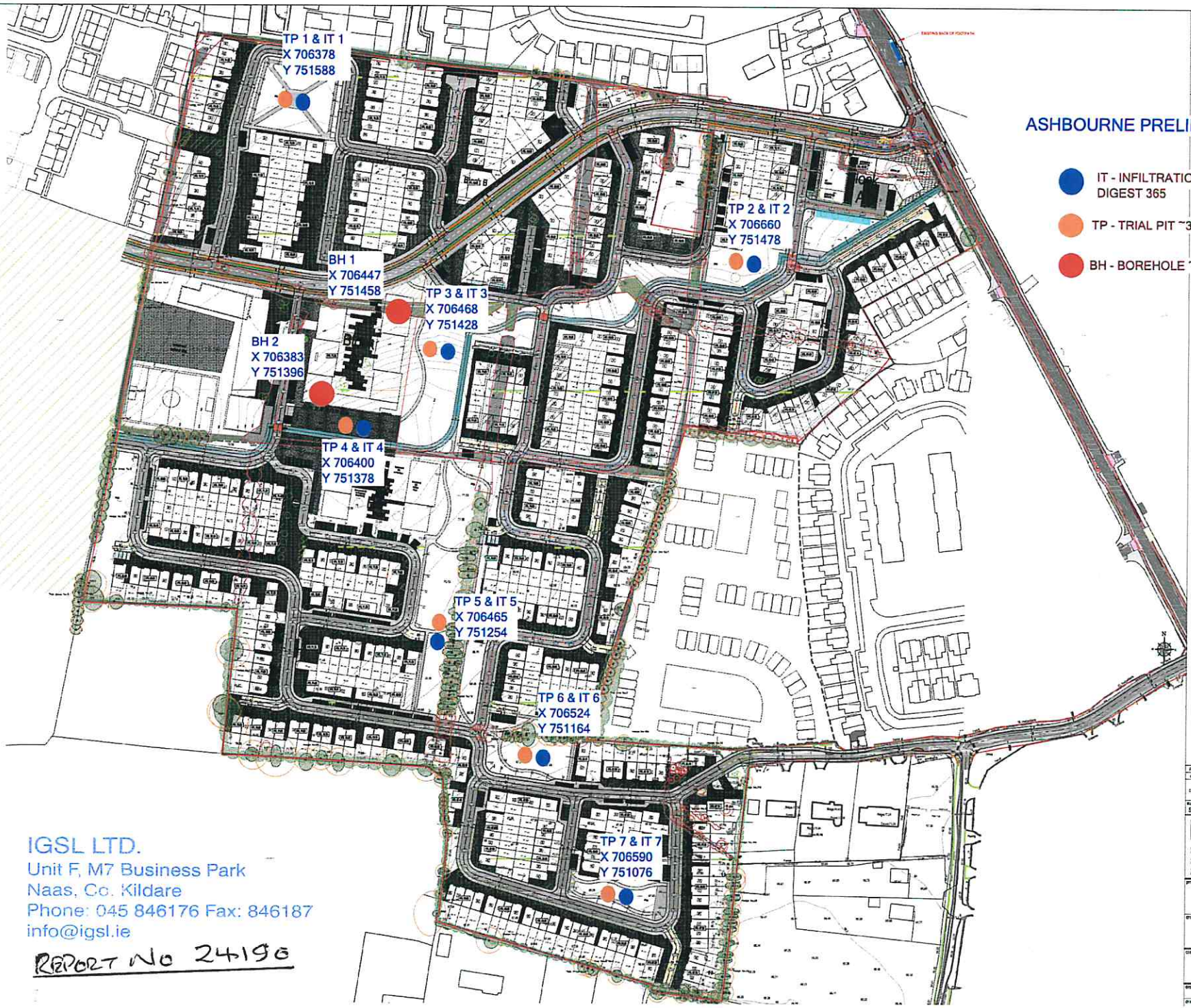
A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix VII Site Plans



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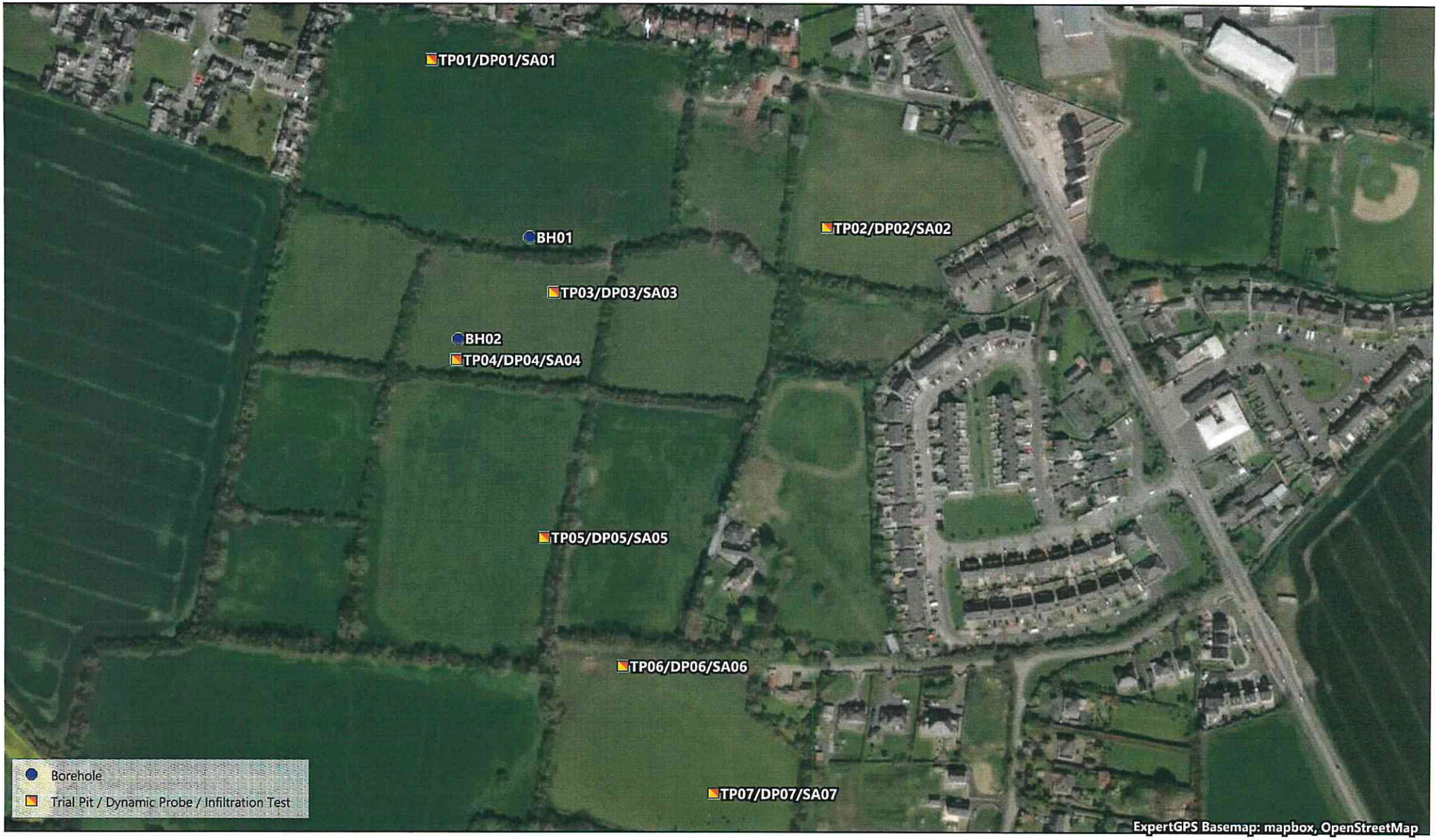
REPORT NO 24196



ExpertGPS

24190 Cherry Lane Ashbourne

50 0 50 100 150 200 250 300 350 400 450 500 550 600 m

Scale: 1 : 3500.

MN 2°00'

Chapter 7 ‘Air Quality & Climate’ - Appendices

Appendix 7.1. - Dust Minimisation Plan

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK (IAQM (2014), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). The following measures will be incorporated into the Construction Environmental Management Plan (CEMP) prepared for the site.

Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 7.1 of Chapter 7 for the windrose for Dublin Airport). As the prevailing wind is predominantly south-westerly to south-easterly, locating construction compounds and storage piles downwind of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (IAQM, 2014; UK ODPM, 2002). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods were care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

Site Roads / Haulage Routes

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80% (UK ODPM, 2002).

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
- Access gates to the site shall be located at least 10m from sensitive receptors where possible;
- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

Land Clearing / Earth Moving

Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust;
- During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided.

Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency (UK ODPM, 2002).
- Where feasible, hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- At the main site traffic exits, a wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

Summary of Dust Mitigation Measures

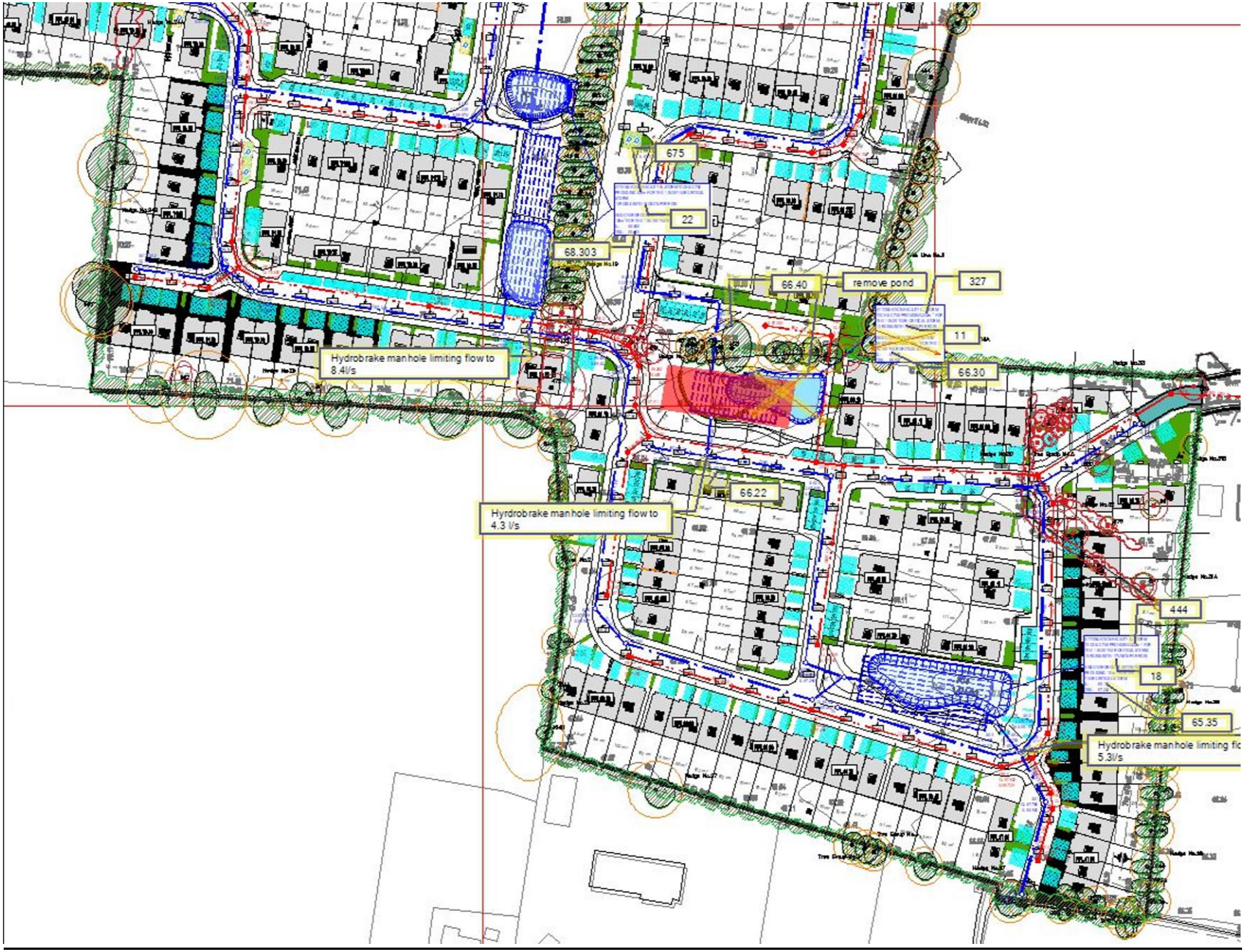
The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

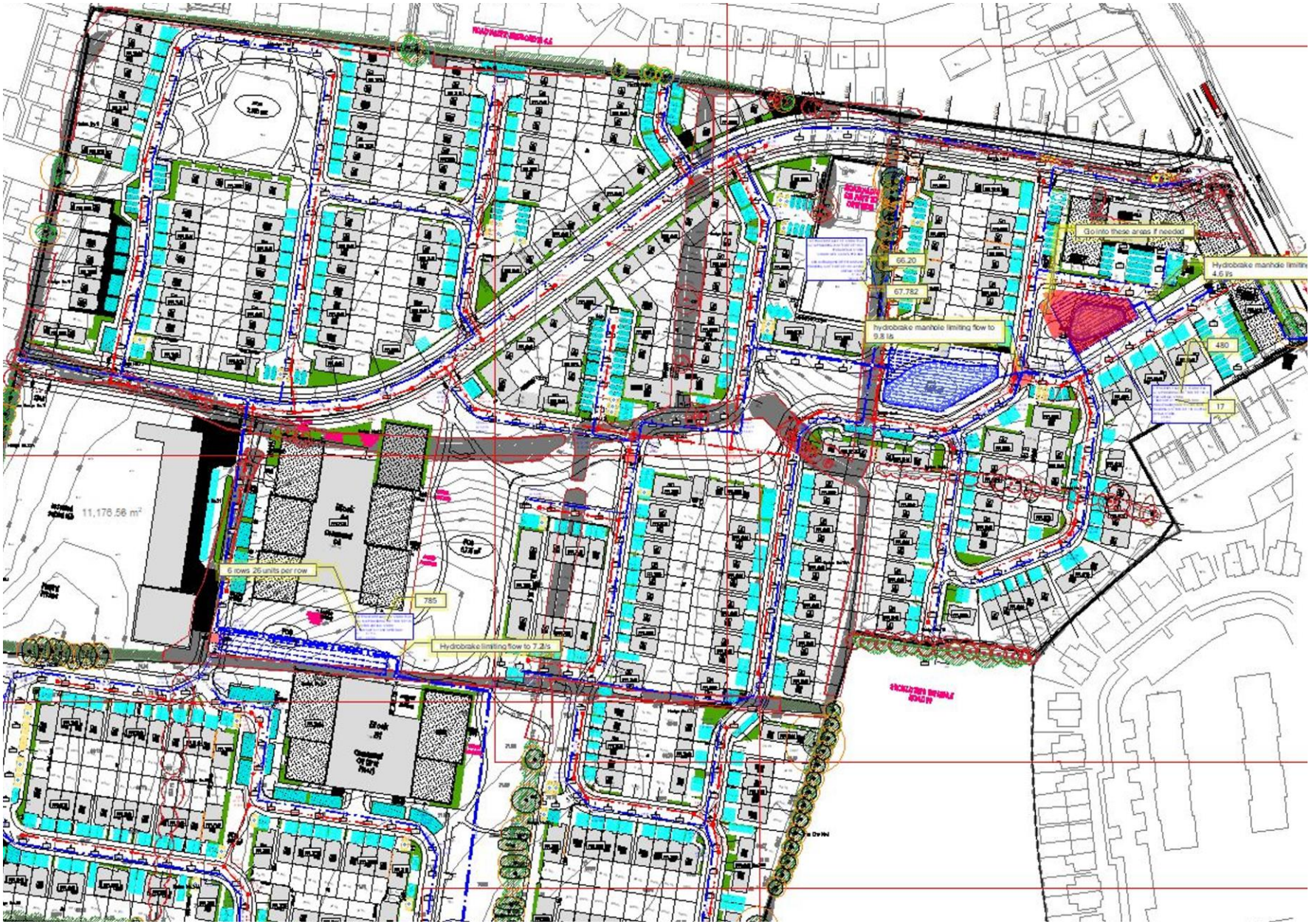
- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;

- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
- The specification of effective measures to deal with any complaints received.

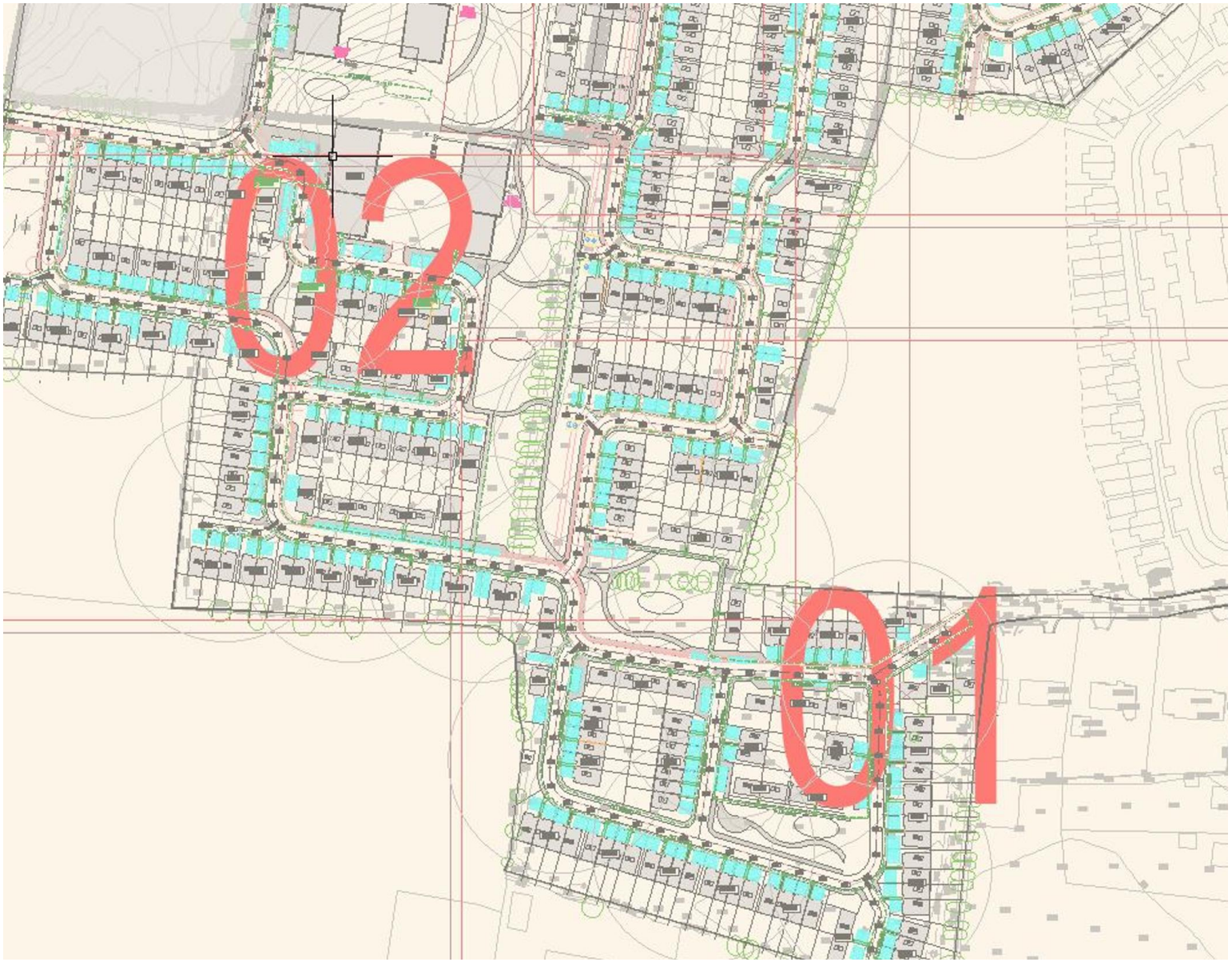
Chapter 9 'Material Assets: Built Services' - Appendices

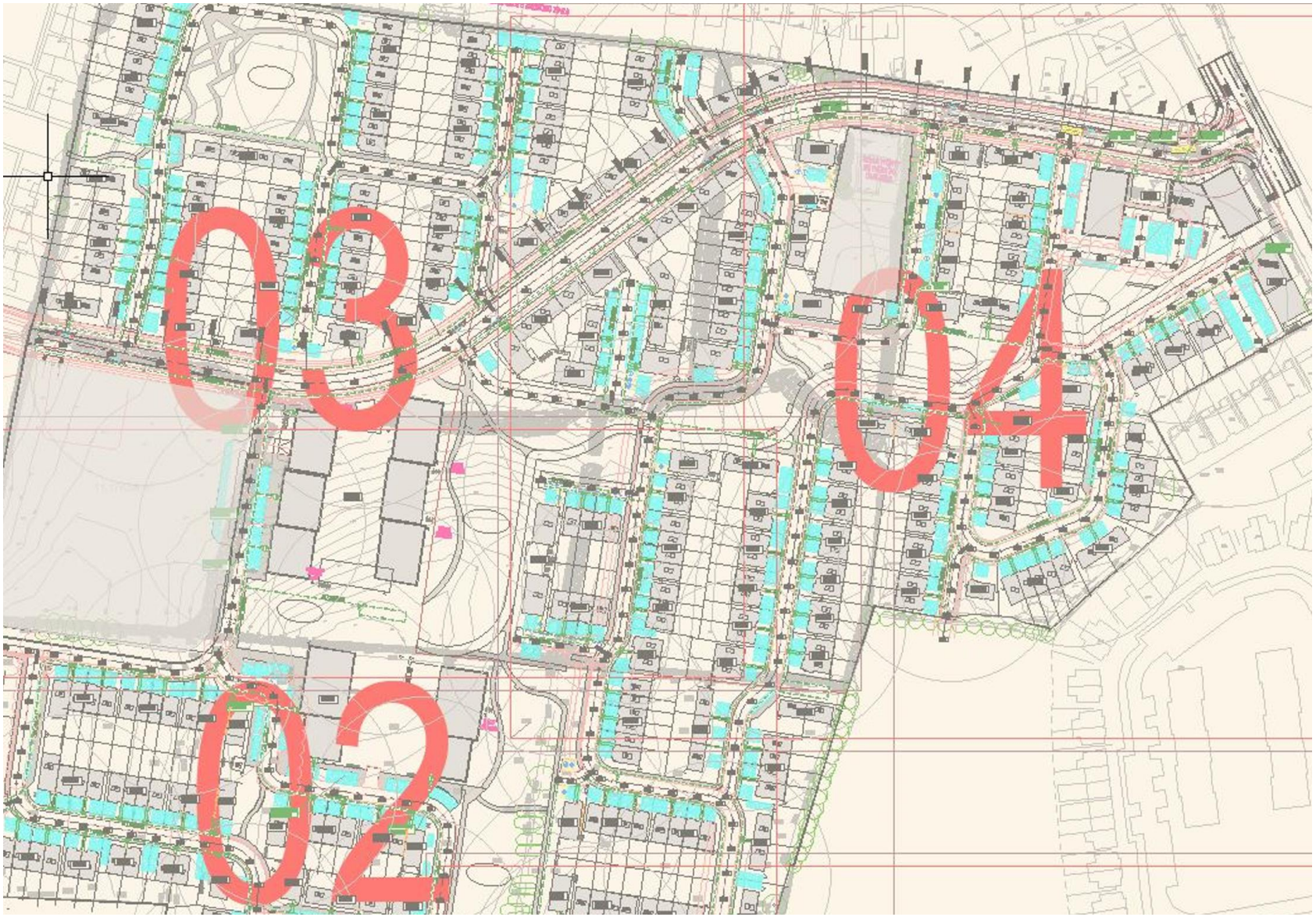
Appendix 9.1.


675
22
68.303
66.40
remove pond
327
11
66.30
Hydrobrake manhole limiting flow to 8.4l/s
66.22
Hyrdrobrake manhole limiting flow to 4.3 l/s
444
18
65.35
Hydrobrake manhole limiting flo
5.3l/s


Go into these areas if needed
66.20
67.782
hydrobrake manhole limiting flow to 9.8 l/s
480
17
11,176.56 m²
6 rows 26 units per row
785
Hydrobrake limiting flow to 7.2l/s

Appendix 9.2.

