Volume 3 Part E

Appendix I. Cultural Heritage Reports

Appendix J. Utility Plans and Waste Management Plan

Appendix I. Cultural Heritage

I.1. Archaeological Assessment (Archer Heritage Planning, 2018)

I.2. Geophysical Survey Report - Lands in Haggardstown, Blackrock, Co. Louth (Target Archaeological Geophysics, 2018)

Haggardstown, Blackrock, Co. Louth

Archaeological Assessment

Client: Kingsbridge Consultancy

Licence No: 18E0417

Archaeologist: Aidan O'Connell

Author: O'Connell

Report Date: 28 August 2018

Our Ref: 2017_44

Archer Heritage Planning

Haggardstown, Blackrock, Co. Louth

Archaeological Assessment

SITE NAME	Haggardstown, Blackrock, Co. Louth
CLIENT	Kingsbridge Consultancy
INVESTIGATION TYPE	Archaeological Assessment
LICENCE NO	18E0417
PLANNING REF	n/a
TOWNLANDS	Haggardstown
IRISH TRANSVERSE MERCATOR	706797, 804321
RMP NO	n/a
RPS NO	n/a
ARCHAEOLOGICAL CONSULTANT	Archer Heritage Planning Ltd.
ARCHAEOLOGIST	Aidan O'Connell
DATE OF ISSUE	29th August 2018
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NON-TECHNICAL SUMMARY

An archaeological assessment was carried out at Haggardstown, Blackrock, Co. Louth (706797, 804321). The site covers an area of 18.2ha. Testing was undertaken under licence 18E0417 issued by the Department of Culture, Heritage and the Gaeltacht in consultation with the National Museum of Ireland. The archaeological assessment indicates the following:

- There are no recorded archaeological sites within the proposed site. The closest listed site is a possible early medieval souterrain (LH012-013) located c. 400m east of the subject site.
- No stray finds recorded in the topographical files of the National Museum of Ireland can be directly associated with the subject site.
- No previously unrecorded archaeological or cultural heritage features were recorded in historic maps
- No new features of archaeological or cultural heritage interest were identified in aerial photographs.
- No previous excavations have been undertaken within the subject site.
- Geophysical survey undertaken across the site displayed no clear evidence for archaeological activity
- Test trenching targeted on various geophysical trends and anomalies recorded no archaeological features
- Test trenching was not undertaken in order to establish the archaeological potential of the remainder of the site.

There will be no impact on known archaeological remains from proposed development works at this location. However, it is possible that buried archaeological deposits remain within the site outside of the 15 tested locations. **It is recommended that any future development works carried out at the subject site be monitored by a suitably qualified archaeologist under licence to the Department of Culture, Heritage and the Gaeltacht in consultation with the National Museum of Ireland.**

NOTE: All conclusions and recommendations expressed in this report are subject to the approval of The Department of Culture, Heritage and the Gaeltacht (DCHG) and the relevant local authorities. As the statutory body responsible for the protection of Ireland's archaeological and cultural heritage resource, the DCHG may issue alternative or additional recommendations.

Revision	Status	Date	Prepared by	Reviewed by	Approved by
1	Final	August 2018	AOC SENIOR ARCHAEOLOGIST	MMcC ARCHAEOLOGIST	CMG

1 INTRODUCTION

This report considers the potential impact on archaeological and cultural heritage sites or features at the location of the proposed residential, phased development at Haggardstown, Blackrock, Co. Louth (Figure 1). This report was prepared by Aidan O'Connell BA MIAI of Archer Heritage Planning Ltd for Kingsbridge Consultancy.

1.1 Proposed Development

The entire development will comprise the construction of 485 housing units. These comprise 260 houses, 213 apartments and 12 duplexes. Site development will also provide for the provision of public open spaces all associated services and car parking spaces (Figure 2). A Planning Application is pending under the Strategic Housing Directive.