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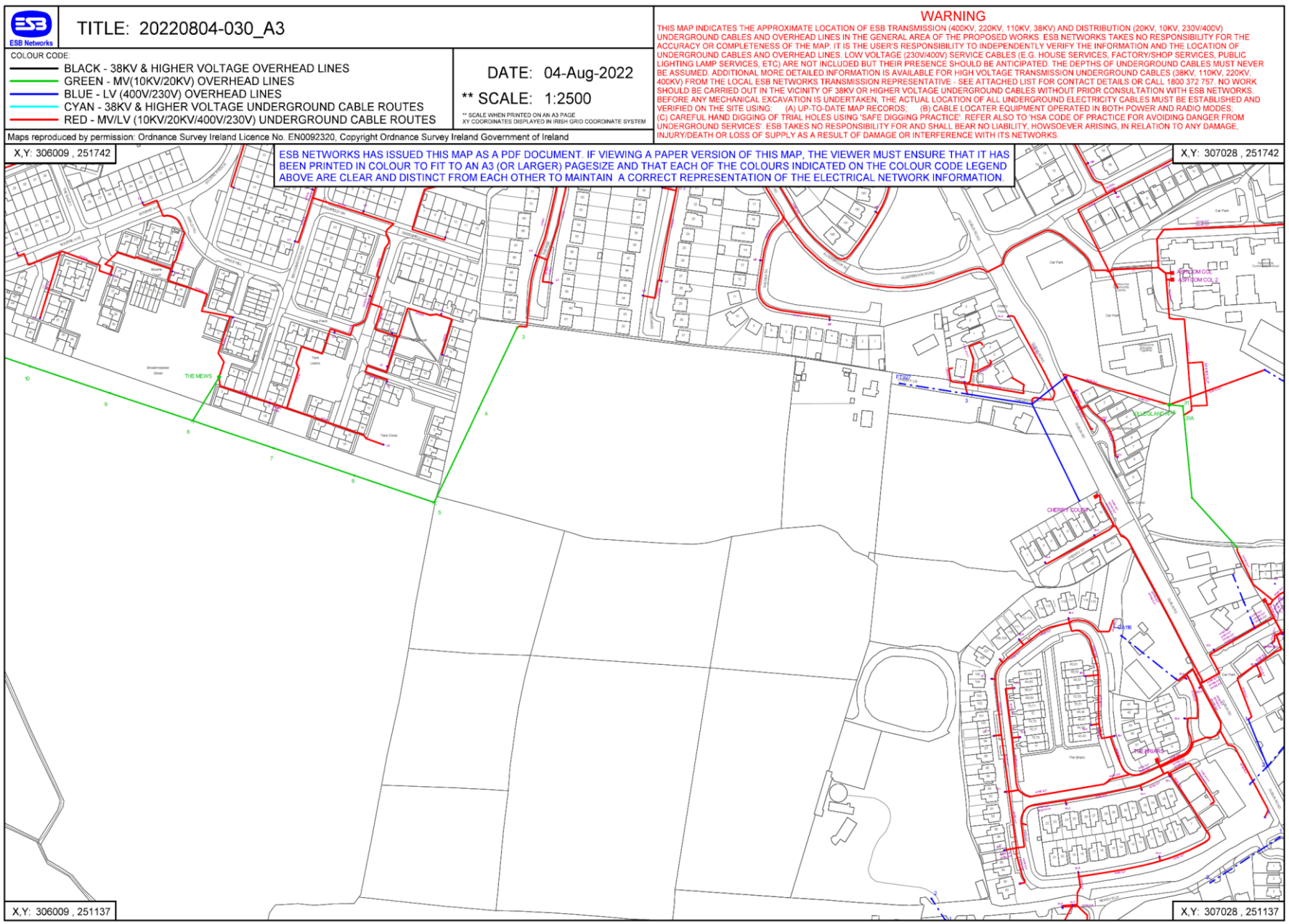
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GREEN - MV(10KV/20KV) OVERHEAD LINES
BLUE - LV (400V/230V) OVERHEAD LINES
CYAN - 38KV & HIGHER VOLTAGE UNDERGROUND CABLE ROUTES
RED - MV/LV (10KV/20KV/400V/230V) UNDERGROUND CABLE ROUTES
DATE: 04-Aug-2022
** SCALE: 1:2500
** SCALE WHEN PRINTED ON AN A3 PAGE
XY COORDINATES DISPLAYED IN IRISH GRID COORDINATE SYSTEM
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WARNING
THIS MAP INDICATES THE APPROXIMATE LOCATION OF ESB TRANSMISSION (400KV, 220KV, 110KV, 38KV) AND DISTRIBUTION (20KV, 10KV, 230V/400V) UNDERGROUND CABLES AND OVERHEAD LINES IN THE GENERAL AREA OF THE PROPOSED WORKS. ESB NETWORKS TAKES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE MAP. IT IS THE USER'S RESPONSIBILITY TO INDEPENDENTLY VERIFY THE INFORMATION AND THE LOCATION OF UNDERGROUND CABLES AND OVERHEAD LINES. LOW VOLTAGE (230V/400V) SERVICE CABLES (E.G. HOUSE SERVICES, FACTORY/SHOP SERVICES, PUBLIC LIGHTING LAMP SERVICES, ETC) ARE NOT INCLUDED BUT THEIR PRESENCE SHOULD BE ANTICIPATED. THE DEPTHS OF UNDERGROUND CABLES MUST NEVER BE ASSUMED. ADDITIONAL MORE DETAILED INFORMATION IS AVAILABLE FOR HIGH VOLTAGE TRANSMISSION UNDERGROUND CABLES (38KV, 110KV, 220KV, 400KV) FROM THE LOCAL ESB NETWORKS TRANSMISSION REPRESENTATIVE - SEE ATTACHED LIST FOR CONTACT DETAILS OR CALL 1800 372 757. NO WORK SHOULD BE CARRIED OUT IN THE VICINITY OF 38KV OR HIGHER VOLTAGE UNDERGROUND CABLES WITHOUT PRIOR CONSULTATION WITH ESB NETWORKS. BEFORE ANY MECHANICAL EXCAVATION IS UNDERTAKEN, THE ACTUAL LOCATION OF ALL UNDERGROUND ELECTRICITY CABLES MUST BE ESTABLISHED AND VERIFIED ON THE SITE USING: (A) UP-TO-DATE MAP RECORDS; (B) CABLE LOCATER EQUIPMENT OPERATED IN BOTH POWER AND RADIO MODES; (C) CAREFUL HAND DIGGING OF TRIAL HOLES USING 'SAFE DIGGING PRACTICE'. REFER ALSO TO 'HSA CODE OF PRACTICE FOR AVOIDING DANGER FROM UNDERGROUND SERVICES'. ESB TAKES NO RESPONSIBILITY FOR AND SHALL BEAR NO LIABILITY, HOWSOEVER ARISING, IN RELATION TO ANY DAMAGE, INJURY/DEATH OR LOSS OF SUPPLY AS A RESULT OF DAMAGE OR INTERFERENCE WITH ITS NETWORKS.
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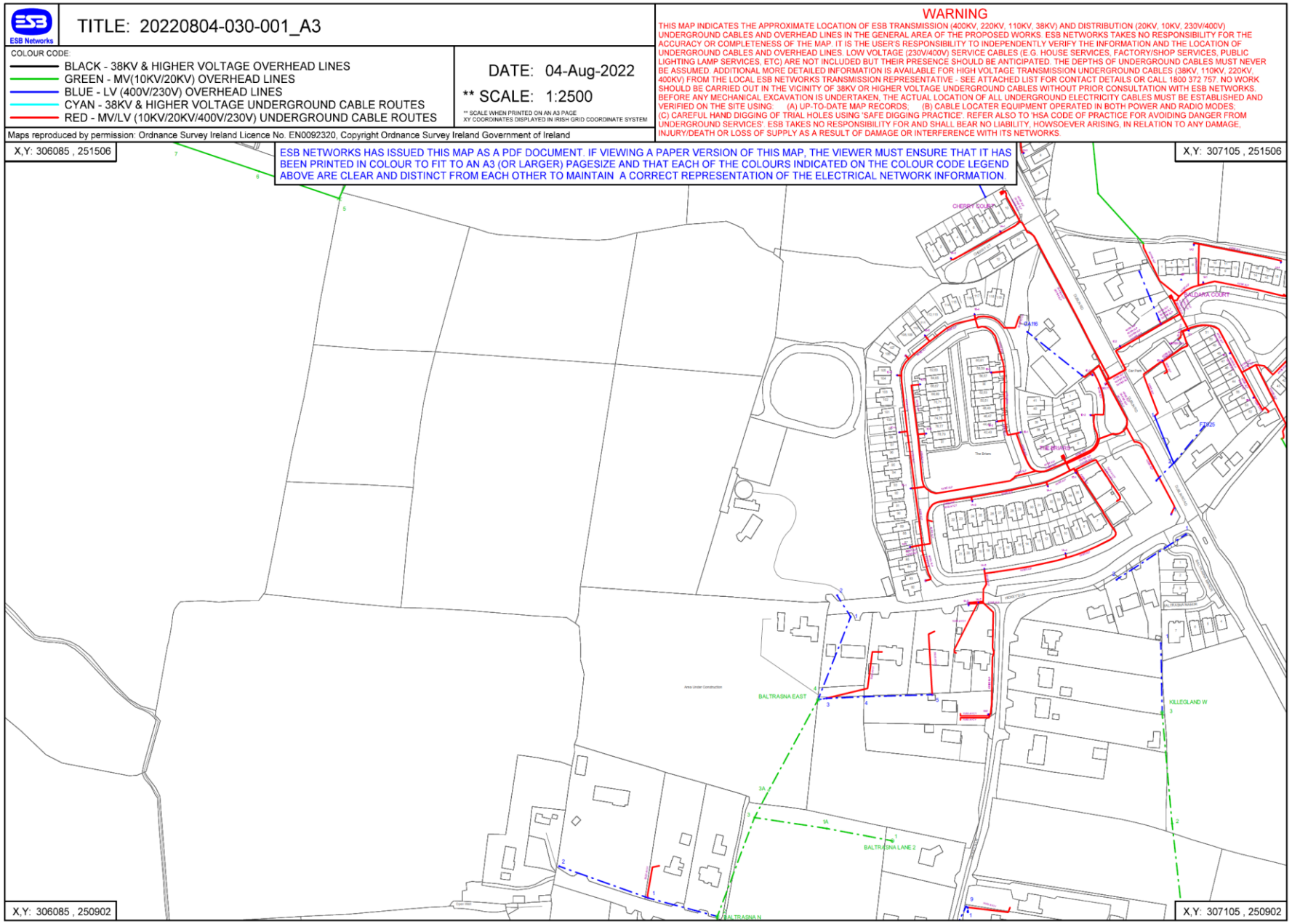
X,Y: 307028 , 251137
THE MEWS
CHERRY COURT
THE BRIARS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RED - MV/LV (10KV/20KV/400V/230V) UNDERGROUND CABLE ROUTES
DATE: 04-Aug-2022
** SCALE: 1:2500
** SCALE WHEN PRINTED ON AN A3 PAGE
XY COORDINATES DISPLAYED IN IRISH GRID COORDINATE SYSTEM
WARNING
THIS MAP INDICATES THE APPROXIMATE LOCATION OF ESB TRANSMISSION (400KV, 220KV, 110KV, 38KV) AND DISTRIBUTION (20KV, 10KV, 230V/400V) UNDERGROUND CABLES AND OVERHEAD LINES IN THE GENERAL AREA OF THE PROPOSED WORKS. ESB NETWORKS TAKES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE MAP. IT IS THE USER'S RESPONSIBILITY TO INDEPENDENTLY VERIFY THE INFORMATION AND THE LOCATION OF UNDERGROUND CABLES AND OVERHEAD LINES. LOW VOLTAGE (230V/400V) SERVICE CABLES (E.G. HOUSE SERVICES, FACTORY/SHOP SERVICES, PUBLIC LIGHTING LAMP SERVICES, ETC) ARE NOT INCLUDED BUT THEIR PRESENCE SHOULD BE ANTICIPATED. THE DEPTHS OF UNDERGROUND CABLES MUST NEVER BE ASSUMED. ADDITIONAL MORE DETAILED INFORMATION IS AVAILABLE FOR HIGH VOLTAGE TRANSMISSION UNDERGROUND CABLES (38KV, 110KV, 220KV, 400KV) FROM THE LOCAL ESB NETWORKS TRANSMISSION REPRESENTATIVE - SEE ATTACHED LIST FOR CONTACT DETAILS OR CALL 1800 372 757. NO WORK SHOULD BE CARRIED OUT IN THE VICINITY OF 38KV OR HIGHER VOLTAGE UNDERGROUND CABLES WITHOUT PRIOR CONSULTATION WITH ESB NETWORKS. BEFORE ANY MECHANICAL EXCAVATION IS UNDERTAKEN, THE ACTUAL LOCATION OF ALL UNDERGROUND ELECTRICITY CABLES MUST BE ESTABLISHED AND VERIFIED ON THE SITE USING: (A) UP-TO-DATE MAP RECORDS; (B) CABLE LOCATER EQUIPMENT OPERATED IN BOTH POWER AND RADIO MODES; (C) CAREFUL HAND DIGGING OF TRIAL HOLES USING 'SAFE DIGGING PRACTICE'. REFER ALSO TO 'HSA CODE OF PRACTICE FOR AVOIDING DANGER FROM UNDERGROUND SERVICES'. ESB TAKES NO RESPONSIBILITY FOR AND SHALL BEAR NO LIABILITY, HOWSOEVER ARISING, IN RELATION TO ANY DAMAGE, INJURY/DEATH OR LOSS OF SUPPLY AS A RESULT OF DAMAGE OR INTERFERENCE WITH ITS NETWORKS.
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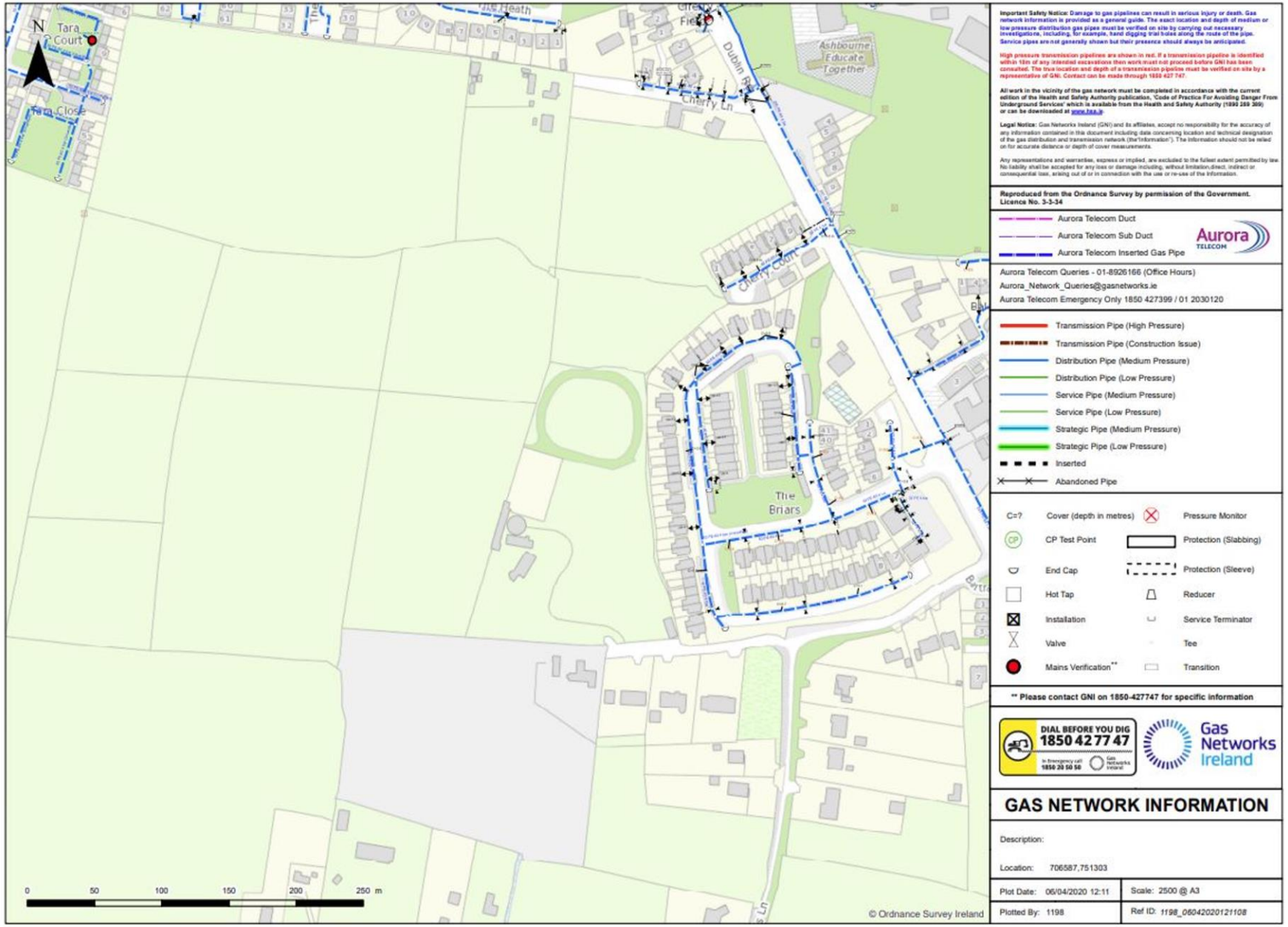
CHERRY COURT
KILDARA COURT

Appendix 9.4.


Important Safety Notice: Damage to gas pipelines can result in serious injury or death. Gas network information is provided as a general guide. The exact location and depth of medium or low pressure distribution gas pipes must be verified on site by carrying out necessary investigations, including, for example, hand digging trial holes along the route of the pipe. Service pipes are not generally shown but their presence should always be anticipated.
High pressure transmission pipelines are shown in red. If a transmission pipeline is identified within 10m of any intended excavations then work must not proceed before GNI has been consulted. The true location and depth of a transmission pipeline must be verified on site by a representative of GNI. Contact can be made through 1850 427 747.
All work in the vicinity of the gas network must be completed in accordance with the current edition of the Health and Safety Authority publication, 'Code of Practice For Avoiding Danger From Underground Services' which is available from the Health and Safety Authority (1890 289 389) or can be downloaded at www.hsa.ie.
Legal Notice: Gas Networks Ireland (GNI) and its affiliates, accept no responsibility for the accuracy of any information contained in this document including data concerning location and technical designation of the gas distribution and transmission network (the"Information"). The Information should not be relied on for accurate distance or depth of cover measurements.
Any representations and warranties, express or implied, are excluded to the fullest extent permitted by law. No liability shall be accepted for any loss or damage including, without limitation,direct, indirect or consequential loss, arising out of or in connection with the use or re-use of the Information.
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Aurora Telecom Duct
Aurora Telecom Sub Duct
Aurora Telecom Inserted Gas Pipe
Aurora TELECOM
Aurora Telecom Queries - 01-8926166 (Office Hours)
Aurora_Network_Queries@gasnetworks.ie
Aurora Telecom Emergency Only 1850 427399 / 01 2030120
Transmission Pipe (High Pressure)
Transmission Pipe (Construction Issue)
Distribution Pipe (Medium Pressure)
Distribution Pipe (Low Pressure)
Service Pipe (Medium Pressure)
Service Pipe (Low Pressure)
Strategic Pipe (Medium Pressure)
Strategic Pipe (Low Pressure)
Inserted
Abandoned Pipe
C=? Cover (depth in metres)
Pressure Monitor
CP Test Point
Protection (Slabbing)
End Cap
Protection (Sleeve)
Hot Tap
Reducer
Installation
Service Terminator
Valve
Tee
Mains Verification**
Transition
** Please contact GNI on 1850-427747 for specific information
DIAL BEFORE YOU DIG 1850 42 77 47
In Emergency call 1850 20 50 50
Gas Networks Ireland
GAS NETWORK INFORMATION
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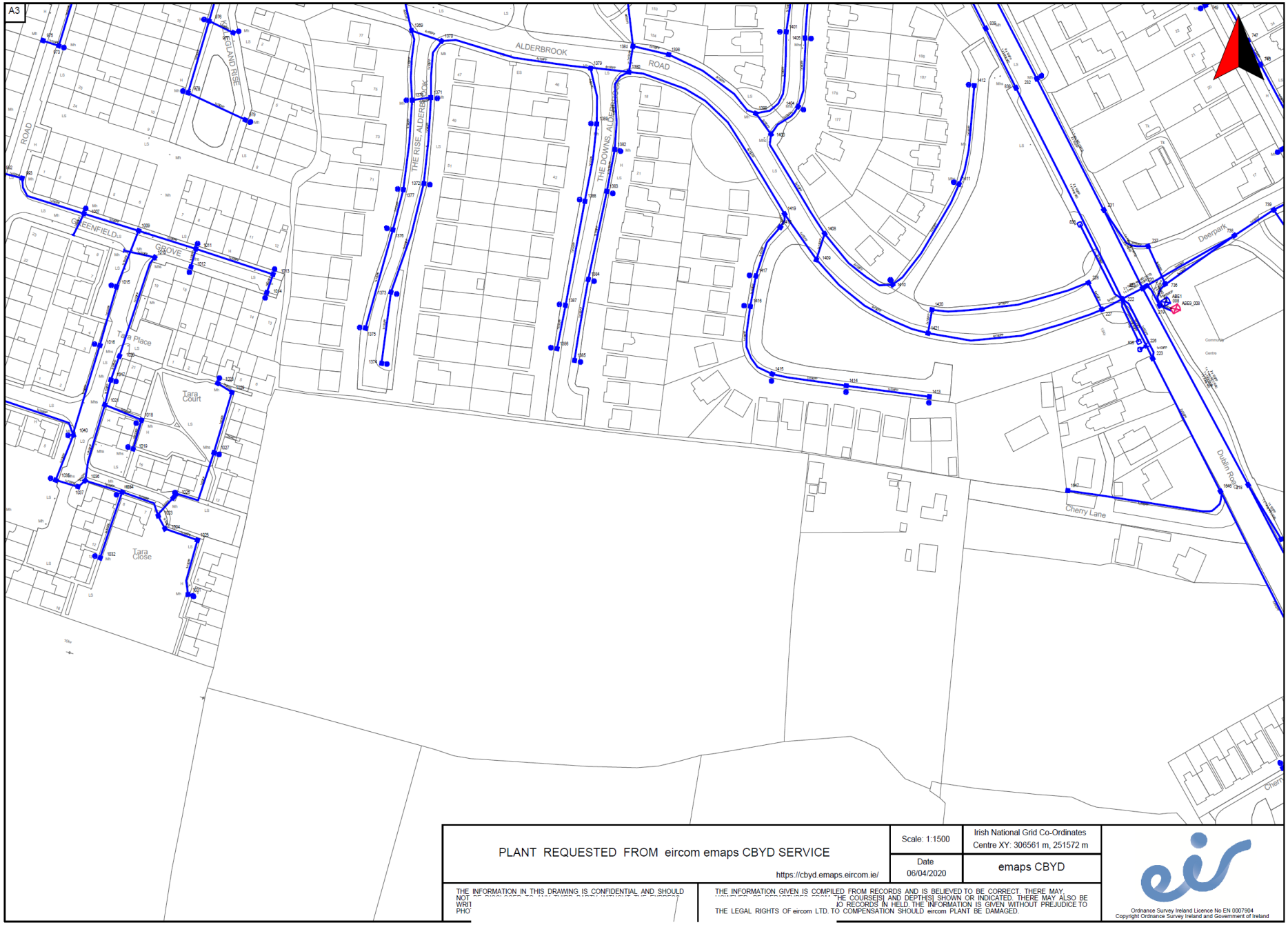
© Ordnance Survey Ireland

Appendix 9.5.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Tara Close
Deerpark
Dublin Road
Cherry Lane
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https://cbyd.emaps.eircom.ie/
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Date
06/04/2020
emaps CBYD
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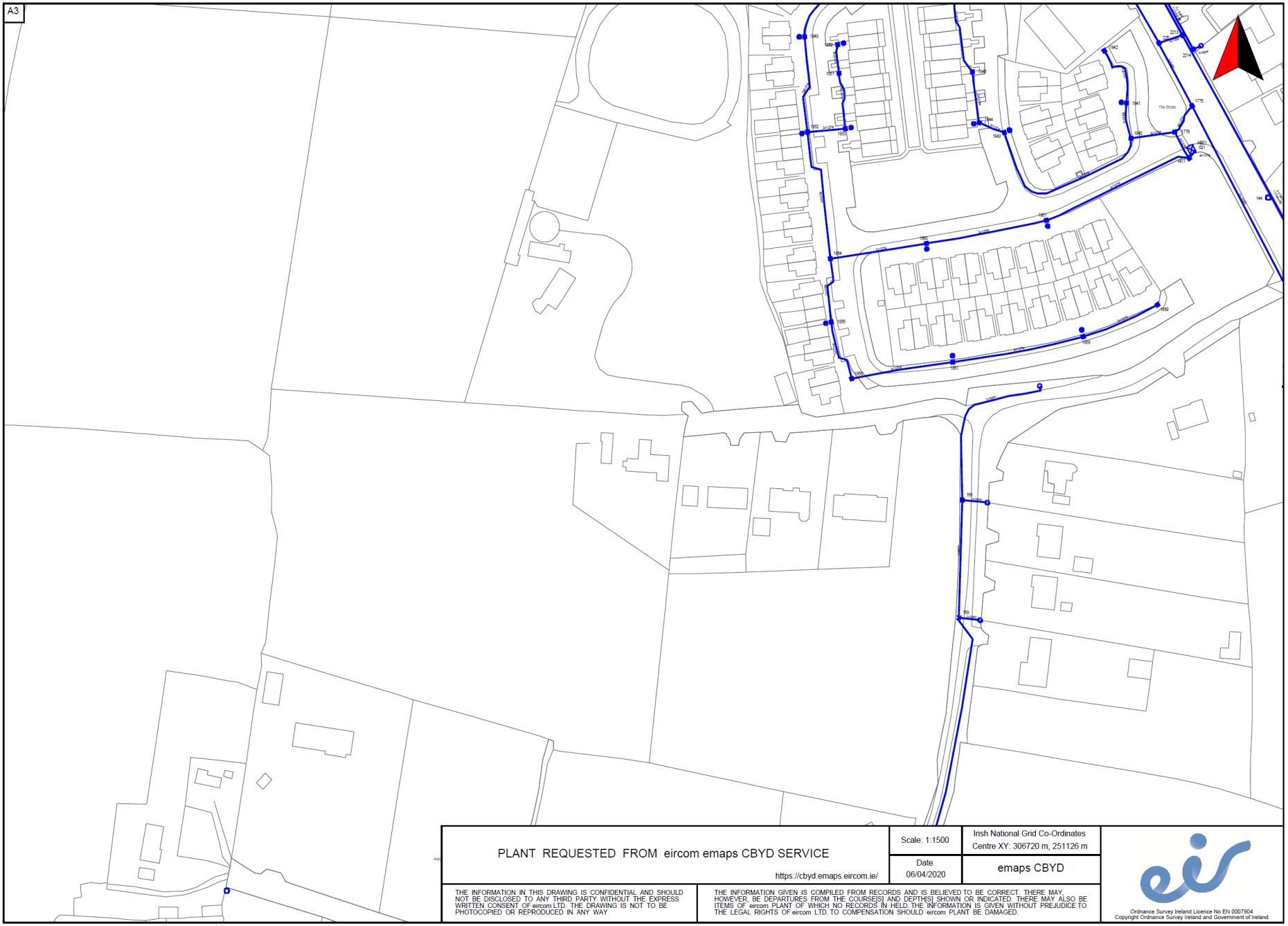
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Date
06/04/2020
emaps CBYD
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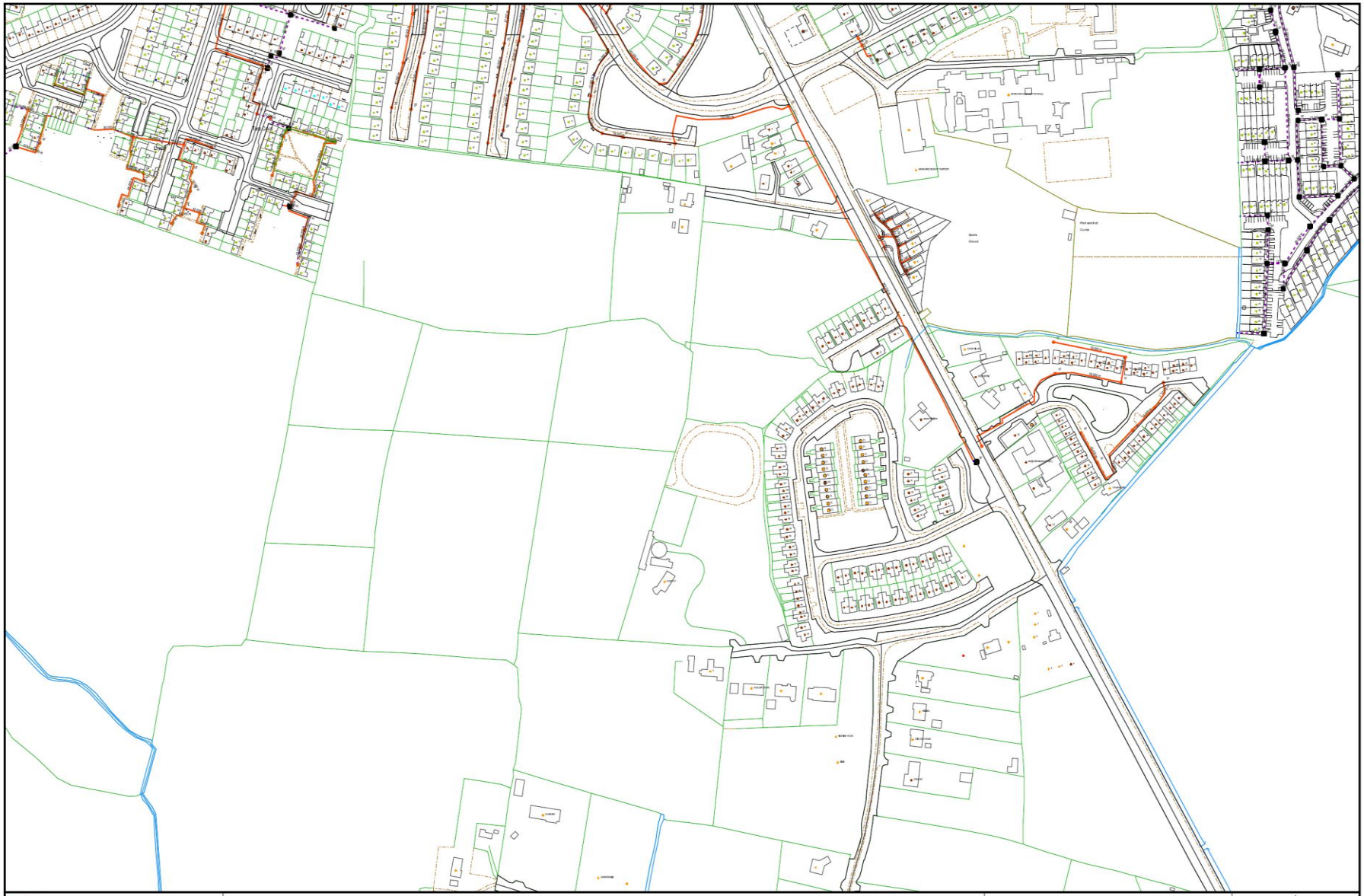
Appendix 9.6.


Unit 7,
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Ballymount,
Dublin 24.
PROJECT NAME
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Chapter 11 'Resource & Waste Management'- Appendices

Appendix 11.1. – Resource & Waste Management Plan

awnconsulting

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Clonshaugh Business & Technology Park,
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W: www.awnconsulting.com

RESOURCE & WASTE MANAGEMENT PLAN FOR PROPOSED STRATEGIC HOUSING DEVELOPMENT TOWNLANDS OF BALTRASNA AND MILLTOWN, ASHBOURNE, CO. MEATH

Report Prepared For

Arnub Ltd. & Aspect Homes (ADC) Ltd

Report Prepared By

Chonaill Bradley, Principal Environmental Consultant

Our Reference

CB/227501.0462WMR01

Date of Issue

29 August 2022

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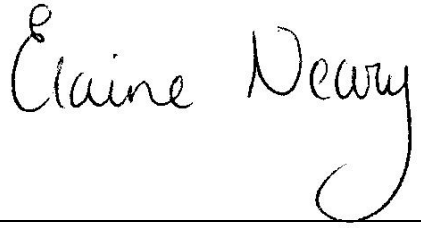
AWN Consulting Limited
Registered in Ireland No. 319812
Directors: F Callaghan, C Dilworth,
T Donnelly, T Hayes, D Kelly, E Porter

Document History

Document Reference		Original Issue Date	
CB/227501.0462WMR01		22 August 2022	
Revision Level	Revision Date	Description	Sections Affected

Record of Approval

Details	Written by	Approved by
Signature		
Name	Chonaill Bradley	Elaine Neary
Title	Principal Environmental Consultant	Associate
Date	29 August 2022	29 August 2022

Contents Page

1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Resource & Waste Management Plan (RWMP) on behalf of Arnub Ltd. & Aspect Homes (ADC) Ltd. The proposed development will consist of 702 no. dwellings, comprised of 420 no. houses, 38 no. duplex units and 244 no. apartments, The proposed development also provides for the following uses: 2 no. creches 4 no. retail units and a GP practice / medical use unit. The proposed development site is located to the west of the R135 Dublin Road, south of existing housing at Alderbrook Rise, Alderbrook Downs & Alderbrook Heath, east of existing housing at Tara Close & Tara Court, south of Cherry Lane and west of Hickey's Lane.

This plan will provide information necessary to ensure that the management of Construction & Demolition (C&D) waste at the site is undertaken in accordance with the current legal and industry standards including the *Waste Management Act 1996* as amended and associated Regulations [1], *Environmental Protection Agency Act 1992* as amended [2], *Litter Pollution Act 1997* as amended [3] and the *Eastern Midlands Region Waste Management Plan 2015 – 2021* [4]. In particular, this plan aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. It also seeks to provide guidance on the appropriate collection and transport of waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and/or water).

This RWMP includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of waste to be generated by the proposed development and makes recommendations for management of different waste streams. The RWMP should be viewed as a live document and should be regularly revisited throughout a project's lifecycle so that opportunities to maximise waste reduction / efficiencies are exploited throughout, and that data is collected on an ongoing basis so that it is as accurate as possible

2.0 C&D RESOURCE AND WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Irish Government issued a policy statement in September 1998*, Changing Our Ways*[5], which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. The target for C&D waste in this report was to recycle at least 50% of C&D waste within a five year period (by 2003), with a progressive increase to at least 85% over fifteen years (i.e. 2013).

In response to the *Changing Our Ways* report, a task force (Task Force B4) representing the waste sector of the already established Forum for the Construction Industry, released a report entitled '*Recycling of Construction and Demolition Waste'* [6] concerning the development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste.

In September 2020, the Irish Government published a policy document outlining a new action plan for Ireland to cover the period of 2020-2025. This plan, *'A Waste Action Plan for a Circular Economy'* [7] (WAPCE), replaces the previous national waste management plan, *"A Resource Opportunity"* (2012), and was prepared in response to the 'European

Green Deal' which sets a roadmap for a transition to an altered economical model, where climate and environmental challenges are turned into opportunities.

The WAPCE sets the direction for waste planning and management in Ireland up to 2025. This reorientates policy from a focus on managing waste to a much greater focus on creating circular patterns of production and consumption. Other policy statements of a number of public bodies already acknowledge the circular economy as a national policy priority.

The policy document contains over 200 measures across various waste areas including circular economy, municipal waste, consumer protection and citizen engagement, plastics and packaging, construction and demolition, textiles, green public procurement and waste enforcement.

One of the first actions to be taken was the development of the Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021) [8] to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021. It is anticipated that the Strategy will be updated in full every 18 months to 2 years.

The Environmental Protection Agency (EPA) of Ireland issued '*Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects' in November 2021* [9]. These guidelines replace the previous 2006 guidelines issued by The National Construction and Demolition Waste Council (NCDWC) and the Department of the Environment, Heritage and Local Government (DoEHLG) in 2006 [10]. The guidelines provide a practical approach which is informed by best practice in the prevention and management of C&D wastes and resources from design to construction of a project, including consideration of the deconstruction of a project. These guidelines have been followed in the preparation of this document and include the following elements:

- Predicted C&D wastes and procedures to prevent, minimise, recycle and reuse wastes;
- Design teams roles and approach;
- Relevant EU, national and local waste policy, legislation and guidelines;
- Waste disposal/recycling of C&D wastes at the site;
- Provision of training for Resource Waste Manager (RM) and site crew;
- Details of proposed record keeping system;
- Details of waste audit procedures and plan; and
- Details of consultation with relevant bodies i.e. waste recycling companies, Local Authority, etc.

Section 3 of the Guidelines identifies thresholds above which there is a requirement for the preparation of a bespoke RWMP for developments. The new guidance classifies developments on a two-tiered system. Developments which do not exceed any of the following thresholds may be classed as Tier 1 development, which require a simplified RWMP:

- New residential development of less than 10 dwellings.
- Retrofit of 20 dwellings or less.

- New commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 1,250m^2.
- Retrofit of commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 2,000m^2; and
- Demolition projects generating in total less than 100m^3 in volume of C&D waste.

A development which exceeds one or more of these thresholds is classed as Tier-2 projects.

This development requires a RWMP as a Tier 2 development as it is above the following criterion:

- New residential development of less than 10 dwellings and
- New commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 1,250m^2.

Other guidelines followed in the preparation of this report include *'Construction and Demolition Waste Management – a handbook for Contractors and Site Managers'* [11], published by FÁS and the Construction Industry Federation in 2002 and the previous guidelines, 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects' (2006).

These guidance documents are considered to define best practice for C&D projects in Ireland and describe how C&D projects are to be undertaken such that environmental impacts and risks are minimised and maximum levels of waste recycling are achieved.

2.2 Regional Level

The proposed development is located in the Local Authority area of Meath County Council (MCC).

The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan applicable to the MCC administrative area, which was published in May 2015. Currently the EMR and other regional waste management plans are under review and the Regional Waste Management Planning Offices expect to publish the final plan in early 2022.

The regional plan sets out the following strategic targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130 - €150 per tonne of waste which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015.*

The *Meath County Development Plan 2021 – 2027* [13] sets out a number of policies and objectives for Meath in line with the objectives of the regional waste management plan.

Waste policies and objectives with a particular relevance to this development are:

Policies:

- *INF POL 61: To facilitate the implementation of National Waste legislation and National and Regional Waste Management Policy.*
- *INF POL 62: To encourage and support the provision of a separate collection of waste throughout the County in accordance with the requirements of the Waste Management (Household Food Waste) Regulations 2009, the Waste Framework Directive Regulations, 2011, the Waste Management (Commercial Food Waste) Regulations 2015 and other relevant legislation to meet the requirements of the Regional Waste Management Plan.*
- *INF POL 64: To encourage and support the expansion and improvement of a three bin system (mixed dry recyclables, organic waste and residual waste) in order to increase the quantity and quality of materials collected for recycling in conjunction with relevant stakeholders.*
- *INF POL 65: To adopt the provisions of the waste management hierarchy and implement policy in relation to the County's requirements under the current or any subsequent Waste Management Plan. All prospective developments in the County shall take account of the provisions of the regional waste management plan and adhere to the requirements of the Plan. Account shall also be taken of the proximity principle and the inter-regional movement of waste.*

Objectives:

- *INF OBJ 54: To facilitate the transition from a waste management economy to a green circular economy to enhance employment opportunities and increase the value recovery and recirculation of resources.*
- *INF OBJ 56: To support developments necessary to manage food waste in accordance with the requirements of the current Waste Management (Food Waste) Regulations and the regional Waste Management Plan.*
- *INF OBJ 68: To support the development of facilities to cater for commercial waste not provided for within the kerbside collection system such as the WEEE, C & D type waste and hazardous materials in accordance with the requirements of the Eastern Midlands Regional Waste Management Plan.*

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the development are:

- Waste Management Act 1996 as amended.
- Environmental Protection Agency Act 1992 as amended.
- Litter Pollution Act 1997 as amended.
- Planning and Development Act 2000 (as amended) [13]

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996* as amended and subsequent Irish legislation, is the principle of *"Duty of Care"*. This implies that the waste producer is responsible for waste from the time it is generated through until its legal recycling, recovery or disposal (including its method of disposal). As it is not practical in most cases for the

waste producer to physically transfer all waste from where it is produced to the final destination, waste contractors will be employed to physically transport waste to the final destination. Following on from this is the concept of *"Polluter Pays"* whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the Developer ensures that the waste contractors engaged by construction contractors are legally compliant with respect to waste transportation, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments* or a Waste or Industrial Emissions Licence granted by the EPA. The COR / permit / licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

3.0 DESIGN APPROACH

The client and the design team have integrated the *'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects'* guidelines into the design workshops, to help review processes, identify and evaluate resource reduction measures and investigate the impact on cost, time, quality, buildability, second life and management post demolition and construction. Further details on these design principals can be found within the aforementioned guidance document.

The design team have undertaken the design process in line with the international best practice principles to firstly prevent wastes, reuse where possible and thereafter sustainably reduce and recover materials. The below sections have been the focal point of the design process and material selections and will continued to be analysed and investigated throughout the design process and when selecting material.

The approaches presented are based on international principles of optimising resources and reducing waste on construction projects through:

- Prevention;
- Reuse;
- Recycling;
- Green Procurement Principles;
- Off-Site Construction;
- Materials Optimisation; and
- Flexibility and Deconstruction.

3.1 Designing For Prevention, Reuse and Recycling

Undertaken at the outset and during project feasibility and evaluation the Client and Design Team considered:

- Establishing the potential for any reusable site assets (buildings, structures, equipment, materials, soils, etc.);
- The potential for refurbishment and refit of existing structures or buildings rather than demolition and new build;
- Assessing any existing buildings on the site that can be refurbished either in part or wholly to meet the Client requirements; and
- Enabling the optimum recovery of assets on site.

3.2 Designing for Green Procurement

Waste prevention and minimisation pre-procurement have been discussed and will be further discussed in this section. The Design Team will discuss proposed design solutions, encourage innovation in tenders and incentivise competitions to recognise sustainable approaches. They should also discuss options for packaging reduction with the main Contractor and subcontractors/suppliers using measures such as 'Just-in-Time' delivery and use ordering procedures that avoid excessive waste. The Green procurement extends from the planning stage into the detailed design and tender stage and will be an ongoing part of the long-term design and selection process for this development.

3.3 Designing for Off-Site Construction

Use of off-site manufacturing has been shown to reduce residual wastes by up to 90% (volumetric building versus traditional). The decision to use offsite construction is typically cost led but there are significant benefits for resource management. Some further considerations for procurement which are being investigated as part of the planning stage design process are listed as follows:

- Modular buildings as these can displace the use of concrete and the resource losses associated with concrete blocks such as broken blocks, mortars, etc.;
    - Modular buildings are typically pre-fitted with fixed plasterboard and installed insulation, eliminating these residual streams from site.
- Use of pre-cast structural concrete panels which can reduce the residual volumes of concrete blocks, mortars, plasters, etc.;
- The use of prefabricated composite panels for walls and roofing to reduce residual volumes of insulation and plasterboards;
- Using pre-cast hollow-core flooring instead of in-situ ready mix flooring or timber flooring to reduce the residual volumes of concrete/formwork and wood/packaging, respectively; and
- Designing for the preferential use of offsite modular units.

3.4 Designing for Materials Optimisation During Construction

To ensure manufacturers and construction companies adopt lean production models, including maximising the reuse of materials onsite.. This helps to reduce the environmental impacts associated with transportation of materials and from waste management activities. This includes investigating the use of standardised sizes for certain materials to help reduce the amount of offcuts produced on site, focusing on promotion and development of off-site manufacture.

3.5 Designing for Flexibility and Deconstruction

Design flexibility has and will be investigated throughout the design process to ensure that where possible products (including buildings) only contain materials that can be recycled and are designed to be easily disassembled. Material efficiency is being considered for the duration and end of life of a building project to produce; flexible, adaptable spaces that enable a resource-efficient, low-waste future change of use; durability of materials and how they can be recovered effectively when maintenance and refurbishment are undertaken and during disassembly/deconstruction.

4.0 DESCRIPTION OF THE DEVELOPMENT

4.1 Location, Size and Scale of the Development

Arnub Ltd. & Aspect Homes (ADC) Ltd. seek permission for a strategic housing development, located in the townlands of Baltrasna and Milltown, Ashbourne, Co. Meath. The proposed development site is located to the west of the R135 Dublin Road, south of existing housing at Alderbrook Rise, Alderbrook Downs & Alderbrook Heath, east of existing housing at Tara Close & Tara Court, south of Cherry Lane and west of Hickey's Lane.

The development will consist of 702 no. dwellings, comprised of 420 no. 2 & 3 storey, 2, 3, 4 & 5 bed houses, 38 no. 2 & 3 bed duplex units in 19 no. blocks, and 244 no. 1, 2 & 3 bed apartments in 20 no. buildings, which range in height from 3-6 storeys. The proposed development also provides for the following uses: (i) 2 no. childcare facilities located in Blocks A and A1 (c.289m² & c. 384m² respectively), (ii) 4 no. retail units, comprised of: 2 no. units in Block A (c.106m² & c. 174m² respectively), 1 no. unit in Block A1 (c.191m²) & 1 no. unit in Block B1 (c.469m²), & 1 no. GP practice / medical use unit located in Block A1 (c.186m²).

Access to the development will by via (i) Cherry Lane to the north-east, off the R135 Dublin Road, via a new proposed internal access road and (ii) via Hickey's Lane to the east, off the R135 Dublin Road, including pedestrian and cycle paths.

The proposed development provides for (i) all ancillary / associated site development works above and below ground, (ii) public open spaces, including hard & soft landscaping, play equipment & boundary treatments, (iii) communal open spaces, (iv) undercroft, basement & surface car parking, including for EV & mobility impaired car parking spaces (v) undercroft, basement & surface bicycle parking, including for external bicycle stores & visitor spaces (vi) bin storage, (vii) public lighting, (viii) signage (xi) plant (M&E) & utility services, including for 7 no. ESB sub-stations (x) green roofs, etc. all on an overall application site area of 20.04 hectares.

The proposed development also includes for an area of c. 1Ha reserved for a school site and playing pitch in the western part of the site. Permission is also sought to demolish all existing structures on site, i.e. 3 no. single storey dwellings & associated out-buildings (659m² in total).

Figure 4.1: *Proposed site location (in red)*

Figure 4.2: *Proposed Site Layout Plan*

4.2 Details of the Non-Hazardous Wastes to be Produced

There will be waste materials generated from the demolition of the existing buildings and hardstanding areas on site, as well as from the further excavation of the building foundations. The volume of waste generated from demolition will be more difficult to segregate than waste generated from the construction phase, as many of the building materials will be bonded together or integrated i.e. plasterboard on timber ceiling joists, steel embedded in concrete, etc.

There will be soil and stones excavated to facilitate construction of the development. The development engineers (DBFL Consulting Engineers) have estimated that c. 75,000m^3 of material will need to be excavated to accommodate the proposed development. It is currently envisaged that the majority of the excavated will be able to be retained and reused onsite for landscaping and fill, with only 15,000m^3 envisaged to be removed from site. When excavated material is to be removed from site, this material will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

During the construction phase there may be a surplus of building materials, such as timber off-cuts, broken concrete blocks, cladding, plastics, metals and concrete generated, however it is envisaged that these quantities will be relatively low due to the nature of development mainly being the installation as opposed to construction. It is envisaged that the majority of construction waste will be generated from packaging waste associated with the battery's that will be delivered to site for installation (Wood, plastic and cardboard waste). The contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

Waste will also be generated from construction workers e.g. organic / food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided on site during the construction phase. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

4.3 Potential Hazardous Wastes Arising

4.3.1 Contaminated Soil

Preliminary site investigations were undertaken be DBFL Consulting engineers, however environmental soil testing and waste classification are yet to be undertaken. It is not envisaged that contaminated ground will be encountered due to the historic use of the land for agricultural purposes. Environmental soil testing and waste classification will be undertaken prior to any material being removed offsite..

If any potentially contaminated material is encountered or any material is to be removed from site, it will need to be segregated from clean / inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled *'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [14] using the *HazWasteOnline* application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC* [15], which establishes the criteria for the acceptance of waste at landfills.

In the event that Asbestos Containing Materials (ACMs) are found within the excavated material, the removal will only be carried out by a suitably permitted waste contractor, in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.* All asbestos will be taken to a suitably licensed or permitted facility.

In the event that hazardous soil, or historically deposited waste is encountered during the construction phase, the contractor will notify MCC and provide a Hazardous / Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal / treatment, in addition to information on the authorised waste collector(s).

4.3.2 Fuel/Oils

Fuels and oils are classed as hazardous materials; any on-site storage of fuel / oil, and all storage tanks and all draw-off points will be bunded and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and the site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel / oil waste generated at the site.

4.3.3 Invasive Plant Species

Site surveys were undertaken by the Scott Cawley Ecology (Project Ecologists) on the 31st of August 2020, 18th of June 2021 and the 20th of April 2022. This included a site walkover survey of the entire site, and around part of the outside perimeter to search for any invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011.

No Japanese Knotweed or any third schedule invasive species were detected. If any are detected during the construction phase of the development, then an invasive species management plan will be produced and submitted to MCC.

4.3.4 Asbestos

Prior to the demolition of the existing structures onsite asbestos refurbishment / demolition surveys will be undertaken by a suitably qualified asbestos expert. The scope of the surveys was confined to all safe and accessible areas of the existing buildings which are due for demolition and in the future.

If any asbestos or asbestos containing materials (ACM) are located onsite then removal of asbestos or ACMs will be carried out by a suitably qualified contractor and ACMs will only be removed from site by a suitably permitted / licenced waste contractor, in accordance with *S.I. No. 589 of 2010 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.* All material will be taken to a suitably licensed or permitted facility.

4.3.5 Other Known Hazardous Substances

Paints, glues, adhesives and other known hazardous substances will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor.

In addition, WEEE (containing hazardous components), printer toner / cartridges, batteries (Lead, Ni-Cd or Mercury) and / or fluorescent tubes and other mercury containing waste may be generated from during C&D activities or temporary site offices. These wastes, if generated, will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

5.0 ROLES AND RESPONSIBILITIES

The *Best Practice Guidelines on the Preparation of Resource Waste Management Plans for Construction and Demolition Projects* promotes that a RM should be appointed. The RM may be performed by number of different individuals over the life-cycle of the Project,

however it is intended to be a reliable person chosen from within the Planning/Design/Contracting Team, who is technically competent and appropriately trained, who takes the responsibility to ensure that the objectives and measures within the Project RWMP are complied with. The RM is assigned the requisite authority to meet the objective and obligations of the RWMP. The role will include the important activities of conducting waste checks/audits and adopting construction and demolition methodology that is designed to facilitate maximum reuse and/or recycling of waste.

5.1 Role of the Client

The Client are the body establishing the aims and the performance targets for the project.

- The Client has commissioned the preparation and submission of a preliminary RWMP as part of the design and planning submission;
- The Client is to commission the preparation and submission of an updated RWMP as part of the construction tendering process;
- The Client will ensure that the RWMP is agreed on and submitted to the local authority prior to commencement of works on site;
- The Client is to request the end-of-project RWMP from the Contractor.

5.2 Role of the Client Advisory Team

The Client Advisory Team or Design Team is formed of architects, consultants, quantity surveyors and engineers and is responsible for:

- Drafting and maintaining the RWMP through the design, planning and procurement phases of the project;
- Appointing a RM to track and document the design process, inform the Design Team and prepare the RWMP.
- Including details and estimated quantities of all projected waste streams with the support of environmental consultants/scientists. This should also include data on waste types (e.g. waste characterisation data, contaminated land assessments, site investigation information) and prevention mechanisms (such as by-products) to illustrate the positive circular economy principles applied by the Design Team;
- Managing and valuing the demolition work with the support of quantity surveyors;
- Handing over of the RWMP to the selected Contractor upon commencement of construction of the development, in a similar fashion to how the safety file is handed over to the Contractor;
- Working with the Contractor as required to meet the performance targets for the project.

5.3 Future Role of the Contractor

The future demolition and construction Contractors have not yet been decided upon for this RWMP. However, once select they will have major roles to fulfil. They will be responsible for:

- Preparing, implementing and reviewing the (including the Pre-Demolition) RWMP throughout the demolition and construction phases (including the management of all suppliers and sub-contractors) as per the requirements of these guidelines;

- Identifying a designated and suitably qualified RM who will be responsible for implementing the RWMP;
- Identifying all hauliers to be engaged to transport each of the resources / wastes off-site;
- Implementing waste management policies whereby waste materials generated on site are to be segregated as far as practicable;
- Renting and operating a mobile-crusher to crush concrete for temporary reuse onsite during construction and reduce the amount of HGV loads required to remove material from site;
- Applying for the appropriate waste permit to crush concrete onsite;
- Identifying all destinations for resources taken off-site. As above, any resource that is legally classified as a 'waste' must only be transported to an authorised waste facility;
- End-of-waste and by-product notifications addressed with the EPA where required;
- Clarification of any other statutory waste management obligations, which could include on-site processing;
- Full records of all resources (both wastes and other resources) should be maintained for the duration of the project; and
- Preparing a RWMP Implementation Review Report at project handover.

6.0 KEY MATERIALS & QUANTITIES

6.1 Project Resource Targets

Project specific resource and waste management targets for the site have not yet been set and this information should be updated for these targets once these targets have been confirmed by the client. However, it is expected for projects of this nature that a minimum of 70% of waste is fully re-used, recycled or recovered. Target setting will inform the setting of project-specific benchmarks to track target progress. Typical Key Performance Indicators (KPIs) that may be used to set targets include (as per guidelines):

- Weight (tonnes) or Volume (m^3) of waste generated per construction value;
- Weight (tonnes) or Volume (m^3) of waste generated per construction floor area (m^2);
- Fraction of resource reused on site;
- Fraction of resource notified as by-product;
- Fraction of waste segregated at source before being sent off-site for recycling/recovery; and
- Fraction of waste recovered, fraction of waste recycled, or fraction of waste disposed.

6.2 Main Construction and Demolition Waste Categories

The main non-hazardous and hazardous waste streams that could be generated by the construction activities at a typical site are shown in Table 6.1. The List of Waste (LoW) code (applicable as of 1 June 2015) (also referred to as the European Waste Code (EWC)) for each waste stream is also shown.

Table 6.1 *Typical waste types generated and LoW codes (individual waste types may contain hazardous substances)*

Waste Material	LoW/EWC Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Treated wood, glass, plastic, containing hazardous substances	17-02-04*
Bituminous mixtures, coal tar and tarred products	17 03 01*, 02 & 03*
Metals (including their alloys) and cable	17 04 01-11
Soil and stones	17 05 03* & 04
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-10
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Organic (food) waste	20 01 08
Mixed Municipal Waste	20 03 01

** Individual waste type may contain hazardous substances*

6.3 Demolition Waste Generation

The demolition stage will involve the demolition of residential and agricultural buildings on-site. The demolition areas are identified in the planning drawings provided with this application. The anticipated demolition waste and rates of reuse, recycling / recovery and disposal are shown in Table 6.2, below.

Table 6.2 *Estimated off-site reuse, recycle and disposal rates for demolition waste*

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	25.9	0	0.0	85	22.0	15	3.9
Concrete, Bricks, Tiles, Ceramics	146.9	30	44.1	65	95.5	5	7.3
Plasterboard	11.5	30	3.5	60	6.9	10	1.2
Asphalts	2.9	0	0.0	25	0.7	75	2.2
Metals	43.2	5	2.2	80	34.6	15	6.5
Slate	23.0	0	0.0	85	19.6	15	3.5
Timber	34.6	10	3.5	60	20.7	30	10.4
Asbestos	0.2	0	0.0	0	0.0	100	0.2
Total	**288.2**		**53.1**		**200.0**		**35.1**

6.4 Construction Waste Generation

Table 6.2 shows the breakdown of C&D waste types produced on a typical site based on data from the EPA *National Waste Reports* [16] *and the joint EPA & GMIT study* [17].

Table 6.2: *Waste materials generated on a typical Irish construction site*

Waste Types	%
Mixed C&D	38
Timber	38
Metals	8
Concrete	1
Other	15

Table 6.3, below, shows the estimated construction waste generation for the proposed Project based on the gross floor area of construction and other information available to date, along with indicative targets for management of the waste streams. The estimated amounts for the main waste types (with the exception of soils and stones) are based on waste generation rate per m^2, using the waste breakdown rates shown in Table 6.2. These have been calculated from the schedule of development areas provided by the architect.

Table 6.3*: Predicted on and off-site reuse, recycle and disposal rates for construction waste*

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	1669.6	10	167.0	80	1335.7	10	167.0
Timber	1416.6	40	566.6	55	779.1	5	70.8
Plasterboard	505.9	30	151.8	60	303.6	10	50.6
Metals	404.7	5	20.2	90	364.3	5	20.2
Concrete	303.6	30	91.1	65	197.3	5	15.2
Other	758.9	20	151.8	60	455.3	20	151.8
Total	5059.3		1148.5		3435.3		475.6

In addition to the waste streams in Table 6.3, there will be c. 75,000 m^3 of soil and stones excavated to facilitate construction of new foundations and underground services. Any suitable excavated material will be temporarily stockpiled for reuse as fill and landscaping, where possible, is envisaged that all excavated material will remain on site and be reused in landscaping with the exception of 15,000m^3 which will be required to be removed from site. When material is not required or deemed to be unsuitable and has to be removed from site it will be removed off-site for appropriate reuse, recovery and / or disposal.

It should be noted that until final materials and detailed construction methodologies have been confirmed, it is difficult to predict with a high level of accuracy the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

6.5 Proposed Resource and Waste Management Options

Waste materials generated will be segregated on-site, where it is practical. Where the on-site segregation of certain wastes types is not practical, off-site segregation will be carried out. There will be skips and receptacles provided to facilitate segregation at source, where feasible. All waste receptacles leaving the site will be covered or enclosed. The appointed waste contractor will collect and transfer the wastes as receptacles are filled. There are numerous waste contractors in the Meath region that provide this service.

All waste arisings will be handled by an approved waste contractor holding a current waste collection permit. All waste arisings requiring disposal off-site will be reused, recycled, recovered or disposed of at a facility holding the appropriate registration, permit or licence, as required.

During construction, some of the sub-contractors on site will generate waste in relatively low quantities. The transportation of non-hazardous waste by persons who are not directly involved with the waste business, at weights less than or equal to 2 tonnes, and in vehicles not designed for the carriage of waste, are exempt from the requirement to have a waste collection permit (per Article 30 (1) (b) of the Waste Collection Permit Regulations 2007, as amended). Any sub-contractors engaged that do not generate more than 2 tonnes of waste at any one time can transport this waste off-site in their work vehicles (which are not designed for the carriage of waste). However, they are required to ensure that the receiving facility has the appropriate COR / permit / licence.

Written records will be maintained by the contractor(s), detailing the waste arising throughout the C&D phases, the classification of each waste type, waste collection permits for all waste contactors who collect waste from the site and COR / permit / licence for the receiving waste facility for all waste removed off-site for appropriate reuse, recycling, recovery and / or disposal

Dedicated bunded storage containers will be provided for hazardous wastes which may arise, such as batteries, paints, oils, chemicals, if required.

The anticipated management of the main waste streams is outlined as follows:

Soil and Stone

The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. The excavations are required to facilitate construction works so the preferred option (prevention and minimisation) cannot be accommodated for the excavation phase.

When material is removed off-site it could be reused as a by-product (and not as a waste). If this is done, it will be done in accordance with Regulation 27 (By-products), as amended, of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2011-2020, (Previously Article 27 of the European Communities (Waste Directive) and referred to as Article 27 in this report), which requires that certain conditions are met and that by-product notifications are made to the EPA via their online notification form. Excavated material should not be removed from site until approval from the EPA has been received. The potential to reuse material as a by-product will be confirmed during the course of the excavation works, with the objective of eliminating any unnecessary disposal of material.

The next option (beneficial reuse) may be appropriate for the excavated material, pending environmental testing to classify the material as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* publication. Clean inert material may be used as fill material in other construction projects or engineering fill for waste licensed sites. Beneficial reuse of surplus excavation material as engineering fill may be subject to further testing to determine if materials meet the specific engineering standards for their proposed end use.

Any nearby sites requiring clean fill/capping material will be contacted to investigate reuse opportunities for clean and inert material. If any of the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Article 27. Similarly, if any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Article 27. Article 27 will be investigated to see if the material can be imported onto this site for beneficial reuse instead of using virgin materials.

If the material is deemed to be a waste, then removal and reuse / recovery / disposal of the material will be carried out in accordance with the *Waste Management Act 1996* as amended, the *Waste Management (Collection Permit) Regulations 2007* as amended and the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licensed sites will be considered.

In the event that contaminated material is encountered and subsequently classified as hazardous, this material will be stored separately to any non-hazardous material. It will require off-site treatment at a suitable facility or disposal abroad via Transfrontier Shipment of Wastes (TFS).

Bedrock

While it is not envisaged that bedrock will be encountered, if bedrock is encountered, it is anticipated that it will not be crushed on site. Any excavated rock is expected to be removed off-site for appropriate reuse, recovery and / or disposal. If bedrock is to be crushed on-site, the appropriate mobile waste facility permit will be obtained from MCC.

Silt & Sludge

During the construction phase, silt and petrochemical interception will be carried out on run-off and pumped water from site works, where required. Sludge and silt will then be collected by a suitably licensed contractor and removed off-site.

Concrete Blocks, Bricks, Tiles & Ceramics

The majority of concrete blocks, bricks, tiles and ceramics generated as part of the construction works are expected to be clean, inert material and should be recycled, where possible. If concrete is to be crushed on-site, the appropriate mobile waste facility permit will be obtained from MCC.

Hard Plastic

As hard plastic is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible.

Timber

Timber that is uncontaminated, i.e. free from paints, preservatives, glues, etc., will be disposed of in a separate skip and recycled off-site.

Metal

Metals will be segregated, where practical, and stored in skips. Metal is highly recyclable and there are numerous companies that will accept these materials.

Glass

Glass materials will be segregated for recycling, where possible.

Waste Electrical & Electronic Equipment (WEEE)

Any WEEE will be stored in dedicated covered cages / receptacles / pallets pending collection for recycling.

Other Recyclables

Where any other recyclable wastes, such as cardboard and soft plastic, are generated, these will be segregated at source into dedicated skips and removed off-site.

Non-Recyclable Waste

C&D waste which is not suitable for reuse or recovery, such as polystyrene, some plastics and some cardboards, will be placed in separate skips or other receptacles. Prior to removal from site, the non-recyclable waste skip / receptacle will be examined by a member of the waste team (see Section 9.0) to determine if recyclable materials have been placed in there by mistake. If this is the case, efforts will be made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

Asbestos Containing Materials

If any asbestos or ACM are found on-site then they should be removed by a suitably competent contractor and disposed of as asbestos waste before the demolition works begin. All asbestos removal work or encapsulation work must be carried out in accordance with *S.I. No. 589 of 2010 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.*

Other Hazardous Wastes

On-site storage of any hazardous wastes produced (i.e. contaminated soil if encountered and / or waste fuels) will be kept to a minimum, with removal off-site organised on a regular basis. Storage of all hazardous wastes on-site will be undertaken so as to minimise exposure to on-site personnel and the public and to also minimise potential for environmental impacts. Hazardous wastes will be recovered, wherever possible, and failing this, disposed of appropriately.

On-Site Crushing

It is currently not envisaged that the crushing of waste materials will occur on-site. However, if the crushing of material is to be undertaken, a mobile waste facility permit will first be obtained from MCC, and the destination of the accepting waste facility will be supplied to the MCC waste unit.

6.6 Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the contractor, either by a weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the nominated project RM (see Section 9.0).

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Act 1996* as amended, *Waste Management (Collection Permit) Regulations 2007* as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* and amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project RM (see Section 9.0) will maintain a copy of all waste collection permits on-site.

If the waste is being transported to another site, a copy of the Local Authority waste COR / permit or EPA Waste / Industrial Emissions Licence for that site will be provided to the nominated project Waste Manager (see Section 9.0). If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) notification document will be obtained from Dublin City Council (as the relevant authority on behalf of all Local Authorities in Ireland) and kept on-site along with details of the final destination (COR, permits, licences, etc.). A receipt from the final destination of the material will be kept as part of the on-site waste management records.

All information will be entered in a waste management recording system to be maintained on-site.

7.0 ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is outlined below. The total cost of C&D waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

7.1 Reuse

By reusing materials on site, there will be a reduction in the transport and recycle / recovery / disposal costs associated with the requirement for a waste contractor to take the material off-site. Clean and inert soils, gravel, stones, etc., which cannot be reused on-site may be used as access roads or capping material for landfill sites, etc. This material is often taken free of charge or at a reduced fee for such purposes, reducing final waste disposal costs.

7.2 Recycling

Salvageable metals will earn a rebate, which can be offset against the costs of collection and transportation of the skips.

Clean, uncontaminated cardboard and certain hard plastics can also be recycled. Waste contractors will charge considerably less to take segregated wastes, such as recyclable waste, from a site than mixed waste.

Timber can be recycled as chipboard. Again, waste contractors will charge considerably less to take segregated wastes, such as timber, from a site than mixed waste.

7.3 Disposal

Landfill charges are currently at around €130 - €150 per tonne which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015*. In addition to disposal costs, waste contractors will also charge a collection fee for skips.

Collection of segregated C&D waste usually costs less than municipal waste. Specific C&D waste contractors take the waste off-site to a licensed or permitted facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill. Clean soil, rubble, etc., is also used as fill / capping material, wherever possible.

8.0 DEMOLITION PROCEDURES

The demolition stage will involve the demolition of residential and agricultural buildings on-site. The demolition areas are identified in the planning drawings submitted as part of this application. A formal demolition plan including safety procedures will be prepared by the demolition contractor. However, in general, the following sequence of works should be followed during the demolition stage:

Check for Hazards

Prior to commencing works, buildings and structures to be demolished will be checked for any likely hazards including asbestos, ACMs, electrical power lines or cables, gas reticulation systems, telecommunications, unsafe structures and fire / explosion hazards, e.g. combustible dust, chemical hazards, oil, fuels and contamination.

Removal of Components

All hazardous materials will be removed first. All components from within the buildings that can be salvaged will be removed next. This will primarily be comprised of metal; however, may also include timbers, doors, windows, wiring and metal ducting, etc.

Removal of Roofing

Steel roof supports, beams, etc., will be dismantled and taken away for recycling / salvage.

Excavation of Services, Demolition of Walls and Concrete

Services will be removed from the ground and the breakdown of walls will be carried out once all salvageable or reusable materials have been taken from the buildings. Finally, any existing foundations and hard standing areas will be excavated.

9.0 TRAINING PROVISIONS

A member of the construction team will be appointed as the RM to ensure commitment, operational efficiency and accountability in relation to waste management during the C&D phases of the development.

9.1 Resource Manager Training and Responsibilities

The nominated RM will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid them in the organisation, operation and recording of the waste management system implemented on site.

The RM will have overall responsibility to oversee, record and provide feedback to the client on everyday waste management at the site. Authority will be given to the Waste Manager to delegate responsibility to sub-contractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The RM will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site. The RM will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this RWMP.

9.2 Site Crew Training

Training of site crew in relation to waste is the responsibility of the RM and, as such, a waste training program should be organised. A basic awareness course will be held for all site crew to outline the RWMP and to detail the segregation of waste materials at source. This may be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of the Waste Storage Areas (WSAs). A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

10.0 TRACKING AND TRACING / RECORD KEEPING

Records should be kept for all waste material which leaves the site, either for reuse on another site, recycling or disposal. A recording system will be put in place to record the waste arisings on Site.

A waste tracking log should be used to track each waste movement from the site. On exit from the site, the waste collection vehicle driver should stop at the site office and sign out as a visitor and provide the security personnel or RM with a waste docket (or Waste Transfer Form (WTF) for hazardous waste) for the waste load collected. At this time, the security personnel should complete and sign the Waste Tracking Register with the following information:

- Date
- Time

- Waste Contractor
- Company waste contractor appointed by, e.g. Contractor or subcontractor name
- Collection Permit No.
- Vehicle Reg.
- Driver Name
- Docket No.
- Waste Type
- EWC / LoW

The waste vehicle will be checked by security personal or the RM to ensure it has the waste collection permit no. displayed and a copy of the waste collection permit in the vehicle before they are allowed to remove the waste from the site.

The waste transfer dockets will be transferred to the RM on a weekly basis and can be placed in the Waste Tracking Log file. This information will be forwarded onto the MCC Waste Regulation Unit when requested.

Each subcontractor that has engaged their own waste contractor will be required to maintain a similar waste tracking log with the waste dockets / WTF maintained on file and available for inspection on site by the main contractor as required. These subcontractor logs will be merged with the main waste log.

Waste receipts from the receiving waste facility will also be obtained by the site contractor(s) and retained. A copy of the Waste Collection Permits, CORs, Waste Facility Permits and Waste Licences will be maintained on site at all times and will be periodically reviewed by the RM. Subcontractors who have engaged their own waste contractors, should provide the main contractor with a copy of the waste collection permits and COR / permit / licence for the receiving waste facilities and maintain a copy on file, available for inspection on site as required.

11.0 OUTLINE WASTE AUDIT PROCEDURE

11.1 Responsibility for Waste Audit

The appointed RM will be responsible for conducting a waste audit at the site during the C&D phase of the proposed Project. Contact details for the nominated RM will be provided to the MCC Waste Regulation Unit after the main contractor is appointed and prior to any material being removed from site.

11.2 Review of Records and Identification of Corrective Actions

A review of all waste management costs and the records for the waste generated and transported off-site should be undertaken mid-way through the construction phase of the proposed Project.

If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. The waste records will be compared with the established recovery / reuse / recycling targets for the site. Each material type will be examined, in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved.

Upon completion of the C&D phase, a final report will be prepared, summarising the outcomes of waste management processes adopted and the total recycling / reuse / recovery figures for the development.

12.0 CONSULTATION WITH RELEVANT BODIES

12.1 Local Authority

Once construction contractors have been appointed and have appointed waste contractors, and prior to removal of any C&D waste materials off-site, details of the proposed destination of each waste stream will be provided to the MCC Waste Regulation Unit.

MCC will also be consulted, as required, throughout the excavation and construction phases in order to ensure that all available waste reduction, reuse and recycling opportunities are identified and utilised and that compliant waste management practices are carried out.

12.2 Recycling / Salvage Companies

The appointed waste contractor for the main waste streams managed by the construction contractors will be audited in order to ensure that relevant and up-to-date waste collection permits and facility registrations / permits / licences are held. In addition, information will be obtained regarding the feasibility of recycling each material, the costs of recycling / reclamation, the means by which the wastes will be collected and transported off-site, and the recycling / reclamation process each material will undergo off-site.

13.0 REFERENCES

1. Waste Management Act 1996 (No. 10 of 1996) as amended.
2. Environmental Protection Agency Act 1992 as amended.
3. Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
4. Eastern Midlands Region Waste Management Plan 2015 – 2021 (2015).
5. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998).
6. Forum for the Construction Industry – *Recycling of Construction and Demolition Waste.*
7. Department of Communications, Climate Action and Environment (DCCAE), *Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025* (Sept 2020).
8. DCCAE, *Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less*' (2021)
9. Environmental Protection Agency (EPA) *'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021)*
10. Department of Environment, Heritage and Local Government, *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (2006).
11. FÁS and the Construction Industry Federation (CIF), *Construction and Demolition Waste Management – a handbook for Contractors and* site *Managers* (2002).
12. Meath County Council*, Meath County Development Plan 2021 – 2027* (2021).
13. Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended
14. EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2018)
15. Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.
16. Environmental Protection Agency (EPA), *National Waste Database Reports 1998 – 2018*.
17. EPA and Galway-Mayo Institute of Technology (GMIT), *EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies – Lessons Learned* (2015).

Appendix 11.2. – Operational Waste Management Plan

OPERATIONAL WASTE MANAGEMENT PLAN FOR PROPOSED STRATEGIC HOUSING DEVELOPMENT TOWNLANDS OF BALTRASNA AND MILLTOWN, ASHBOURNE, CO. MEATH

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Our Reference

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Title	Principal Environmental Consultant	Associate
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CONTENTS

1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Operational Waste Management Plan (OWMP) on behalf of Arnub Ltd. & Aspect Homes (ADC) Ltd. The proposed development will consist of 702 no. dwellings, comprised of 420 no. houses, 38 no. duplex units and 244 no. apartments, The proposed development also provides for the following uses: 2 no. creches 4 no. retail units and a GP practice / medical use unit. The proposed development site is located to the west of the R135 Dublin Road, south of existing housing at Alderbrook Rise, Alderbrook Downs & Alderbrook Heath, east of existing housing at Tara Close & Tara Court, south of Cherry Lane and west of Hickey's Lane.

This OWMP has been prepared to ensure that the management of waste during the operational phase of the proposed development is undertaken in accordance with the current legal and industry standards including, the *Waste Management Act 1996* as amended and associated Regulations [1], *Environmental Protection Agency Act 1992* as amended [2], *Litter Pollution Act 1997* as amended [3], the '*Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021*' [4] and *Meath County Council (MCC) Waste Management (Segregation, Storage & Presentation of Household and Commercial Waste) Bye-Laws (2018)* [5]. In particular, this OWMP aims to provide a robust strategy for the storage, handling, collection and transport of the wastes generated at site.

In addition, the following guidelines were consulted for healthcare specific waste management practice in relation to the proposed medical unit use and supporting medical care:

- Health Service Executive (HSE), *Waste Management Awareness Handbook* (2011) [6]; and
- HSE and Department of Health and Children (DOHC), *Healthcare Risk Waste Management: Segregation, Packaging and Storage Guidelines for Healthcare Risk Waste, 4th Edition* (2010) [7].

This OWMP aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. The OWMP also seeks to provide guidance on the appropriate collection and transport of waste to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil or water resources). The plan estimates the type and quantity of waste to be generated from the proposed development during the operational phase and provides a strategy for managing the different waste streams.

At present, there are no specific guidelines in Ireland for the preparation of OWMPs. Therefore, in preparing this document, consideration has been given to the requirements of national and regional waste policy, legislation and other guidelines.

2.0 OVERVIEW OF WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Irish Government issued a policy statement in September 1998 titled as *'Changing Our Ways'* [6] which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. A heavy emphasis was placed on reducing reliance on landfill and finding alternative methods for managing waste. Amongst other things, Changing Our Ways stated a target of at least 35% recycling of municipal (i.e. household, commercial and non-process industrial) waste.

A further policy document *'Preventing and Recycling Waste – Delivering Change'* was published in 2002 [7]. This document proposed a number of programmes to increase recycling of waste and allow diversion from landfill. The need for waste minimisation at source was considered a priority.

This view was also supported by a review of sustainable development policy in Ireland and achievements to date, which was conducted in 2002, entitled *'Making Irelands Development Sustainable – Review, Assessment and Future Action'* [8]. This document also stressed the need to break the link between economic growth and waste generation, again through waste minimisation and reuse of discarded material.

In order to establish the progress of the Government policy document *Changing Our Ways*, a review document was published in April 2004 entitled *'Taking Stock and Moving Forward'* [9]. Covering the period 1998 – 2003, the aim of this document was to assess progress to date with regard to waste management in Ireland, to consider developments since the policy framework and the local authority waste management plans were put in place, and to identify measures that could be undertaken to further support progress towards the objectives outlined in *Changing Our Ways*.

In particular, *Taking Stock and Moving Forward* noted a significant increase in the amount of waste being brought to local authority landfills. The report noted that one of the significant challenges in the coming years was the extension of the dry recyclable collection services.

In September 2020, the Irish Government published a new policy document outlining a new action plan for Ireland to cover the period of 2020-2025. This plan *'A Waste Action Plan for a Circular Economy'* [10] (WAPCE), was prepared in response to the 'European Green Deal' which sets a roadmap for a transition to a new economy, where climate and environmental challenges are turned into opportunities, replacing the previous national waste management plan *"A Resource Opportunity"* (2012).

The WAPCE sets the direction for waste planning and management in Ireland up to 2025. This reorientates policy from a focus on managing waste to a much greater focus on creating circular patterns of production and consumption. Other policy statements of a number of public bodies already acknowledge the circular economy as a national policy priority.

The policy document contains over 200 measures across various waste areas including circular economy, municipal waste, consumer protection and citizen engagement, plastics and packaging, construction and demolition, textiles, green public procurement and waste enforcement.

One of the first actions to be taken was the development of the *Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021)* [11] to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021. It is anticipated that the Strategy will be updated in full every 18 months to 2 years.

Since 1998, the Environmental Protection Agency (EPA) has produced periodic *'National Waste (Database) Reports'* [12] detailing, among other things, estimates for household and commercial (municipal) waste generation in Ireland and the level of recycling, recovery and disposal of these materials. The *2019 National Waste Statistics*, which is the most recent study published, along with the national waste statistics web resource (November 2021) reported the following key statistics for 2019:

- **Generated –** Ireland produced 3,085,652 t of municipal waste in 2019. This is almost a 6% increase since 2018. This means that the average person living in Ireland generated 628 kg of municipal waste in 2019.
- **Managed –** Waste collected and treated by the waste industry. In 2019, a total of 3,036,991 t of municipal waste was managed and treated.
- **Unmanaged –**Waste that is not collected or brought to a waste facility and is, therefore, likely to cause pollution in the environment because it is burned, buried or dumped. The EPA estimates that 48,660 t was unmanaged in 2019.
- **Recovered –** The amount of waste recycled, used as a fuel in incinerators, or used to cover landfilled waste. In 2019, around 83% of municipal waste was recovered – a decrease from 84% in 2018.
- **Recycled –** The waste broken down and used to make new items. Recycling also includes the breakdown of food and garden waste to make compost. The recycling rate in 2019 was 37%, which is down from 38% in 2018.
- **Disposed –** Less than a sixth (15%) of municipal waste was landfilled in 2019. This is an increase from 14% in 2018.

2.2 Regional Level

The proposed development is located in the Local Authority area of Meath County Council (MCC).

The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan applicable to the MCC administrative area, which was published in May 2015. Currently the EMR and other regional waste management plans are under review and the Regional Waste Management Planning Offices expect to publish the final plan in early 2022.

The regional plan sets out the following strategic targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130 - €150 per tonne of waste which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015.*

The *Meath County Development Plan 2021 – 2027* [13] sets out a number of policies and objectives for Meath in line with the objectives of the regional waste management plan.

Waste policies and objectives with a particular relevance to this development are:

Policies:

- *INF POL 61: To facilitate the implementation of National Waste legislation and National and Regional Waste Management Policy.*
- *INF POL 62: To encourage and support the provision of a separate collection of waste throughout the County in accordance with the requirements of the Waste Management (Household Food Waste) Regulations 2009, the Waste Framework Directive Regulations, 2011, the Waste Management (Commercial*

Food Waste) Regulations 2015 and other relevant legislation to meet the requirements of the Regional Waste Management Plan.

- *INF POL 64: To encourage and support the expansion and improvement of a three bin system (mixed dry recyclables, organic waste and residual waste) in order to increase the quantity and quality of materials collected for recycling in conjunction with relevant stakeholders.*
- *INF POL 65: To adopt the provisions of the waste management hierarchy and implement policy in relation to the County's requirements under the current or any subsequent Waste Management Plan. All prospective developments in the County shall take account of the provisions of the regional waste management plan and adhere to the requirements of the Plan. Account shall also be taken of the proximity principle and the inter-regional movement of waste.*

Objectives:

- *INF OBJ 54: To facilitate the transition from a waste management economy to a green circular economy to enhance employment opportunities and increase the value recovery and recirculation of resources.*
- *INF OBJ 56: To support developments necessary to manage food waste in accordance with the requirements of the current Waste Management (Food Waste) Regulations and the regional Waste Management Plan.*
- *INF OBJ 68: To support the development of facilities to cater for commercial waste not provided for within the kerbside collection system such as the WEEE, C & D type waste and hazardous materials in accordance with the requirements of the Eastern Midlands Regional Waste Management Plan.*

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the proposed development are:

- Waste Management Act 1996 as amended.
- Environmental Protection Agency Act 1992 as amended;
- Litter Pollution Act 1997 as amended and
- Planning and Development Act 2000 as amended [14]

These Acts and subordinate Regulations transpose the relevant European Union Policy and Directives into Irish law.

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996* as amended and subsequent Irish legislation, is the principle of "Duty of Care". This implies that the waste producer is responsible for waste from the time it is generated through until its legal disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final disposal area, waste contractors will be employed to physically transport waste to the final waste disposal site.

It is, therefore, imperative that the residents, commercial tenants (including the crèche unit) and the proposed facilities management company undertake on-site management of waste in accordance with all legal requirements and that the facilities management company employ suitably permitted / licenced contractors to undertake off-site management of their waste in accordance with all legal requirements. This includes the requirement that a waste contactor handle, transport and reuse / recover / recycle / dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving

facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the Waste Management (Facility Permit & Registration) Regulations 2007, as amended, or a Waste or Industrial Emissions (IE) Licence granted by the EPA. The COR / permit / licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and / or disposed of at the specified site.

2.3.1 Meath County Council Waste Management Bye-Laws

The MCC *"Meath County Council Waste Management (Storage, Presentation and Segregation of Household and Commercial Waste) By-Laws (2018)"* came into effect on the 12thth of November 2018. These by-laws set a number of enforceable requirements on waste holders with regard to storage, separation and presentation of waste within the MCC functional area. Key requirements under these by-laws of relevance to the proposed development include the following:

- Kerbside waste presented for collection shall not be presented for collection earlier than 6.00pm on the day immediately preceding the designated waste collection day;
- All containers used for the presentation of kerbside waste and any uncollected waste shall be removed from any roadway, footway, footpath or any other public place no later than 8:00am on the day following the designated waste collection day;
- An authorised waste collector is engaged to service the receptacles referred to in this section of these bye-laws, with documentary evidence, such as receipts, statements or other proof of payment, demonstrating the existence of this engagement being retained for a period of no less than two years. Such evidence shall be presented to an authorised person within a time specified in a written request from either that person or from another authorised person employed by Meath County Council;
- Adequate access and egress onto and from the premises by waste collection vehicles is maintained; and
- Written information is provided to each tenant or other occupier about the arrangements for waste separation, segregation, storage and presentation prior to collection,

The full text of the waste by-laws is available from the MCC website.

2.4 Regional Waste Management Service Providers and Facilities

Various contractors offer waste collection services for the residential and commercial sectors in the MCC region. Details of waste collection permits (granted, pending and withdrawn) for the region are available from the NWCPO.

As outlined in the regional waste management plan, there is a decreasing number of landfills available in the region. Only three municipal solid waste landfills remain operational and are all operated by the private sector. There are a number of other licensed and permitted facilities in operation in the region including waste transfer stations, hazardous waste facilities and integrated waste management facilities. There are two existing thermal treatment facilities, one in Duleek, Co. Meath and a second facility in Poolbeg in Dublin.

The FCC Recycling Centre at Seatown East, Swords, located c. 15km southeast of the development site, can be utilised by the residents of the proposed development for other household waste streams. This centre can accept furniture, paint, wood, mattresses, plastic, waste tyres, mixed bulky waste, electrical items, clothes and shoes. The MCC Navan Recyling Centre is c. 30km to the northwest. There is also a

bring bank located c. 1km nort of the proposed development at Topline Murtaghs, Ashbourne, where glass and aluminium cans can be deposited.

A copy of all CORs and waste permits issued by the Local Authorities are available from the NWCPO website and all Waste / Industrial Emissions Licenses issued are available from the EPA.

3.0 DESCRIPTION OF THE DEVELOPMENT

3.1 Location, Size and Scale of the Development

Arnub Ltd. & Aspect Homes (ADC) Ltd. seek permission for a strategic housing development, located in the townlands of Baltrasna and Milltown, Ashbourne, Co. Meath. The proposed development site is located to the west of the R135 Dublin Road, south of existing housing at Alderbrook Rise, Alderbrook Downs & Alderbrook Heath, east of existing housing at Tara Close & Tara Court, south of Cherry Lane and west of Hickey's Lane.

The development will consist of 702 no. dwellings, comprised of 420 no. 2 & 3 storey, 2, 3, 4 & 5 bed houses, 38 no. 2 & 3 bed duplex units in 19 no. blocks, and 244 no. 1, 2 & 3 bed apartments in 20 no. buildings, which range in height from 3-6 storeys. The proposed development also provides for the following uses: (i) 2 no. childcare facilities located in Blocks A and A1 (c.289m² & c. 384m² respectively), (ii) 4 no. retail units, comprised of: 2 no. units in Block A (c.106m² & c. 174m² respectively), 1 no. unit in Block A1 (c.191m²) & 1 no. unit in Block B1 (c.469m²), & 1 no. GP practice / medical use unit located in Block A1 (c.186m²).

Access to the development will by via (i) Cherry Lane to the north-east, off the R135 Dublin Road, via a new proposed internal access road and (ii) via Hickey's Lane to the east, off the R135 Dublin Road, including pedestrian and cycle paths.

The proposed development provides for (i) all ancillary / associated site development works above and below ground, (ii) public open spaces, including hard & soft landscaping, play equipment & boundary treatments, (iii) communal open spaces, (iv) undercroft, basement & surface car parking, including for EV & mobility impaired car parking spaces (v) undercroft, basement & surface bicycle parking, including for external bicycle stores & visitor spaces (vi) bin storage, (vii) public lighting, (viii) signage (xi) plant (M&E) & utility services, including for 7 no. ESB sub-stations (x) green roofs, etc. all on an overall application site area of 20.04 hectares.

The proposed development also includes for an area of c. 1Ha reserved for a school site and playing pitch in the western part of the site. Permission is also sought to demolish all existing structures on site, i.e. 3 no. single storey dwellings & associated out-buildings (659m² in total).

3.2 Typical Waste Categories

The typical non-hazardous and hazardous wastes that will be generated at the proposed development will include the following:

- Dry Mixed Recyclables (DMR) - includes waste paper (including newspapers, magazines, brochures, catalogues, leaflets), cardboard and plastic packaging, metal cans, plastic bottles, aluminium cans, tins and Tetra Pak cartons;
- Organic waste – food waste and green waste generated from internal plants / flowers;
- Glass; and
- Mixed Non-Recyclable (MNR)/General Waste.

In addition to the typical waste materials that will be generated at the development on a daily basis, there will be some additional waste types generated less frequently / in smaller quantities which will need to be managed separately including:

- Green / garden waste may be generated from internal plants / flowers and landscaping;
- Batteries (both hazardous and non-hazardous);
- Waste electrical and electronic equipment (WEEE) (both hazardous and non-hazardous);
- Printer cartridges / toners;
- Chemicals (paints, adhesives, resins, detergents, etc.);
- Light bulbs;
- Textiles;
- Waste cooking oil (if any generated by the residents);
- Furniture (and, from time to time, other bulky wastes); and
- Abandoned bicycles.

Wastes will be segregated into the above waste types to ensure compliance with waste legislation and guidance while maximising the re-use, recycling and recovery of waste with diversion from landfill wherever possible.

3.2.1 Healthcare Waste from the Medical Unit

Healthcare waste is defined in the HSE and DOHC *Healthcare Risk Waste Management* publication as *"solid or liquid waste arising from healthcare"*. Waste materials generated will fall into two main categories, namely healthcare non-risk waste (i.e. non-clinical healthcare waste) and healthcare risk waste (hazardous) as illustrated in Figure 3.1. Hazardous waste has been further subdivided in this plan into non-clinical hazardous waste and clinical/risk waste.

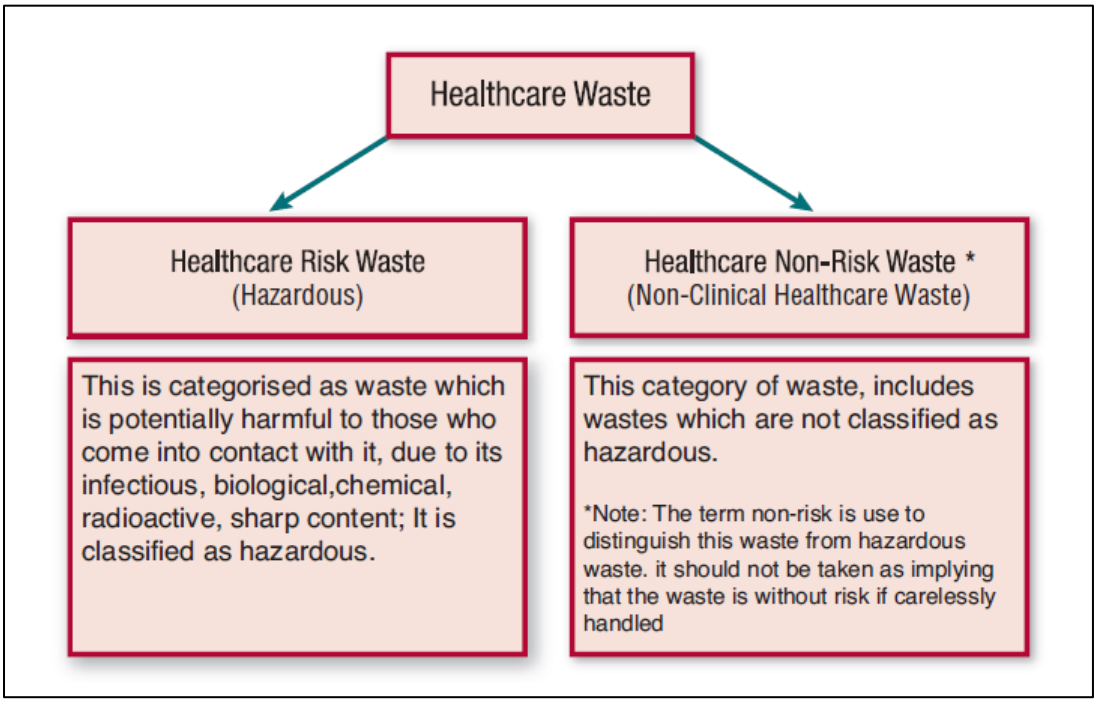

Figure 3.1 Healthcare Waste Categories (Source: HSE, *Waste Management Awareness Handbook* (2001)

Non-Risk/Non-Clinical Non-Hazardous Waste

The typical non-risk/non-clinical non-hazardous waste streams that will be generated will include the following typical waste categories:

- Dry Mixed Recyclables (DMR) – includes cardboard, non-confidential paper, newspaper, leaflets plastic packaging and bottles, aluminium cans, tins and Tetra Pak cartons;
- Confidential paper;
- Mixed Non-Recyclable /General Waste (MNR);
- Organic (food/catering) waste; and
- Glass.

In addition to the typical non-risk/non-clinical non-hazardous waste materials that will be generated on a daily basis, there will be some additional wastes generated on a regular basis that will need to be managed separately including:

- Green/garden waste from landscaping activities;
- Textiles;
- Batteries (non-hazardous) *note: hazardous batteries may also be generated which are referred to in Section 3.2.2*;
- WEEE including computers, printers and other ICT equipment (non-hazardous) *note: WEEE containing hazardous components may also be generated which are referred to in Section 3.2.2*; and
- Furniture (and from time to time other bulky wastes).

Non-Clinical Hazardous Waste

The typical non-clinical hazardous waste streams that will be generated will include the following:

- Printer/toner cartridges;
- Batteries (hazardous) *note: non-hazardous batteries may also be generated which are referred to in Section 3.2.1*;
- WEEE including computers, printers and other ICT equipment (containing hazardous components) *note: WEEE not containing hazardous components may also be generated which are referred to in Section 3.2.1*;
- Cleaning chemicals (solvents, pesticides, paints, adhesives, resins, detergents, etc.); and
- Light bulbs (Long Life, LED and Lilament bulbs).

Healthcare Risk Waste (Hazardous)

Healthcare risk waste will be generated from the treatment of clients and from contaminated projects associated with treatment. Figure 3.2 over shows the classification and colour coding of healthcare risk waste as presented in the HSE guidance document.

Not all of the waste types listed in Figure 3.2 will be generated at the medical unit as the unit will provide care services only and will not carry out significant surgical procedures or cancer care services.

The healthcare risk waste generated at the care centre will comprise waste disposed of in yellow bags (such as dressings, swabs, bandages, gloves, nappies etc.) and yellow sharps buckets (for waste such as needles, syringes, razors, stitch cutters etc.).

Figure 3.2 Segregation of Healthcare Risk Waste (Source: HSE and DOHC, *Healthcare Risk Waste Management* (2010) and HSE, *Waste Management Awareness Handbook* (2011))

3.3 European Waste Codes

In 1994, the *European Waste Catalogue* [18] and *Hazardous Waste List* [19] were published by the European Commission. In 2002, the EPA published a document titled the *European Waste Catalogue and Hazardous Waste List* [20], which was a condensed version of the original two documents and their subsequent amendments. This document has recently been replaced by the EPA '*Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [21], applicable since the 1st June 2015. This waste classification system applies across the EU and is the basis for all national and international waste reporting, such as those associated with waste collection permits, CORs, permits and licences and the EPA National Waste Database.

Under the classification system, different types of wastes are fully defined by a code. The List of Waste (LoW) code (also referred to as European Waste Code (EWC)) for typical waste materials expected to be generated during the operation of the proposed development are provided in Table 3.1, below.

Table 3.1 Typical Waste Types Generated and LoW Codes

Waste Material	LoW/EWC Code
Paper and Cardboard	20 01 01
Plastics	20 01 39
Metals	20 01 40
Mixed Non-Recyclable Waste	20 03 01
Glass	20 01 02
Biodegradable Kitchen Waste	20 01 08
Oils and Fats	20 01 25
Textiles	20 01 11
Batteries and Accumulators*	20 01 33* - 34
Printer Toner/Cartridges*	20 01 27* - 28
Green Waste	20 02 01
WEEE*	20 01 35*-36
Chemicals (solvents, pesticides, paints & adhesives, detergents, etc.) *	20 01 13*/19*/27*/28/29*30
Fluorescent tubes and other mercury containing waste*	20 01 21*
Bulky Wastes	20 03 07
Healthcare wastes (wastes from natal care, diagnosis, treatment or prevention of disease in humans, includes non-hazardous and hazardous wastes) *	18 01 01 -18 01 09*

* *Individual waste type may contain hazardous materials*

4.0 ESTIMATED WASTE ARISINGS

A waste generation model (WGM) developed by AWN has been used to predict waste types, weights and volumes expected to arise from operations within the proposed development. The WGM incorporates building area and use and combines these with other data, including Irish and US EPA waste generation rates.

The estimated quantum / volume of waste that will be generated from the residential units and amenity areas has been determined based on the predicted occupancy of the units. While the estimated quantum / volume of waste that will be generated from the commercial units is based upon floor area m^2 and its usage.

The estimated waste generation for the proposed development for the main waste types is presented in Table 4.1, 4.2 and 4.3

Table 4.1 *Estimated Waste Generation for Residential Apartment Units*

Waste Type	Waste Volume (m^3 / week)			
	Residential Apartment Block A (Combined)	**Residential Apartment Block B (Combined)**	**Residential Apartment Block A1 (Combined)**	**Residential Apartment Block B1 (Combined)**
Organic Waste	0.48	0.22	1.44	0.92
Dry Mixed Recyclables	3.38	1.52	10.18	6.55
Glass	0.09	0.04	0.28	0.18
Mixed Non-Recyclables	1.78	0.80	5.35	3.45
Total	**5.73**	**2.58**	**17.25**	**11.10**

Table 4.2 *Estimated Waste Generation for Residential Individual Houses/Duplexes and =Apartment Units*

Waste Type	Waste Volume (m^3 / week)			
	Residential Apartment Block Type F (Combined – Per Block)	**Individual House / Duplex 2 Bed (Individual)**	**Individual House / Duplex 3 Bed (Individual)**	**Individual House 4 Bed (Individual)**
Organic Waste	0.06	0.02	0.02	0.02
Dry Mixed Recyclables	0.41	0.11	0.13	0.18
Glass	0.01	<0.00	<0.00	<0.00
Mixed Non-Recyclables	0.28	0.07	0.08	0.09
Total	**0.76**	**0.20**	**0.23**	**0.29**

Table 4.3 *Estimated Waste Generation for Commercial Units*

Waste type	Waste Volume (m^3/week)		
	Retail & Crèche Block A (Combined)	**Retail, Crèche, Medical Block A1 (Combined)**	**Retail Block B (Combined)**
Organics	0.22	0.14	0.14
DMR	1.73	2.04	2.83
Glass	0.04	0.05	0.08
MNR	1.33	2.36	1.18
Confidential Paper	-	0.18	-
Medical Waste	-	0.14	-
Total	2.39	**4.78**	4.23

BS5906:2005 Waste Management in Buildings – Code of Practice [22] has been considered in the calculations of waste estimates. AWN's modelling methodology is based on recently published data and data from numerous other similar developments in Ireland and is based on AWN's experience, it provides a more representative estimate of the likely waste arisings from the proposed development.

5.0 WASTE STORAGE AND COLLECTION

This section provides information on how waste generated within the site will be stored and collected. This has been prepared with due consideration of the proposed site layout as well as best practice standards, local and national waste management

requirements, including those of MCC. In particular, consideration has been given to the following documents:

- *BS 5906:2005 Waste Management in Buildings – Code of Practice,*
- *EMR Waste Management Plan 2015 – 2021;*
- *Meath County Council, Meath County Development Plan 2021-2027 (2021);*
- MCC *'Waste Management (Segregation, Storage and Presentation of Household & Commercial Waste) Bye-Laws' (2018);*
- *DoHLGH, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities* (2020) [23]:
- *HSE, Waste Management Awareness Handbook; and*
- *HSE and DOHC, Healthcare Risk Waste Management: Segregation, Packaging and Storage Guidelines for Healthcare Risk Waste.*

Waste Storage Areas

Locations of all Waste Storage Areas (WSAs) can be viewed on the drawings submitted with the planning application under separate cover.

Residential Units Block A

Two (2 no.) shared communal WSA has been allocated within the development design for this residential apartment block. This has been strategically located at ground floor level, in close proximity to the cores.

Residential Units Block B

One (1 no.) shared communal WSA has been allocated within the development design for this residential apartment block. This has been strategically located at ground floor level, in close proximity to the cores.

Residential Units Block A1

Four (4 no.) shared communal WSAs have been allocated within the development design for this residential apartment block. These has been strategically located at basement level, in close proximity to the cores.

Residential Units Block B1

Two (2 no.) shared communal WSAs have been allocated within the development design for this residential apartment block. These have been strategically located at ground floor level, in close proximity to the cores.

Houses & Duplex Units

Duplexes and House will have their own individual WSAs allocated at the rear of their home where external access to the rear yard is possible. Where external access to the rear of the property is unavailable, bins will be stored at the front of the unit, in a screened area, shielded from view of the road.

Commercial Block A

One (1 no.) shared communal WSA has been allocated within the development design for the commercial units in block A to share. This has been strategically located at ground floor level, in close proximity to the cores.

Commercial Block A1

One (1 no.) shared communal WSA has been allocated within the development design for the commercial units in block A to share. This has been strategically located at ground floor level, in close proximity to the cores.

Additionally the medical unit will be required to allocate space within their own unit for the storage of medical hazardous waste.

Commercial Block B1

One (1 no.) shared WS A has been allocated within the development design for the commercial unit in blockB1. This has been strategically located at ground floor level, in close proximity to the unit.

Using the estimated waste generation volumes in Tables 4.1, above, the waste receptacle requirements for MNR, DMR, organic waste and glass have been established for the shared WSA. It is envisaged that all waste types will be collected on a weekly basis. The WSA has been appropriately sized to accommodate the weekly waste requirements for waste receptacles.

Residential Houses and Duplexes with their own individual waste stores and type Block F unit blocks will have sufficient space for a fortnightly waste receptacle collection.

Waste Storage Requirements

Estimated waste storage requirements for the operational phase of the proposed development are detailed in Table 5.1, below.

Table 5.1 *Waste storage requirements for the proposed development*

Area/Use	Bins Required				
	MNR[1]	DMR[2]	Organic	Glass	Additional
Houses / Duplex (Individual WSA)	1 x 240L	1 x 240L	1x 120L	-	-
Residential Units Block A (Combined)	2 x 1100L	3 x 1100L	2 x 240L	1 x 240L	-
Residential Units Block B (Combined)	1 x 1100L	2 x 1100L	1 x 240L	1 x 120L	-
Residential Units Block A1 (Combined)	5 x 1100L	10 x 1100L	6 x 240L	2 x 240L	-
Residential Units Block B1 (Combined)	3 x 1100L 1 x 240L	6 x 1100L	4 x 240L	1 x 240L	-
Residential Units Block F Per Block (Combined)	1 x 11000L	1 x 1100L	1 x 120L	1 x 120L	-
Commercial Block A (Combined)	2 x 1100L	2 x 1100L	1 x 240L	1 x 120L	-

Area/Use	Bins Required				
	MNR[1]	DMR[2]	Organic	Glass	Additional
Commercial Block A1 (Combined)	2 x 1100L 1 x 240L	2 x 1100L	1 x 240L	1 x 120L	-
Commercial Block B1 (Combined)	1 x 1100L	2 x 1100L	1 x 240L	1 x 120L	-
Medical Haz Waste Only Block A1	-	-	-	-	1 x 240L Medical Waste 2 x Sharps buckets

Note: 1 = Mixed Non-Recyclables
2 = Dry Mixed Recyclables

The waste receptacle requirements have been established from distribution of the total weekly waste generation estimate into the holding capacity of each receptacle type. Waste storage receptacles as per Table 5.1, above, (or similar appropriate approved containers) will be provided by the facilities management company in the residential WSA.

The types of bins used will vary in size, design and colour dependent on the appointed waste contractor. However, examples of typical receptacles to be provided in the WSAs are shown in Figure 5.1. All waste receptacles used will comply with the SIST EN 840-1:2020 and SIST EN 840-2:2020 standards for performance requirements of mobile waste containers, where appropriate.

Figure 5.1 *Typical waste receptacles of varying size (240 L and 1100 L)*

5.1 Waste Storage – Residential Units

Residents will be required to segregate waste into the following main waste streams:

- DMR;
- MNR;
- Glass; and
- Organic waste.

Residents in apartment blocks will be required to take their segregated waste materials to their designated shared WSA and deposit their segregated waste into the appropriate bins.

It is anticipated that residents in duplexes and houses with external access to the rear of the property and will store waste in bins at the back areas of the houses and duplexes. For houses and duplexes with no external access to the rear, a dedicated shielded area for storage of 2 no. 240l and 1 no. 120 l litre wheelie bins have been allocated at the front of the property.

Provision will be made in all residential units to accommodate 3 no. bin types to facilitate waste segregation at source. An example of a potential 3 bin storage system is provided in figure 5.32 below.

Figure 5.2 Example three bin storage system to be provided within the unit design

Each bin / container in the WSAs will be clearly labelled and colour coded to avoid cross contamination of the different waste streams. Signage will be posted above or on the bins to show exactly which waste types can be placed in each bin.

Access to the shared residential WSAs will be restricted to authorised residents, facilities management and waste contractors by means of a key or electronic fob access.

Other waste materials such as textiles, batteries, lightbulbs, WEEE, cooking oil and printer toner / cartridges will be generated less frequently by the residents. Residents will be required to identify suitable temporary storage areas for these waste items within their own units and dispose of them appropriately. Further details on additional waste types can be found in Section 5.6.

5.2 Waste Storage – Crèche (Commercial)

Staff will be required to segregate their waste into the following waste categories within their own unit:

- DMR;
- MNR;
- Glass; and
- Organic waste.

As required, the crèche staff will be required to take the segregated waste materials to the designated commercial WSA in their block and deposit the segregated waste into the appropriate bins.

Each bin/container in the WSAs will be clearly labelled and colour coded to avoid cross contamination of the different waste streams. Signage will be posted above or on the bins to show exactly which waste types can be placed in each bin.

Access to the WSAs will be restricted to authorised commercial unit staff, crèche facility staff, facilities management and waste contractors by means of a key or electronic fob access.

Other waste materials such as textiles, batteries, lightbulbs, WEEE, cooking oil and printer toner / cartridges will be generated less frequently. The crèche tenant will be required to identify suitable temporary storage areas for these waste items within their own unit and dispose of them appropriately. Further details on additional waste types can be found in Section 5.6.

5.3 Waste Storage – Retail Units (Commercial)

The commercial tenants will be required to segregate waste within their own units into the following main waste types:

- DMR;
- MNR;
- Glass; and
- Organic waste.

As required, the staff will need to bring segregated DMR, MNR, glass and organic to their designated WSA and deposit their segregated waste into the appropriate bins.

Suppliers for the commercial tenants should be requested by the tenants to make deliveries in reusable containers, minimize packaging or remove any packaging after delivery, where possible, to reduce waste generated by the proposed development.

If any kitchens are allocated in commercial unit areas, this will contribute a significant portion of the volume of waste generated on a daily basis, and as such it is important that adequate provision is made for the storage and transfer of waste from these areas to the WSA.

If kitchens are required it is anticipated that waste will be generated in kitchens throughout the day, primarily at the following locations:

- Food Storage Areas (i.e. cold stores, dry store, freezer stores and stores for decanting of deliveries);
- Meat Preparation Area;
- Vegetable Preparation Area;
- Cooking Area;
- Dish-wash and Glass-wash Area; and
- Bar Area

Small bins will be placed adjacent to each of these areas for temporary storage of waste generated during the day. Waste will then be transferred from each of these areas to the shared commercial WSA.

All bins / containers in the commercial tenants' areas as well as in the WSA will be clearly labelled and colour coded to avoid cross contamination of the different waste streams. Signage will be posted above or on the bins to show exactly which wastes can be put in each.

Other waste materials such as textiles, batteries, lightbulbs, WEEE, cooking oil and printer toner / cartridges will be generated less frequently. The tenants will be required

to store these waste types within their own unit and arrange collection with an appropriately licensed waste contractor. Facilties management may arrange collection, depending on the agreement. Further details on additional waste types can be found in Section 5.6.

5.4 Waste Storage – Medical Unit

The Medical unit tenant(s) will segregate waste into the following main waste streams:

- DMR;
- MNR;
- Organic waste;
- Glass;
- Confidential Paper; and
- Medical waste

Waste will be generated from a wide variety of activities throughout the proposed medical and pharmacy units. Health care risk wastes (HCRW) will typically be generated in the clinical treatment and consultation rooms. DMR and MNR waste will be generated throughout the building. Confidential and non-confidential paper waste will mainly be generated in offices and staff workstations.

Appropriate colour coded, labelled and secured receptacles will be required for HCRW generated in the building as set out in the HSE, *Waste Management Awareness Handbook* (and illustrated in Figure 3.2). The required HCRW receptacles will be:

- Yellow bags (stored in rigid bins e.g. 60L pedal bin)
- Yellow rigid buckets with yellow lid

These waste receptacles will be stored in designated clinical treatment and consultation rooms. Facilities or cleaning staff will transfer the risk waste bags/buckets on a regular basis to a dedicated medical risk WSA located within the units own footprint. This WSA will have 1 no. 240 litre yellow clinical waste bin and 2 no. sharps bucket.

In addition, clinical waste bags and sharps buckets may be temporarily transferred to utility stores located across the building during the day prior to transfer to the healthcare risk WSA. Where required, these temporary storage locations should have 60/80 litre pedal bins for yellow risk waste bags and shelf storage for sharps buckets. Facilities or cleaning staff will transfer this waste to the dedicated healthcare risk WSA on a daily basis.

Non-risk waste receptacles for DMR and MNR will be strategically positioned in the treatment rooms, consulting rooms and offices as necessary.

Where suitable, it is proposed that office and workstation areas will utilise area waste stations (AWSs) for non-risk waste streams as opposed to using individual receptacles at desks. AWSs should be conveniently located within 10-15m of workstations, where possible, and would typically include:

- 1 no. 60/80 litre receptacle for dry mixed recyclables;
- 1 no. 60/80 litre receptacle for mixed non-recyclables; and
- 1 no. 60/80 litre receptacle for confidential paper.

In addition, smaller bins or caddies for organic and glass waste should be located in the micro kitchen areas. In addition, smaller bins or caddies for organic and glass waste should be located in the micro kitchen areas. Containers for storage of waste electrical and electronic equipment (WEEE), waste batteries and light bulbs may also be provided in an internal non-risk waste storage area.

Furniture and other bulk items may be generated infrequently in the medical unit. The medical unit staff will be required to identify suitable temporary storage areas for these waste items within the healthcare facility and dispose of them appropriately. Further details on additional waste types can be found in Section 5.6.

5.5 Waste Collection

There are numerous private contractors that provide waste collection services in the MCC area. All waste contractors servicing the proposed development must hold a valid waste collection permit for the specific waste types collected. All waste collected must be transported to registered / permitted / licensed facilities only.

Bins from the proposed development's shared WSAs will be brought to staging / collection points adjacent to the internal roads within the development. The waste receptacles will be moved by the waste contractor or facilities management immediately prior to collection. Bins will be returned to the WSA immediately following collection in line with the waste bye-laws.

Residents in duplexes and houses with individual WSAs will be responsible for transferring their owns bins to the curb for collection by the nominated waste contractor.

The staging areas are such that it will not obstruct traffic or pedestrians (allowing a footway path of at least 1.8m, the space needed for two wheelchairs to pass each other) as is recommended in the Design Manual for Urban Roads and Streets (2019) [21].

A trolley / tug or suitable vehicle may be required to convey the bins to and from the collection areas. The facilities management, residents or waste contractor will ensure that empty bins are promptly returned to the WSAs after collection / emptying in line with the MCC waste bye-laws.

Suitable access and egress has been provided to enable the bins to be moved easily from the WSAs to the waste collection vehicles on the appropriate days. Waste will be collected at agreed days and times by the nominated waste contractors.

All waste receptacles will be clearly identified as required by waste legislation and the requirements of the MCC *Waste Bye-Laws*. Waste will be presented for collection in a manner that will not endanger health, create a risk to traffic, harm the environment or create a nuisance through odours or litter.

It is recommended that bin collection times are staggered to reduce the number of bins required to be emptied at once and the time the waste vehicle is on-site. This will be determined during the process of appointment of a waste contractor.

5.6 Additional Waste Materials

In addition to the typical waste materials that are generated on a daily basis, there will be some additional waste types generated from time to time that will need to be managed separately. A non-exhaustive list is presented below.

<u>Green Waste</u>
Green waste may be generated from gardens, external landscaping and internal plants / flowers. Green waste generated from landscaping of external areas will be removed by external landscape contractors. Green waste generated from gardens internal plants / flowers can be placed in the organic waste bins.

Batteries

A take-back service for waste batteries and accumulators (e.g. rechargeable batteries) is in place in order to comply with the S.I. No. 283/2014 - European Union (Batteries and Accumulators) Regulations 2014, as amended. In accordance with these regulations, consumers are able to bring their waste batteries to their local civic amenity centre or can return them free of charge to retailers which supply the equivalent type of battery, regardless of whether or not the batteries were purchased at the retail outlet and regardless of whether or not the person depositing the waste battery purchases any product or products from the retail outlet.

The commercial tenants cannot use the civic amenity centre. They must segregate their waste batteries and either avail of the take-back service provided by retailers or arrange for recycling / recovery of their waste batteries by a suitably permited / licenced contractor. Facilties management may arrange collection, depending on the agreement.

Waste Electrical and Electronic Equipment (WEEE)

The WEEE Directive (Directive 2002/96/EC) and associated Waste Management (WEEE) Regulations have been enacted to ensure a high level of recycling of electronic and electrical equipment. In accordance with the regulations, consumers can bring their waste electrical and electronic equipment to their local recycling centre. In addition, consumers can bring back WEEE within 15 days to retailers when they purchase new equipment on a like for like basis. Retailers are also obliged to collect WEEE within 15 days of delivery of a new item, provided the item is disconnected from all mains, does not pose a health and safety risk and is readily available for collection.

As noted above, the commercial tenants cannot use the civic amenity centre. They must segregate their WEEE and either avail of the take-back / collection service provided by retailers or arrange for recycling / recovery of their WEEE by a suitably permited / licenced contractor. Facilties management may arrange collection, depending on the agreement.

Printer Cartridge / Toners

It is recommended that a printer cartridge / toner bin is provided in the commercial unit, where appropriate. The commercial tenant will be required to store this waste within their unit and arrange for return to retailers or collection by an authorised waste contractor, as required.

Waste printer cartridge / toners generated by residents can usually be returned to the supplier free of charge or can be brought to a civic amenity centre.

Chemicals

Chemicals (such as solvents, paints, adhesives, resins, detergents, etc) are largely generated from building maintenance works. Such works are usually completed by external contractors who are responsible for the off-site removal and appropriate recovery / recycling / disposal of any waste materials generated.

Any waste cleaning products or waste packaging from cleaning products generated in the commercial units that is classed as hazardous (if they arise) will be appropriately stored within the tenants' own space. Facilties management may arrange collection, depending on the agreement.

Any waste cleaning products or waste packaging from cleaning products that are classed as hazardous (if they arise) generated by the residents should be brought to a civic amenity centre.

Light Bulbs
Waste light bulbs (fluorescent, incandescent and LED) may be generated by lighting at the commercial units. It is anticipated that commercial tenants will be responsible for the off-site removal and appropriate recovery / disposal of these wastes. Facilties management may arrange collection, depending on the agreement.

Light bulbs generated by residents should be taken to the nearest civic amenity centre for appropriate storage and recovery / disposal.

Textiles
Where possible, waste textiles should be recycled or donated to a charity organisation for reuse. Commercial and residential tenants will be responsible for disposing of waste textiles appropriately.

Waste Cooking Oil
If the commerial tenants use cooking oil, waste cooking oil will need to be stored within the unit on a bunded area or spill pallet and regular collections by a dedicated waste contractor will need to be organised as required. Under sink grease traps will be installed in any cooking space.

If the residents generate waste cooking oil, this can be brought to a civic amenity centre.

Furniture & Other Bulky Waste Items
Furniture and other bulky waste items (such as carpet, etc.) may occasionally be generated by the commercial tenant. The collection of bulky waste will be arranged, as required by the tenant. If residents wish to dispose of furniture, this can be brought a civic amenity centre.

Abandoned Bicycles
Bicycle parking areas are planned for the development. As happens in other developments, residents sometimes abandon faulty or unused bicycles, and it can be difficult to determine their ownership. Abandoned bicycles should be donated to charity if they arise or Facilties management willmay arrange collection by a licensed waste contractor.

Covid-19 Waste

Any waste generated by residential and commercial tenants that have tested positive for Covid-19 should be manged in accordance with the current Covid-19 HSE Guidelines at the time that that waste arises. At the time this report was prepared, the HSE Guidelines require the following procedure for any waste from a person that tests positive for Covid-19:

- Put all waste (gloves, tissues, wipes, masks) from that person in a bin bag and tie when almost full;
- Put this bin bag into a second bin bag and tie a knot;
- Store this bag safely for 3 days, then put the bag into the non-recyclable waste / general waste wheelie bin for collection / emptying.

Please note that this guidance is likely to be updated by the time the proposed Development is open and occupied and the relevant guidance at the time will need to be reviewed.

5.7 Waste Storage Area Design

The shared WSAs will be designed and fitted-out to meet the requirements of relevant design standards, including:

- Be fitted with a non-slip floor surface;
- Provide ventilation to reduce the potential for generation of odours with a recommended 6-10 air changes per hour for a mechanical system for internal WSAs;
- Provide suitable lighting – a minimum Lux rating of 220 is recommended;
- Appropriate sensor controlled lighting;
- Be easily accessible for people with limited mobility;
- Be restricted to access by nominated personnel only;
- Be supplied with hot or cold water for disinfection and washing of bins;
- Be fitted with suitable power supply for power washers;
- Have a sloped floor to a central foul drain for bins washing run-off;
- Have appropriate graphical and written signage placed above and on bins indicating correct use;
- Have access for potential control of vermin, if required;
- Robust design of doors to bin area incorporating steel sheet covering where appropriate; and
- Be fitted with CCTV for monitoring.

The facilities company will be required to maintain the waste storage areas in good condition as required by the MCC Waste Bye-Laws.

Access to the Healthcare Risk WSA will be restricted to authorised staff, be sufficient to allow a 240 litre bin to pass easily into and out of the room for transfer to the waste collection zone.

In accordance with the HSE publication *National Hospital Office – National Cleaning Manual Appendices*, the following specifications are also required:

- The waste receptacle including all component parts should be clean and well-maintained with no blood or body substances, rust, dust, dirt, debris and spillages.
- Bins should be emptied as appropriate, with fresh liners fitted in accordance with local and national policy. Bags should be removed and labelled/tagged when no more than ¾ full and stored appropriately in a secure location.
- There should be an agreed schedule in operation for replacement of sani-bins in place.
- The sani-bin/nappy bin, including all component parts should be clean and well-maintained with no blood or body substances, rust, dust, dirt, debris and spillages.

6.0 CONCLUSIONS

In summary, this OWMP presents a waste strategy that addresses all legal requirements, waste policies and best practice guidelines and demonstrates that the required storage areas have been incorporated into the design of the proposed development.

Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus contributing to the targets set out in the *EMR Waste Management Plan 2015 – 2021*.

Adherence to this plan will also ensure that waste management at the development is carried out in accordance with the requirements of the *MCC Waste Bye-Laws.*

The waste strategy presented in this document will provide sufficient storage capacity for the estimated quantity of segregated waste. The designated areas for waste storage will provide sufficient room for the required receptacles in accordance with the details of this strategy.

7.0 REFERENCES

1. Waste Management Act 1996 as amended.
2. Environmental Protection Agency Act 1992 (Act No. 7 of 1992) as amended.
3. Litter Pollution Act 1997 (Act No. 12 of 1997) as amended.
4. Eastern-Midlands Waste Region, *Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021* (2015).
5. Meath County Council (MCC) *'Waste Management (Segregation, Storage and Presentation of Household & Commercial Waste Bye-Laws'* (2018).
6. Health Service Executive (HSE), *Waste Management Awareness Handbook* (2011).
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Chapter 12 'Cultural Heritage (Archaeology & Architectural)' - Appendices

Appendix 1 – Recorded Monuments within 1km of the Proposed Development's planning boundary.

RMP Reference	Classification	Townland
ME045-003----	Ringfort – rath	KILLEGLAND
ME045-006----	Burial ground	BALTRASNA
ME045-004----	Church	KILLEGLAND
ME045-026----	Souterrain	BALTRASNA
ME045-005----	Castle - tower house	KILLEGLAND
ME045-040----	Kiln - corn-drying	KILLEGLAND
ME045-030----	Fulacht fia	BALTRASNA
ME045-033----	Field boundary	BALTRASNA
ME045-041----	Mill - unclassified	KILLEGLAND
ME045-032----	Field boundary	FLEENSTOWN LITTLE
ME045-031----	Fulacht fia	BALTRASNA
ME045-051----	Ring-ditch	DONAGHMORE
ME045-046----	Ring-ditch	BALTRASNA
ME045-049----	Enclosure	DONAGHMORE
ME045-045----	Ring-ditch	BALTRASNA
ME045-004001-	Graveyard	KILLEGLAND
ME045-004002-	Ringfort - rath	KILLEGLAND
ME045-067----	Ringfort - rath	KILLEGLAND
ME045-033005-	Well	BALTRASNA
ME045-004006-	Souterrain	KILLEGLAND
ME045-075002-	Ring-ditch	KILLEGLAND
ME045-075003-	Ring-ditch	KILLEGLAND
ME045-033001-	Well	BALTRASNA
ME045-033004-	Habitation site	BALTRASNA
ME045-033003-	Kiln - corn-drying	BALTRASNA
ME045-041001-	Fish-pond	KILLEGLAND
ME045-005001-	Bawn	KILLEGLAND
ME045-005002-	Ford	KILLEGLAND
ME045-070----	Burnt mound	KILLEGLAND
ME045-073----	Ring-ditch	KILLEGLAND
ME045-075----	Ring-ditch	KILLEGLAND
ME045-033002-	Field system	BALTRASNA
ME045-071----	Settlement cluster	KILLEGLAND
ME045-073001-	Metalworking site	KILLEGLAND
ME045-077----	Enclosure	KILLEGLAND
ME045-075004-	Ring-ditch	KILLEGLAND
ME045-075001-	Ringfort - rath	KILLEGLAND
ME045-075005-	Ring-ditch	KILLEGLAND
ME045-072----	Enclosure	KILLEGLAND
ME045-004003-	Souterrain	KILLEGLAND
ME045-004005-	Souterrain	KILLEGLAND
ME045-076001-	Ring-ditch	KILLEGLAND
ME045-004004-	Ecclesiastical enclosure	KILLEGLAND
ME045-076002-	Ring-ditch	KILLEGLAND

Appendix 2 – Results of Leigh's 2022 Geophysical Survey

GEOPHYSICAL SURVEY

REPORT

Milltown,

Ashbourne,

County Meath

Date:
15/02/2022

Licence: 22R0015

J. M. Leigh Surveys Ltd.
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GEOPHYSICAL SURVEY SUMMARY SHEET
MILLTOWN & BALTRASNA, ASHBOURNE, COUNTY MEATH

Site Name	Ashbourne	**Ref No.**	22003
Townland	Milltown & Baltrasna	**Licence No.**	22-R-0015
County	Meath	**Licence Holder**	Joanna Leigh
ITM (centre)	E706460, N751340	**Purpose**	Pre-planning
Client	Aspect Developments Ltd.	**Reference No.**	N/A

Ground Conditions	Survey was conducted within ten agricultural fields. Overall ground conditions were fair; the northern half comprised long grass and the southern half comprised short pasture.
Survey Type	Detailed gradiometer survey totalling c. 20 hectares.

Summary of Results

The geophysical survey has successfully identified multiple circular responses which are of archaeological potential. Five of these measure c.6m-7m in diameter and it is speculated that they may represent small enclosures or barrow features. Two slightly larger sub-circular responses (11.5m & 15m in diameter) have also been identified which are of clear archaeological potential. These most likely represent enclosure sites.

Further responses and trends within the data may represent associated pit-type features although interpretation is cautious. An irregular ditched response in Area H may represent a short, ditched feature comprising of burnt material.

Field Staff	Joanna Leigh & Susan Curran		
Report Date	15/02/2022	**Report Author**	Susan Curran

Contents

Geophysical Survey Report
Milltown & Baltrasna, Ashbourne, County Meath

1 Introduction

1.1 A geophysical survey has been conducted by J. M. Leigh Surveys Ltd. at a site in the townlands of Milltown and Baltrasna, Ashbourne, Co. Meath. The survey was requested by Yvonne Whitty on behalf of Aspect Developments Ltd. The survey forms part of a wider pre-planning archaeological investigation.

1.2 The application area is contained within ten agricultural fields (Areas A to J) in the south of Ashbourne, County Meath. The Dublin Road (R135) is located to the east and residential developments border the site to the north and north-west. The site is bounded by agricultural fields to the south and west and by further fields and a small number of domestic dwellings to the east. Figure 1 presents the site and survey location at a scale of 1:4,000.

1.3 There are no recorded monuments within the application area. However, a geophysical survey was conducted in the fields to the west in 2020 (J. Leigh 20R0164). The survey was undertaken to investigate several sites previously recorded as cropmark features. One of those identified included a 'Ringfort – rath' (ME045-067) which lies c. 150m to the west of the current application area, as presented in Figure 1.

1.4 Further monuments in the vicinity include a recorded 'Burial ground' (ME045-006) situated c. 400m to the south-west and a 'Souterrain' (ME045-026) which lies c.560m to the south-east. A cluster of monuments in the environs of Killegland Church (ME045-004) are located c. 540m to the north-west; these include a 'Graveyard' (ME045-004001), 'Ecclesiastical enclosure' (ME045-004004), 'Ringfort – rath' (ME045-004002) and three 'Souterrains' (ME045-004003, ME045-004005 & ME045-004006).

1.5 The main aim of the survey was to identify any geophysical responses that may represent previously unknown archaeological remains within the application area. The detailed gradiometer survey was conducted under licence 22R0015 issued by the Department of Housing, Local Government and Heritage.

2 Survey ground conditions and further information (Figure 1)

2.1 The survey area was contained within ten pasture fields (Areas A to J).

2.2 The northern half of the application area (Areas A to F) largely comprised long grass with rutted ground in places. A small field in the south-eastern corner (immediately south of Area C) was inaccessible and not suitable for survey due to overgrown vegetation. Area B comprised a house and garden, survey was conducted here where accessible. A wire fence demarcating the garden has resulted in considerable localised magnetic disturbance.

2.3 The southern half of the application area (Areas G to J) largely comprised short pasture; ground conditions were good. Areas I and J were waterlogged in places; particularly in the eastern half of Area I and along the northern boundary of Area J.

3 Survey Methodology

3.1 A detailed gradiometer survey detects subtle variations in the local magnetic field and measurements are recorded in nano-Tesla (nT). Some archaeological features such as ditches, large pits and fired features have an enhanced magnetic signal and can be detected through recorded survey.

3.2 Data was collected with a Bartington Grad 601-2 instrument. This is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey fast and effective.

3.3 The instrument is calibrated in the field to ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.01nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.

3.4 All data was collected in ‘zigzag’ traverses. Grid orientation remained constant throughout to facilitate the data display and interpretation.

3.5 Data was collected with a sample interval of 0.25m and a traverse interval of 1m, providing 6400 readings per 40m x 40m grid. The survey grid was set out using a GPS VRS unit. Survey tie-in information is available upon request.

3.6 The survey methodology, data presentation and report content adhere to the European Archaeological Council (EAC) (2016) ‘Guidelines for the use of Geophysics in Archaeology’.

4 Data display

4.1 An overall summary greyscale image and accompanying interpretation diagram are presented in Figures 2 and 3, at a scale of 1:2,000. Further greyscale images and accompanying interpretation diagrams are presented in Figures 4-7 at a scale of 1:1,500.

4.2 Numbers in parenthesis in the text refer to specific responses highlighted in the interpretation diagrams (Figures 3, 5 & 7).

4.3 Isolated ferrous responses highlighted in the interpretation diagram most likely represent modern ferrous litter and debris and are not of archaeological interest. These are not discussed in the text unless considered relevant.

4.4 The raw gradiometer data is presented in archive format in Appendix A1.01 and A1.02. The raw data is displayed as a greyscale image and xy-trace plot. The archive plots are used to aid interpretation of the results and are used for reference only. The archive plots are available as PDF images upon request.

4.5 The display formats referred to above and the interpretation categories are discussed in the summary technical information section at the end of this report.

5 Survey Results

Areas A to F (Figures 4 & 5)

Area A

5.1 A series of poorly defined positive magnetic responses form a fragmented linear trend (1) in the western half of Area A. This is oriented approximately north/south, parallel with the current field boundary. The response is suggestive of a ditch and most likely represent a former field boundary.

5.2 In the south-eastern corner of Area A, an amorphous area of magnetic disturbance (2) has been identified, close to the field entrance to Area E. Although it is possible that this is modern in origin, an archaeological interpretation can also be considered. It is possible that a spread of burnt material of archaeological interest is represented here. This interpretation is cautious but must be considered.

5.3 Two broad amorphous magnetic responses (3) are evident in the southern half of Area A. Although it is possible that they represent pit-type features, interpretation is tentative. They have no clear form and may equally represent natural variations within the sub-soil.

5.4 Further isolated responses are evident in Area A. However, no clear pattern is evident, and they may represent more deeply buried ferrous material. An archaeological interpretation is cautious.

Area B

5.5 Area B is dominated by modern magnetic disturbance. This is caused by the house in the north-eastern corner and the associated fence which runs through Area B. No clear responses of interest have been identified.

Area C

5.6 Area C is dominated by modern ferrous disturbance, suggesting significant ground disturbance has occurred. Given the extent of this interference, it is possible that anomalies of potential archaeological interest may be obscured.

5.7 A poorly defined linear trend (4) runs north/south in the western half of Area C. This may represent a former field division; however, this interpretation is cautious given the level of modern magnetic disturbance in this area.

Area D

5.8 No clear responses were record in Area 5. An isolated response (5) may be of interest but may equally represent more deeply buried ferrous material.

Area E

5.9 A series of responses (6) form a curvilinear pattern in the southern half of Area E. This measures c.7m in overall diameter and is suggestive of an enclosure, possibly a barrow. This is of clear archaeological potential.

5.10 To the east of (6) a poorly defined linear trend (7) runs approximately north/south, parallel to the present field boundary. This most likely represents a former field division. A similar response (17) has been identified in Area H and it is likely that this represents a continuation of (7).

5.11 Isolated responses (8) are evident between 5m and 12m to the south-east of (6). It is possible that these represent pit-type features associated with (6).

Area F

5.12 Several poorly defined short linear trends have been identified in Area F. These most likely reflect natural variations in the subsoil and are not considered to be of archaeological potential.

Areas G to J (Figures 6 & 7)

Area G

5.13 A responses and associated trend (9) form a curvilinear pattern in the north-western corner of Area G, close to the field boundary. This measures c.6m in overall diameter. The response has a magnetic signature indicative of archaeology, and it is possible that a plough damaged archaeological feature is represented here. Although the archaeological pattern is difficult to discern, the response and trend (9) are of possible archaeological interest.

5.14 A positive magnetic response (10) has been identified in the south-western corner of Area G. The response is suggestive of a short, ditched feature. However, an archaeological interpretation is tentative as no coherent pattern is evident and it may equally represent natural variations in the sub-soil.

Area H

5.15 A series of clearly defined positive magnetic responses form a curvilinear pattern (11) in the northern half of Area H, adjacent to the field boundary. The responses are indicative of a ditched feature, most likely representing an enclosure. This

measures c.15m in overall diameter and appears to be truncated by the field boundary with Area E. The boundary here is c.11m wide and it is not possible to identify any traces of (11) within Area E. It is speculated that (11) represents the southern half of a circular enclosure.

5.16 Approximately 40m to the south-west of (11), a series of positive magnetic responses and trends (12) form a vague curvilinear pattern measuring c.7m in overall diameter. Although difficult to discern, it is possible that the remains of a small enclosure or barrow site are represented here. Although tentative, an archaeological interpretation must be considered.

5.17 A series of responses (13) form a circular pattern c. 50m south of (12). The response measures c.7m in overall diameter with a clear gap in the north-eastern quadrant. The response is indicative of a ditched enclosure, possibly a barrow. This is of clear archaeological potential.

5.18 Approximately 40m south of (13), a series of responses (14) and trends form a curvilinear pattern similar to (12). The responses are less well defined than (12) and (13) and it is speculated that this may represent the partial remains of a ploughed-out enclosure, possibly another barrow. This measures c. 6.5m in diameter and is considered to be of archaeological potential.

5.19 Two short responses (15) form an irregular pattern at the north-west of Area H. This lies c.60m from (11) and c.15m west of (12). Although a clear pattern is not evident, the magnetic signature is consistent with archaeological responses, possibly containing burnt material. It is possible that the remains of an irregularly shaped ditched feature are represented here, and an archaeological interpretation must be considered.

5.20 In the vicinity of (11) there are numerous isolated responses. Although these may represent more deeply buried ferrous debris, it is possible that pit-type features associated with (11) have been recorded. In particular, the responses (16) have a clear magnetic signature indicative of archaeology. These may represent large pit features comprising of burnt material. An archaeological interpretation is preferred.

5.21 A series of poorly defined linear trends (17) run approximately north/south in the eastern half of Area H, parallel to the modern field boundary. This appears to be a continuation of the possible field division (7) which was identified to the north in Area E. A further trend (18) extends westwards and perpendicular to (17), It is likely that

this represents another field division which may be associated with the same phase of activity.

5.22 Multiple broad responses (19) are evident throughout Area H. They are suggestive of isolated pit-type responses. However, an archaeological interpretation is cautious as they do not form a coherent pattern. It is possible that they represent more deeply buried ferrous material. The archaeological potential of these isolated responses is unclear.

Area I

5.23 Similar isolated responses (20) are evident in Area I. Again, an archaeological interpretation is cautious as there is no clear pattern evident.

Area J

5.24 A series of poorly defined magnetic responses and trends (21) form a curvilinear pattern in the eastern half of Area J. This measures c.11.5m in overall diameter with a possible gap in the south. The response is suggestive of a circular ditched feature, possibly a ploughed-out enclosure. Although poorly defined, this is of archaeological potential.

5.25 Two areas of increased magnetic response (22) are evident in the northern half of Area J. While it is possible that they represent spreads of archaeological material, an archaeological interpretation is tentative as they may equally represent more recent ground disturbance.

5.26 Two linear responses (23) have been identified c.15m east of (21). These are poorly defined and may represent former field divisions.

6 Conclusion

6.1 The survey has successfully identified several areas of archaeological potential, particularly in Area H which comprises several responses of archaeological interest.

6.2 Five sub-circular ditch type responses of clear archaeological potential have been identified in Areas E, G and H. These measure c.6m-7m in diameter and are indicative of small sub-circular enclosures, most likely barrows; this is speculative. Responses (6) and (13) are very clearly defined, with a gap evident in the north-eastern quadrant of (13). The remaining responses, (9), (12) and (14) are less well defined, with only part of the enclosing feature evident. It is speculated that they have been plough damaged. All five are considered to be of archaeological potential.

6.3 Two larger possible enclosures, (11) and (21) have been identified in Areas H and J. While only the southern half of (11) is evident, its overall diameter measures c.15m. Response (21) is less well defined and has an overall diameter of c.11.5m. These most likely represent the remains of sub-circular ditched enclosures and are of archaeological potential.

6.4 A sub-linear response has been identified within the cluster of responses in the northern half of Area H. Although irregular in shape, its signature is indicative of archaeology and may represent a short, ditched feature.

6.5 Possible areas of burning have been identified in Areas H and J, those in Area H are in relative proximity to the probable enclosures (11) and (12). The responses may represent pits or spreads of burnt material and an archaeological interpretation must be considered.

6.6 Possible former field boundaries have been identified. A linear trend in Area E appears to extend southwards into Area H where a perpendicular offshoot has also been identified. Likewise, linear responses in Areas A and J are suggestive of former field boundaries. A poorly defined linear trend in Area C may represent a further field division. The probable field divisions are parallel with the north/south boundaries of the modern field system which are largely consistent with those depicted on OS 6inch and 25inch mapping. It is speculated therefore, that the probable field divisions identified on the geophysical survey may predate the OS historic mapping.

6.7 Consultation with a licensed archaeologist and with the Department of Housing, Local Government and Heritage is recommended to establish if any additional archaeological works are required.

7 Technical Information Section

Instrumentation & Methodology

Detailed Gradiometer Survey

Detailed gradiometer survey can either be targeted across a specific area of interest or conducted as a blanket survey across an entire application area, often as a standalone methodology.

Sampling methodologies can vary but a typical survey is conducted with a sample interval of 0.25m and a traverse interval of 1m. This allows detection of potential archaeological responses. Data is often collected in grids measuring 40m x 40m, with the data displayed accordingly. A more detailed survey methodology may be applied where archaeological remains are thought likely. This can sometimes produce results with a more detailed resolution. A survey with a grid size of 20m x 20m and a traverse interval of 0.5m will provide a data set with high resolution.

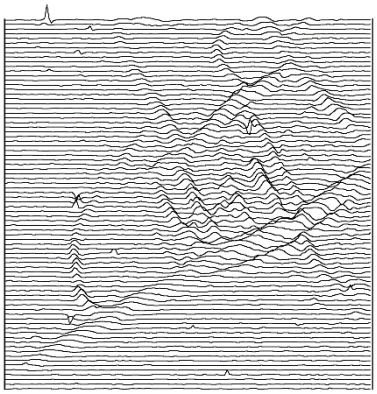
Bartington GRAD 601-2

The Bartington Grad 601-2 instrument is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey very fast and effective. The sensors have a separation of 1m allowing greater sensitivity.

Frequent realignment of the instruments and zero drift correction ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.1nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.

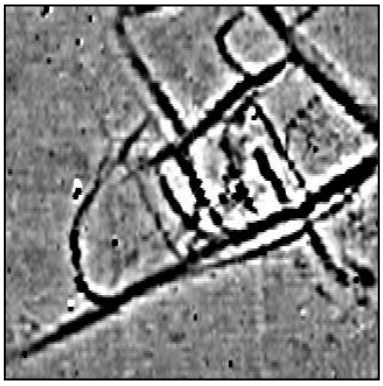
Gradiometer Data Display & Presentation

XY Trace



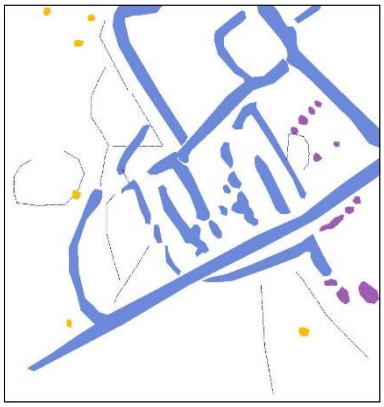
The data are presented as a series of linear traces, enabling a semi-profile display of the respective anomalies along the X and Y-axes. This display option is essential for distinguishing between modern ferrous materials (buried metal debris) and potential archaeological responses. The XY trace plot provides a linear display of the magnitude of the response within a given data set.

*Greyscale**



As with dot density plots, the greyscale format assigns a cell to each datum according to its location on the grid. The display of each data point is conducted at very fine increments, allowing the full range of values to be displayed within the given data set. This display method also enables the identification of discrete responses that may be at the limits of instrument detection. In the summary diagrams processed, interpolated data is presented. Raw un-interpolated data is presented in the archive drawings along with the xy-trace plots.

Interpretation



An interpretation of the data is made using many of the plots presented in the final report, in addition to examination of the raw and processed data. The project managers' knowledge and experience allow a detailed interpretation of the survey results with respect to archaeological potential.

**XY Trace and raw greyscale plots are presented in archive form for display of the raw survey data. Summary greyscale images of the interpolated data are included for presentation purposes and to assist interpretation. The archive plots are provided as PDF images upon request.*

Glossary of Interpretation Terms

Categories of responses may vary for different data sets. The list below are the most used categories for describing geophysical responses, as presented in the summary interpretation diagrams.

Archaeology

This category refers to responses which are interpreted as of clear archaeological potential and are supported by further archaeological evidence such as aerial photography or excavation. The term is generally associated with significant concentrations of former settlement, such as ditched enclosures, pits, and associated features.

?Archaeology

This term corresponds to anomalies that display typical archaeological patterns where no record of comparative archaeological evidence is available. In some cases, it may prove difficult to distinguish between these and evidence of more recent activity also visible in the data.

Area of Increased Magnetic Response

These responses often lack any distinctive archaeological form, and it is therefore difficult to assign any specific interpretation. The resulting responses are site specific, possibly associated with concentrations of archaeological debris or more recent disturbance to underlying archaeological features.

Trend

This category refers to low-level magnetic responses barely visible above the magnetic background of the soil. Interpretation is tentative, as these anomalies are often at the limits of instrument detection.

Ploughing/Ridge & Furrow

Visible as a series of linear responses, these anomalies equate with recent or archaeological cultivation activity.

?Natural

A broad response resulting from localised natural variations in the magnetic background of the subsoil; presenting as broad amorphous responses most likely resulting from geological features.

Ferrous Response

These anomalies exhibit a typically strong magnetic response, often referred to as ‘iron spikes,’ and are the result of modern metal debris located within the topsoil.

Area of Magnetic Disturbance

This term refers to large-scale magnetic interference from existing services or structures. The extent of this interference may in some cases obscure anomalies of potential archaeological interest.

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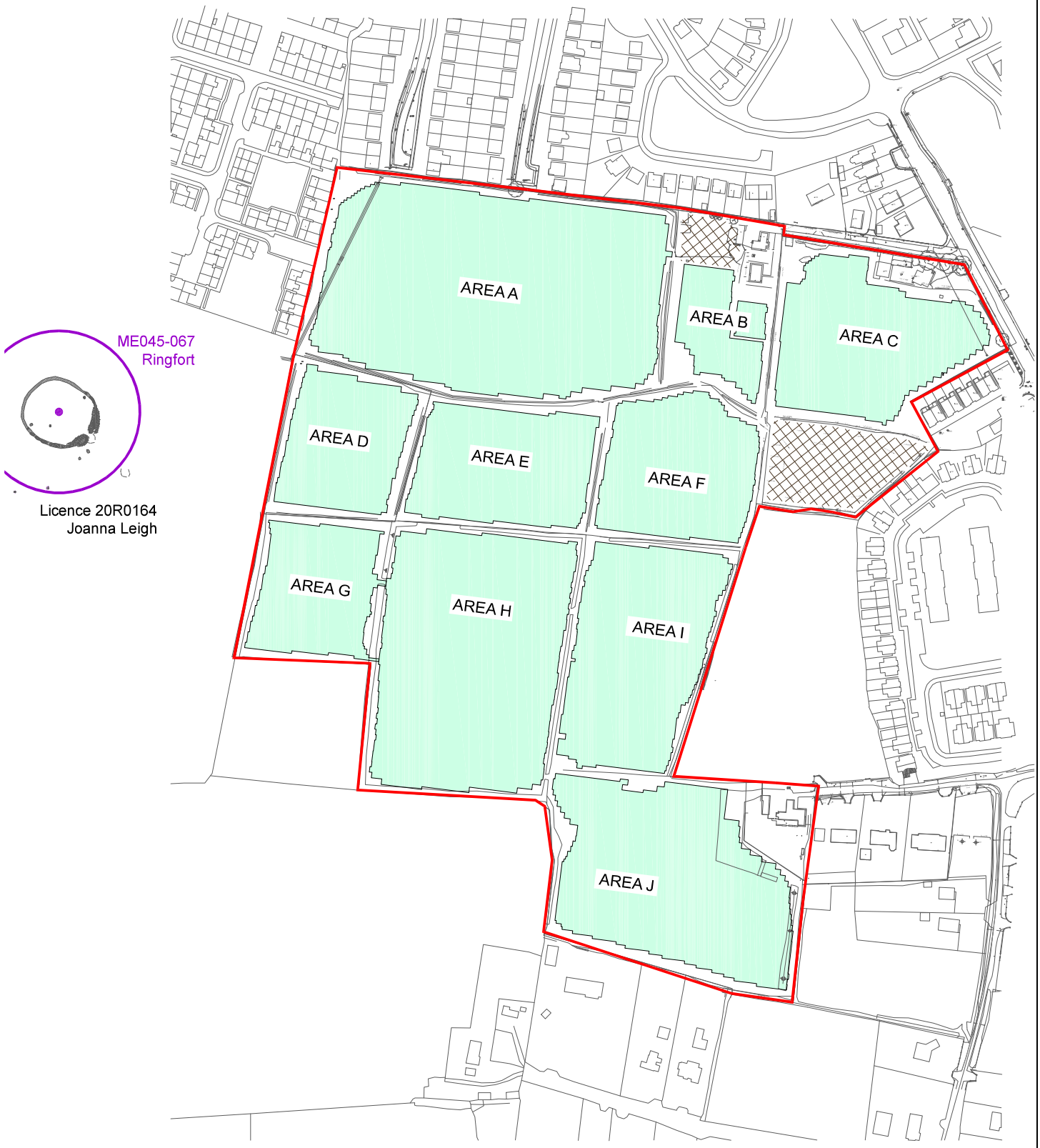
List of Figures

Figure	Description	Paper Size	Scale
Figure 1	Site & survey location diagram	A4	1:4,000
Figure 2	Overall summary greyscale image	A3	1:2,000
Figure 3	Overall summary interpretation diagram	A3	1:2,000
Figure 4	Areas A-F: summary greyscale image	A3	1:1,500
Figure 5	Areas A-F: summary interpretation diagram	A3	1:1,500
Figure 6	Areas G-J: summary greyscale image	A3	1:1,500
Figure 7	Areas G-J: summary interpretation diagram	A3	1:1,500

Archive Data Supplied as a PDF Upon Request

A1.01	Raw Data Greyscale Image	A0	1:750
A1.02	Raw Data XY-Trace Plot	A0	1:750



Application Area

Detailed Gradiometer Survey

Not Suitable for Survey - Overgrown

0 metres 160

Client: Yvonne Whitty Archaeology	Project: Geophysical Survey Milltown, Ashbourne, County Meath	Title: Site & Survey Location	J.M. Leigh Surveys Ltd. www.jmlsurveys.com

Scale @ A4: 1:4,000
Figure: 1
Licence No.: 22R0015
Issue Date: 15.02.2022

AREA A

AREA B

AREA C

AREA D

AREA E

AREA F

AREA G

AREA H

AREA I

AREA J

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N

0 metres 80

Client: Aspect Developments Ltd.	Project: Geophysical Survey Milltown, Ashbourne, County Meath	Title: Overall Summary Greyscale Image	J.M. Leigh Surveys Ltd. www.jmlsurveys.com

Scale @ A3:	1:2,000
Figure:	2
Licence No.:	22R0015
Issue Date:	15.02.2022

AREA A
AREA B
AREA C
AREA D
AREA E
AREA F
AREA G
AREA H
AREA I
AREA J
EP
EP
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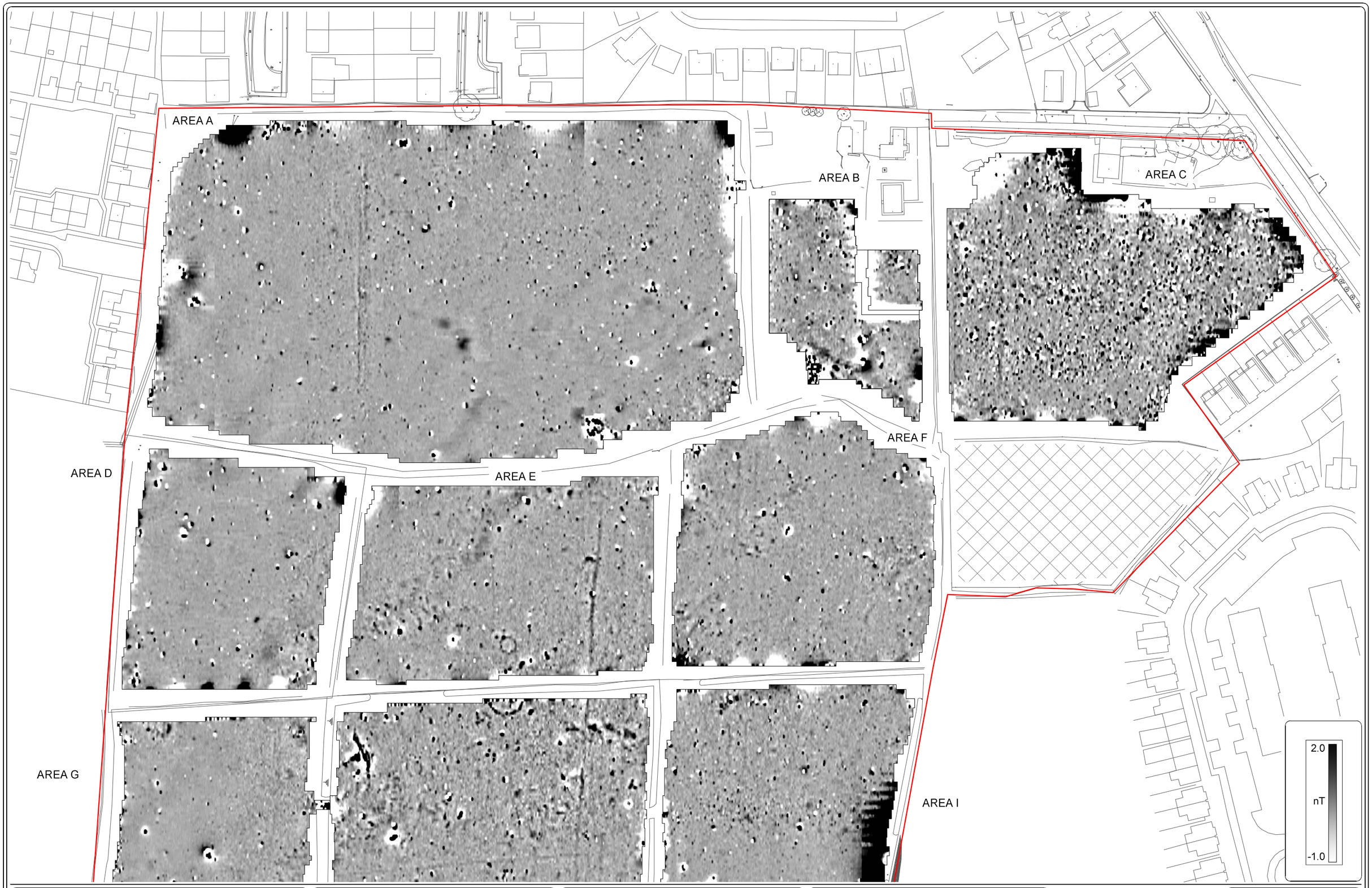
?Archaeology
?Archaeology
?Archaeology - ? Burnt feature
Area of increased magnetic response
Trend
Modern ferrous
Modern magnetic disturbance

0 metres 80

N

Client: Aspect Developments Ltd.	Project: Geophysical Survey Milltown, Ashbourne, County Meath	Title: Overall Summary Interpretation Diagram	J.M. Leigh Surveys Ltd. www.jmlsurveys.com	Scale @ A3: 1:2,000 Figure: 3 Licence No.: 22R0015 Issue Date: 15.02.2022



0 metres 60

Client: Aspect Developments Ltd.

Project: Geophysical Survey Milltown, Ashbourne, County Meath

Title: Areas A - F Summary Greyscale Image

J.M. Leigh Surveys Ltd.
www.jmlsurveys.com

Scale @ A3:	1:1,500
Figure:	4
Licence No.:	22R0015
Issue Date:	15.02.2022

AREA A

AREA B

AREA C

AREA D

AREA E

AREA F

AREA G

1

2

3

4

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11

12

15

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17

18

19

20

?Archaeology

?Archaeology

?Archaeology - ? Burnt feature

Area of increased magnetic response

Trend

Modern ferrous

Modern magnetic disturbance

0 metres 60

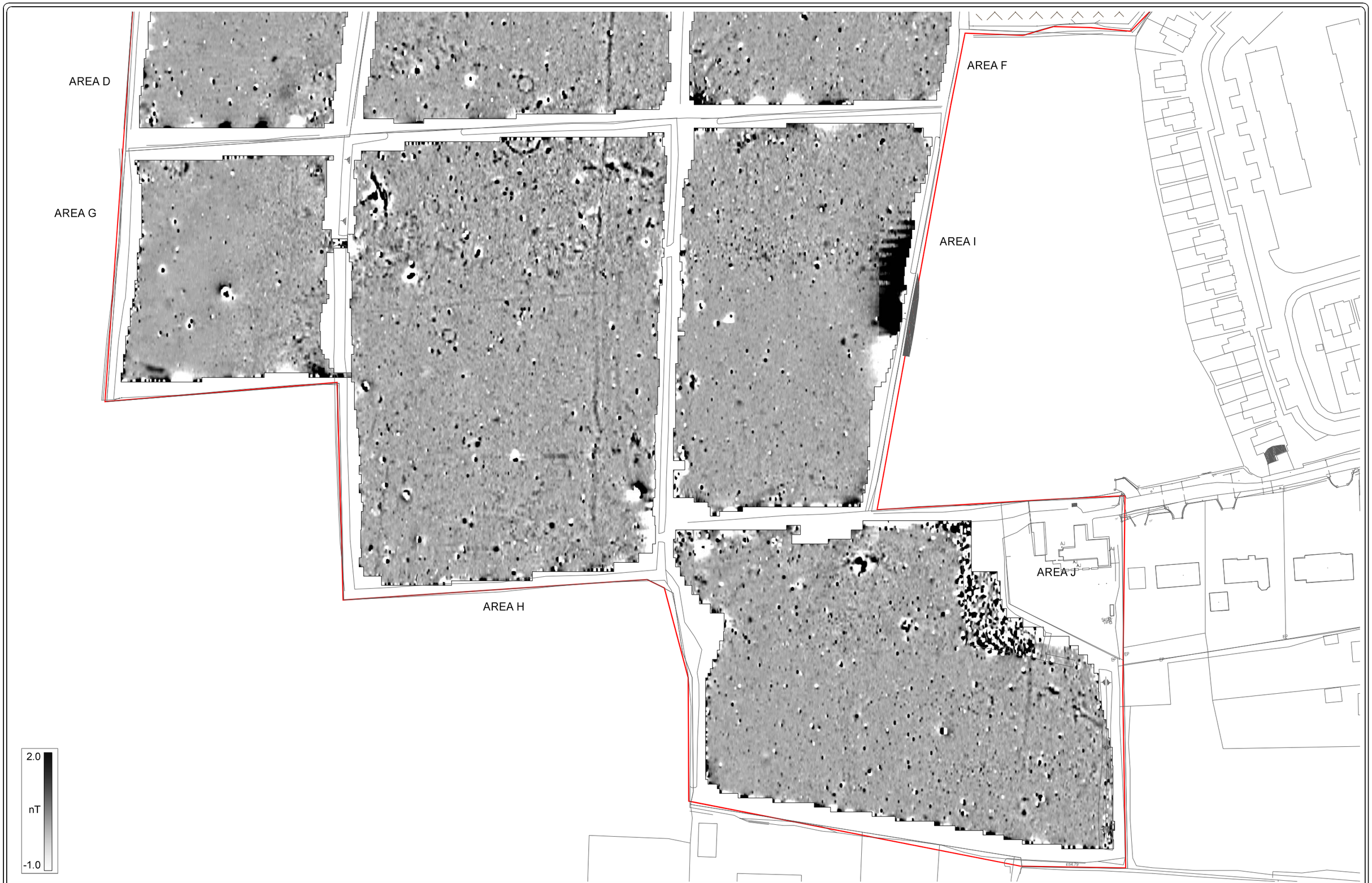
Client: Aspect Developments Ltd.

Project: Geophysical Survey Milltown, Ashbourne, County Meath

Title: Areas A - F Summary Interpretation Diagram

J.M. Leigh Surveys Ltd.
www.jmlsurveys.com

Scale @ A3: 1:1,500
Figure: 5
Licence No.: 22R0015
Issue Date: 15.02.2022



0 metres 60

Client: Aspect Developments Ltd.

Project: Geophysical Survey Milltown, Ashbourne, County Meath

Title: Areas G - J Summary Greyscale Image

J.M. Leigh Surveys Ltd.
www.jmlsurveys.com

Scale @ A3:	1:1,500
Figure:	6
Licence No.:	22R0015
Issue Date:	15.02.2022

AREA D

AREA G

AREA F

AREA I

AREA H

AREA J

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?Archaeology
?Archaeology
?Archaeology - ? Burnt feature
Area of increased magnetic response
Trend
Modern ferrous
Modern magnetic disturbance

0 metres 60

Client: Aspect Developments Ltd.

Project: Geophysical Survey Milltown, Ashbourne, County Meath

Title: Areas G - J Summary Interpretation Diagram

J.M. Leigh Surveys Ltd.
www.jmlsurveys.com

Scale @ A3: 1:1,500
Figure: 7
Licence No.: 22R0015
Issue Date: 15.02.2022

Appendix 3 – List of Archaeological Excavations in Ashbourne.

Licence	Excavation Reference	Location	Archaeologist	Distance from Study Area	Type
02E0708	2002:1415 2002:1416	Killegland Street/Castle Street, Ashbourne	Frazer	800m north-west	Corn drying kiln, medieval tower house and earthworks
02E1728	2003:1346	Killegland Street/Castle Street, Ashbourne	Frazer	900m north-west	Medieval millrace
03E1902	2003:1347	Castle Street, Ashbourne	O'Carroll	800m north-west	Fording site
04E1228	2004:1166	Castle Street, Ashbourne	Sweetman	300m north	No archaeological significance
04E1252	-	Killegland Street/Castle Street, Ashbourne	Frazer	900m north-west	Medieval settlement
05E0423	2005:1142 2006:1495	Killegland Street/Castle Street, Ashbourne	Frazer	800m north-west	Burnt mound, medieval field system, post-medieval structural remains
05E1321	2006:1496	Churchfields, Ashbourne	Halliday	700m north-west	Medieval features
05E1386	2005:1143	Castle Street, Ashbourne	Kavanagh	300m north	No archaeological significance
06E0233	2006:1603	Milltown Estate, Ashbourne	Carroll	800m north	No archaeological significance

06E0779	2006:1497	Churchfields, Ashbourne	Halliday	700m north-west	Medieval features
06E0782	2006:1498	Churchfields, Ashbourne	Halliday	700m north-west	Medieval features
06E0871	2006:1499	Churchfields, Ashbourne	Kavanagh	700m north-west	Medieval features
08E0014	2008:933	Main Street, Ashbourne	Stephens	860m north	No archaeological significance
-	-	Frederick Street, Ashbourne	Phelan	930m north	No archaeological significance

Appendix 4 – List of Archaeological Investigations in advance of the M2 Motorway.

Licence	Excavation Reference	Location	Archaeologist	Type
03E1229	2004:1334	Raystown	Seaver	Early medieval settlement complex
03E1229	2004:1460	Raystown Site 21	Halliday	Early medieval enclosure and features
03E1237	2004:1247	Harlockstown Site 31	Murray	Burnt mound
03E1310	2004:1248	Harlockstown Site 20	Murray	Burnt mound
03E1312	2004:1238	Fleenstown Little Site 16	Moore	Multi-period activity
03E1315	2003:1397	Baltrasna Test Area 18	Halliday	12th–14th century ceramics and deposits
03E1316	2004:1176	Ballybin and Cookstown Site 23	McGowan	Barrow
03E1327	2004:1269	Killegland and Ballybin Site 22	McGowan	Bronze Age well and metalworking features
03E1354	2003:1362	Baltrasna Test Area 17	Halliday	Medieval ditches
03E1354	2004:1178	Baltrasna Sites 17-18	Fallon	Multi-period habitation
03E1355	2004:1239	Fleenstown Little Site 14	Murray	Prehistoric pit
03E1361	2003:1361	Baltrasna Site 15	Halliday	Burnt mound

03E1363	2003:1398	Harlockstown Site 30	McKinstry	No archaeological significance
03E1526	2004:1249	Harlockstown Site 19	O'Connor	Prehistoric activity

Appendix 5 – Ashbourne Test-Trenching

Test-trenching programme

Introduction

An archaeological test trenching programme was carried out on the proposed development site at Baltrasna and Milltown over ten days from the 8th-19th August 2022. The testing was carried out in very warm, sunny and dry conditions.

The site is divided into eleven fields and lies to the west of the R135 Dublin Road, accessed off Cherry Lane. A twelfth field (Field 11) was included in the initial assessment for the site but does not form part of the currently proposed development. A farmyard and bungalow are present at the northern end of the proposed development. Another bungalow and associated garden lies to the south of the farmyard and is not included in the proposed development lands. Two additional dwellings are present along the southern side of Cherry Lane and are included within the proposed development. These are still standing and were not tested during the testing programme.

The site is currently in agricultural use with cattle grazing. The fields were bounded by hedgerows, with banks and ditches present in places. Electric fencing was present around the perimeters of the fields.

General soil profile

The topsoil across the site was a brown silty clay with moderate stone inclusions. It ranged in depth from field to field. Examples of variance are provided below:

Field 3 0.4-0.46m depth. Overlay mid-dark orangey brown boulder clay with grey mottle.

Field 4 0.27-0.33m depth. Overlay yellowish brown boulder clay, which in turn overlay a dark grey stony boulder clay.

Field 5 0.3-0.4m depth.

Field 7 0.3-0.4m depth. Overlay a pale grey water-laid silt, which overlay boulder clay. Evidence of flooding.

In places the topsoil overlay a compact mixed plough soil, which was a mottled brown, orange and grey silty clay with inclusions of brick, post-medieval ceramics, glass and occasional pebbles. This measured 0.05-0.08m in thickness and overlay the natural subsoil and a number of cut features described below.

Natural subsoil

The natural subsoil varied across the site. A stony boulder clay was identified in the western end of the site to the south that gave way to a yellow brown clay centrally within the site, which in turn gave way to a mottled compact boulder clay to the east. Further to the north stonier bands were evident along the central part of the site and a limestone bedrock outcrop was identified east of centre along Trench 6. Smaller bedrock and natural gravel outcrops and were identified towards the western end of Trenches 7 and 8, which were at the top of the slope within the site.

Trenches

Trench	Length	Width	Depth	Orientation	Agricultural feature	Archaeology	Natural feature	Field

Chapter 13 'The Landscape'- Appendices

Appendix 13.1. – Verified Views and CGI's

3D DESIGN BUREAU

Creative & Technical 3D Solutions
Design | Planning | Marketing

Strategic Housing Development (SHD) Ashbourne, County Meath

Verified Views and CGI

Applicant: Arnub Ltd. & Aspect Homes (ADC) Ltd.

September 2022

+353 (0) 1 2880186
info@3ddesignbureau.com
www.3ddesignbureau.com

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: CGI Location Map
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	**Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.**	**Image Title: CGI 1**
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	**Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.**	**Image Title: CGI 2**
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: CGI 3
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: CGI 4
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: CGI 5
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: CGI 6
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: CGI 7
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: CGI 8
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	**Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.**	**Image Title: CGI 9**
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	**Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.**	**Image Title: Viewpoint Location Map**
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 187 m	Date & Time: 31/05/22 9:06:24

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 1
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 187 m	Date & Time: 31/05/22 9:06:24

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 1
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 81.5 m	Date & Time: 31/05/22 09:33:44

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 2
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 81.5 m	Date & Time: 31/05/22 09:33:44

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 2
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 50mm	Approx Dist: 66 m	Date & Time: 31/05/22 08:57:23

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 3
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 50mm	Approx Dist: 66 m	Date & Time: 31/05/22 08:57:23

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 3
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 50mm	Approx Dist: 90 m	Date & Time: 03/06/22 6:26:17

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 4
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 50mm	Approx Dist: 90 m	Date & Time: 03/06/22 6:26:17

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 4
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 0 m	Date & Time: 31/05/22 09:23:26

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 5
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 0 m	Date & Time: 31/05/22 09:23:26

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 5
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 27.5	Date & Time: 31/05/22 09:38:37

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 6
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 27.5	Date & Time: 31/05/22 09:38:37

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 6
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 50mm	Approx Dist: 98 m	Date & Time: 31/05/22 09:43:05

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 7
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 50mm	Approx Dist: 98 m	Date & Time: 31/05/22 09:43:05

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 7
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 50mm	Approx Dist: 230 m	Date & Time: 31/05/22 09:50:21

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 8

CGI & VVMs by 3D DESIGN BUREAU
Tel: 01 288 0186
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info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 50mm	Approx Dist: 230 m	Date & Time: 31/05/22 09:50:21

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 8
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 21 m	Date & Time: 31/05/22 10:32:07

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 9
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 21 m	Date & Time: 31/05/22 10:32:07

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 9
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 50mm	Approx Dist: 147 m	Date & Time: 31/05/22 10:36:35

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 10
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 50mm	Approx Dist: 147 m	Date & Time: 31/05/22 10:36:35

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 10
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 50mm	Approx Dist: 108.5 m	Date & Time: 31/05/22 10:51:34

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 11
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 50mm	Approx Dist: 108.5 m	Date & Time: 31/05/22 10:51:34

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 11
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 403 m	Date & Time: 31/05/22 10:04:51

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 12
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF24-70mmf/4LISUSM	Focal Length: 24mm	Approx Dist: 403 m	Date & Time: 31/05/22 10:04:51

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 12
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF16-35mmf/4LISUSM	Focal Length: 35mm	Approx Dist: 473 m	Date & Time: 03/06/22 15:32:46

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 13
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF16-35mmf/4LISUSM	Focal Length: 35mm	Approx Dist: 473 m	Date & Time: 03/06/22 15:32:46

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 13
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF16-35mmf/4LISUSM	Focal Length: 35mm	Approx Dist: 601 m	Date & Time: 03/06/22 16:03:41

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Baseline VVM 14
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

Camera Type: Canon EOS 5D Mark IV	Lens Type: EF16-35mmf/4LISUSM	Focal Length: 35mm	Approx Dist: 601 m	Date & Time: 03/06/22 16:03:41

Project Title: Strategic Housing Development (SHD) Ashbourne, County Meath	Applicant Name: Arnub Ltd. & Aspect Homes (ADC) Ltd.	Image Title: Proposed VVM 14
	CGI & VVMs by 3D DESIGN BUREAU	Tel: 01 288 0186 www.3ddesignbureau.com info@3ddesignbureau.com

3D DESIGN BUREAU

APPENDIX

Methodology

Verified Views Montages (VVM)

Table Of Contents **Page**

1.Overview

This methodology has been prepared by 3D Design Bureau to explain the production of Verified View Montages (VVM). The preparation and presentation of reliable verifiable visual information is a key component to the writing of Landscape Visual Impact Assessment reports. It should be noted that VVMs are technical images and should be produced and used in a technically appropriate manner.

This booklet maybe accompanied by the inclusion of a number of CGIs from various viewpoint locations within the proposed site. These have been produced to give a better understanding of the design intent from a close range perspective. Whilst we have included soft landscaping that reflects the proposed design as close as possible, artistic license may have been used with for certain planting and trees with regard to species, size and exact locations.

2.What Is A Verified View Montage

A Verified View Montage (VVM) is an accurate visual representation of the potential impact (or lack there of) that a proposed development may have on its surrounding environment when constructed. VVMs are produced using technical scientific verification methods, through the use of photography, surveying, 3D modelling, rendering and post-production.
Verified View Montages work by using the correct geospatial insertion of accurate and detailed digital 3D models in the existing landscape allowing for a photorealistic view of the planned development in its intended location.
The correct combination of all these fields of expertise will deliver a result in which we believe and trust to be accurate for official usage by the client for their intended purposes (ex. Planning applications, impact studies,...).

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3.Methodology

3.1 Project Planning

Following appointment to the project, a desktop study is carried out with a full list of suggested views being drawn up for review prior to visiting site. This is carried
out between 3D Design Bureau, the client, and the planning consultant.

Note: If a LVIA report is being written by a third party (landscape architect or planning consultant), the medium to long range views will be guided by them. After obtaining a full list of viewpoint locations, it is reviewed, checked and a plan for the taking of baseline photographs is put in place.
Note: 3D modelling of the proposed scheme can, and usually is, commenced prior to the photographic site visit.

3.2 Data Capture: High Resolution Baseline Photography

Every baseline photograph is captured in raw settings using a high-resolution digital SLR camera. This allows for the maximum possible information to be retained in the digital file. It also avoids the file being altered by any internal camera processing definitions, which retains the maximum control and fidelity on the end results.

The focal lengths used depend on the surrounding context and proximity to the subject site. 3D Design Bureau use high quality lenses with focal lengths that allow for capturing enough surrounding context without compromising quality and fidelity, by avoiding excessive barrelling, distortion, or aberrations. All shots are taken horizontally with the use of a 50mm lens (where possible) and wider angle also.

Note: Although the 50mm focal length represents the perceived scale of the human eye, it does not represent the human field of view and therefore should not necessarily be used to show the proposed development in its context. Peripheral vision needs to be accounted for and whilst the 50mm lens option is recommended in the *British Landscape Institute Technical Guidance Note*, this does not take into account the dynamic movement of the human eye.

Furthermore, panoramic VVMs are described in the *British Landscape Institute Technical Guidance Note*. 3DDB do not produce these type of VVMs as they are made up of a series of individual VVMs stitched together. The stitching process is a non repeatable action which can result in different outputs of same image each time. Therefore accuracy and verifiability can be called into question.

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3.Methodology

3.2 Data Capture: High Resolution Baseline Photography (cont`d)

Each photo location is correctly recorded and marked as follows

On-Site:

The tripod location on site is paint marked and photographed in relation to existing elements. (Fig 1 below)
The location of each photo is manually marked on a printed map while on site.
The camera height is recorded.

In-Studio:

All photographs go through post processing back in the studio. The full set of photos along with a viewpoint location map (Fig 2 below) are issued to the client for review and to choose the best shots that will demonstrate the visual impact that the proposed scheme may/may not have. For each photo at each location, two focal lengths will be issued – the 50mm option and a wider field of view option. The most appropriate shot will be chosen depending on the surrounding context and location of the shot. See earlier section 3.2 for further explanation.

Fig.1: Camera Location marked and photographed.

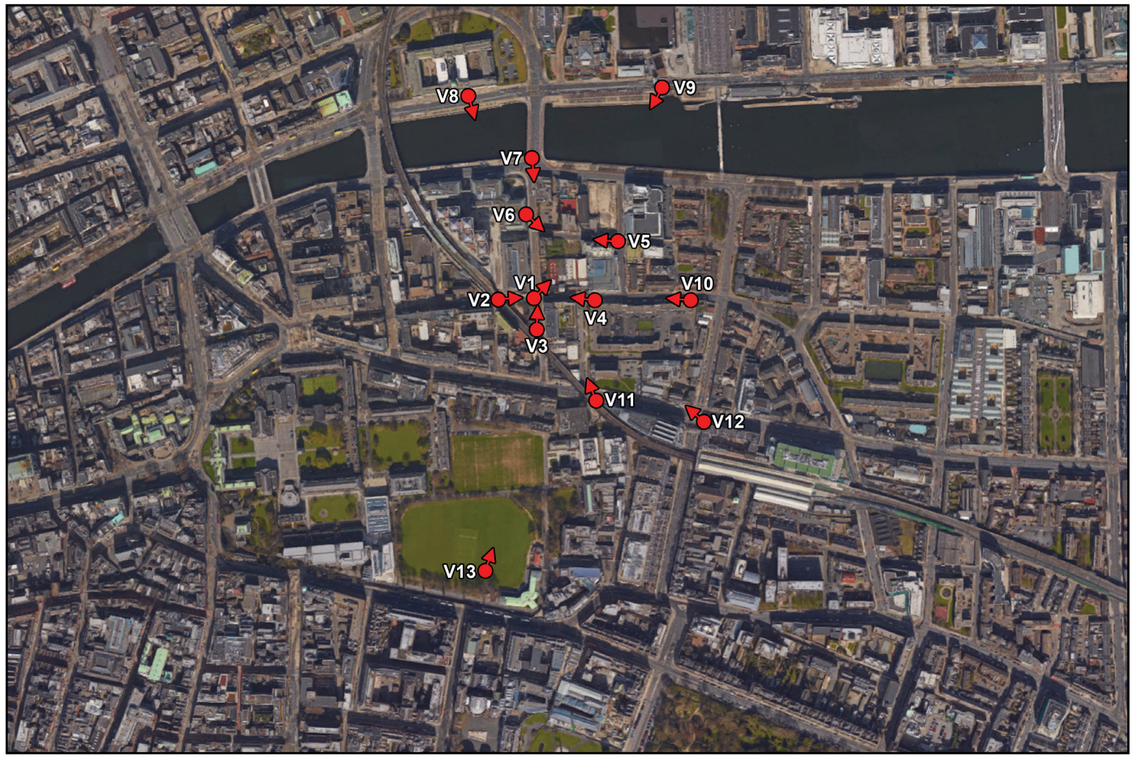

Fig.2: Viewpoint location map post site visit.

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3.Methodology

3.2 Data Capture: High Resolution Baseline Photography (cont`d)

Sample baseline photographs prior to selection and prior to marking up for surveying.

Fig.3: Baseline photo for view 5

Fig.4: Baseline photo for view 3

Fig.5: Baseline photo for view 4

Fig.6: Baseline photo for view 9

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3.Methodology

3.3 Baseline Photo Surveying

When all baseline photos are chosen for the VVMs, each one is marked up in studio as per Fig 7 below. Fixed reference points within each photo, such as parapet heights, kerbing, lamp posts etc are coloured coded on the baseline photos. All ‘marked up’ baseline photos are then issued to our qualified topographical surveyor for surveying purposes.
The survey team records the camera/tripod position using GPS and Total Station to an accuracy of +/-1cm Northing and Easting and to an accuracy of +/- 2cm Elevation. The ‘marked up’ fixed reference points identified in each photo are then surveyed to establish exact orientation of the view and to verify the photomontage process. (Fig 8 below). This survey data is later modelled and included in the digital 3D model of the proposed development. (See section 3.4)

Fig.7: Fixed reference points marked for surveyour.

Fig.8: Fixed reference points surveyed and numbered by surveyor.

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3.Methodology

3.4 3D Modelling & Visualisation

3D Modelling

An accurate digital 3D model of the ‘proposed’ development is produced using 3D software of choice. All of 3D Design Bureau’s 3D modelling is carried out within AutoDesk’s Revit. The digital 3D model is created from a combination of the third party architectural, engineering and landscape drawings. All proposed model information is contained in the one file and it is always positioned relative to the existing topographical site survey information supplied.
The ‘marked up’ fixed reference points (see section 3.3) which have been surveyed, are also modelled along with any other relevant survey information from the supplied topographical survey drawings. As stated above, the proposed 3D model and survey 3D model information are geospatially positioned relative to one another. This is imperative to ensure the accurate positioning and camera matching of the proposed digital 3D model within each chosen photo.

Visualisation

Once the digital 3D Revit model is complete, it is handed over to the 3D visualisation team for production. This stage of production involves matching of textures & finishes, lighting conditions and asset population for the proposed scheme. This ensures the accurate visual representation of the digital 3D model is as close as possible to the intended future ‘As Built’ development. Note: For accurate camera matching of the digital model to the baseline photography (which can take place prior to the visualisation process) please see Section 3.5.
There are various 3D visualisation software’s that are widely used for this stage of production. 3D Design Bureau use Autodesk 3D Studio Max as its main software for the visualisation process. This is accepted as the leading industry standard for architectural visualisation work and production of VVMs.

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3.Methodology

3.4 3D Modelling & Visualisation

Fig.8: Digital 3D model including the fixed reference points

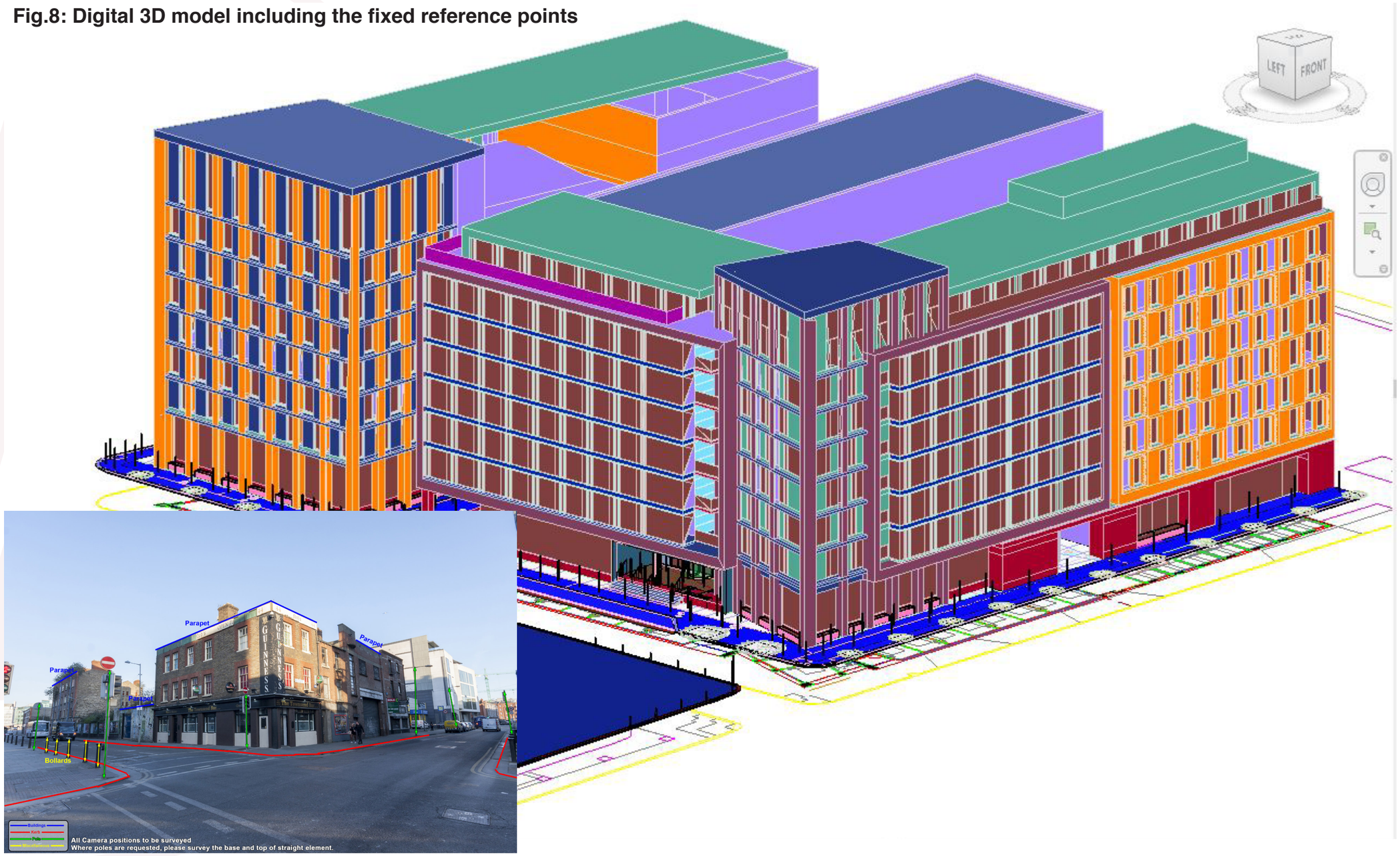

Fig.9: Fixed reference points surveyed and numbered by surveyor.

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3.Methodology

3.5 Camera Matching / Rendering / Post Production

Following the completion the 3D visualisation process, Section 3.4, (but in some instances prior to this) the following methodology is applied to ensure views are verifiable.

Camera Matching

All of the information recorded at the time of the baseline photographic site visit, that is, camera co-ordinates, angle of view, and direction of view, is programmed into the virtual camera within the 3D software package of choice - 3D Studio Max. Insertion of digital cameras within the software, with the matching attributes of the physical camera, is carried out. All elements of the photo survey, that have been surveyed and included in the digital model and geolocated relative to the proposed development are a key component to the camera matching process. This careful methodology ensures that the size, position, and height, of the proposed development in each VVM is correct to an accuracy of 0.33% i.e. +/- 1mm on an A3 print.oposed development in each VVM is correct to an accuracy of

Rendering

Following the camera matching and 3D visualisation process the views are ‘rendered’ at high resolution and placed onto its matching baseline photograph using Adobe Photoshop software. The mathematical accuracy is then double checked and verified by ensuring that existing ‘marked up’ fixed reference p point features, which were also rendered, line up exactly in the baseline photo.

Post Production

Post production for all views is the last stage in the VVM process. The VVM specialist establishes which existing features such as buildings, landscape and trees, are in the foreground of the proposed development and those that are in the background, i.e. which features will mask the development and which ones will appear behind the development. When it is found that the development is not visible due to foreground features, its extremities will be indicated with a red outline. Furthermore on wide angle chosen views, the extent of 50mm lens is identified on the shot.

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3.Methodology

3.5 Camera Matching / Rendering / Post Production

Fig.10: Fixed reference points for surveyor on Baseline untreated photo.

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3.Methodology

3.5 Camera Matching / Rendering / Post Production

Fig.11: Fixed reference points modelled, rendered and overlaid on baseline photo confirming accuracy

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4. Results

The resulting VVM, having gone through this extensive procedure, is classed as an accurate and verifiable representation of the proposed development as viewed from the selected photo locations. This shows, as closely as possible, any future impact a proposed development may have on the surrounding environment and existing buildings. It should be noted that the foundation of any Landscape/Townscape Visual Impact Assessment (LVIA / TVIA) report are accurate verified view montages.

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Appendix 13.2. – Landscape Masterplan

Included here is an A3 version of the proposed Landscape Masterplan. A larger A1 version of the same plan along with landscape sections and a landscape design rationale report have been submitted separately to the EIAR as part of the supporting planning documentation for this application

LEGEND

SOFT LANDSCAPE

- Back garden Grass area (Private Amenity)
- Amenity Grass area (Open Space)
- Meadow planting
- Hedge planting Shrubs - Medium & Low height
- Native Under-storey Shrubs
- Existing Trees to be retained
- Existing Hedgerow to be retained
- Open space Tree planting
- Street Tree planting

HARD LANDSCAPE

- Landform - All mounds no greater than 1:4 slope
- Concrete Footpath
- Asphalt - Buff Coloured to Parks and Open Spaces
- Permeable Parking Pavement & Driveways
- Play Area - Rubber Safety Surface
- 4m Shared Pedestrian and Cycleway - Asphalt
- Hardwood Timber Deck in Apartment Communal Amenity Courtyards
- Pavers To Plaza & Open Space - Dark/Light Grey
- Pavers To Courtyards - Buff/ Dark and Light Grey
- Muga
- Raised Planter With Timber Edge Seating
- Low wall (400mm high) with estate railing (600mm high)
- Ring Seat/ Bench/ Picnic Table
- Play Equipment & Bolders
- Table Tennis
- Bin Stores To Front Gardens

REV	DATE	AMENDMENT

CUNNANE STRATTON REYNOLDS

LAND PLANNING & DESIGN

DUBLIN OFFICE
3 MOLESWORTH PLACE DUBLIN 2
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N

PROJECT: HICKEY'S LANE ASHBOURNE	DATE: AUG 2022
	SCALE: 1:1250@A1 / 1:2500@A3
DRAWING: LANDSCAPE MASTERPLAN	DRAWN: FDL CHECKED: LC
APPENDIX 13-2	DRAWING NO: 21659-3-100