2 METHOD STATEMENT

This archaeological assessment aims to establish the archaeological potential of the proposed development area, to determine the potential impact of the proposed development and if necessary design a suitable mitigation strategy. The following sources were consulted in the preparation of this report:

- Record of Monuments and Places (RMP) & Sites and Monuments Record (SMR)[1];
- Topographical Files of the National Museum of Ireland;
- Aerial photography (various collections including National Museum of Ireland, Geological Survey of Ireland and/or Ordnance Survey Ireland);
- Historical maps (including early edition Ordnance Survey (OS) maps and pre-Ordnance Survey held at Trinity College Map Library);
- Reference material (journals, papers, books etc.) held by the National Library of Ireland, local libraries and/or on-line search facilities/collections (e.g. JSTOR etc.);
- Relevant on-line databases (e.g. Excavation Bulletin; National Roads Authority archaeological database).
- Geophysical Survey Report 18R0036

[1] Archive Unit National Monuments Service, Department of Arts, Heritage and the Gaeltacht, Room G50, Custom House Dublin 1

3 RECEIVING ENVIRONMENT

The proposed site is an 18.2 hectare green-field site located east of Louth Golf Club at Blackrock, Co. Louth (Haggardstown Td., Upper Dundalk Barony, Haggardstown Parish; OS Louth sheet 7 & 12; ITM 706797, 804321; Figure 1). It is composed of two large rectangular fields currently in stubble, the site slopes gently west to east before sloping more steeply east where the proposed connecting road to the Blackrock Road runs to a low area near the sea. Numerous rock outcrops overgrown with bramble and other vegetation were noted within the subject site.

3.1 Archaeological Background

Blackrock is a coastal village in the parish of Haggardstown, largely subsumed into the town of Dundalk. Recorded monuments in the area and, in particular, in close proximity to the works area attest to significant medieval settlement. These comprise souterrains (LH012-069002, LH012-011 & LH012-13) two castle sites (LH012-010 & LH012-012) and St. Furseys church and graveyard (LH012-014). Haggardstown was previously known as Stamanaran with a laneway called Bothar Maol denoting the border between it and the Marshes Upper, the name "Bothar Maol" may refer to a flat-topped hillock in the area (Sharkey 2016). This is also reputed to be an ancient roadway referenced in the *Táin Bó Cuailgne* and may refer to the laneway which borders the subject site to the north (Mr. B Mc Sherry pers comm.). In more recent times the village of Blackrock developed as a coastal resort and in the mid-nineteenth century, Lewis (1837, 240) described Blackrock as 'much frequented, during the summer season, by the farmers of the inland counties, both for the purposes of bathing and drinking the sea-water'.

3.2 Record of Monuments and Places

The Record of Monuments and Places (RMP) is a statutory inventory of archaeological sites protected under the National Monuments Acts 1930-2004 (Section 12, 1994 Act). It is compiled and maintained by the Archaeological Survey of Ireland (ASI) and comprises descriptive lists and maps of all sites, monuments and zones of archaeological potential, recorded to date in the country. The inventory concentrates on pre-1700 AD sites and is based on a previous inventory known as the Sites and Monuments Record (SMR) which does not have legal protection or status (full records of the ASI are available at www.archaeology.ie).

There are no recorded archaeological sites **within** the subject site. The closest listed sites are a group of 6 early medieval souterrains (LH007-082 – LH007-086), two of which are associated with enclosures. All sites located within 1km of the subject site are listed below in Table 1. The closest RMP's are shown

on Figure 1. The following descriptions were derived from the published 'Archaeological Inventory of County Louth' (Dublin: Stationery Office, 1987) and in certain instances entries have been revised and updated in the light of recent research (date of upload/revision: 10 July 2007).

SMR	Class	Townland	ITM	Distance
LH007-080----	Souterrain	Marshes Upper	706498, 804971	c. 560m
Excavated by P. Gosling in 1980 prior to factory construction. The site consisted of a passage (L 14.5m overall, Wth 1m) extending NW (L 8m) then curving gently E (L 6.5m). A second passage (L 3m, Wth 0.7m) extended N from the middle of the first passage and terminated at the E end of a gallery (L 3.5m, Wth 1m) aligned E-W.				
LH007-081----	Souterrain	Marshes Upper	706058, 804831	c. 580m
Excavated by P. Gosling in 1981 and restored by Dundalk UDC. The souterrain consists of a passage (L 4m, Wth 1.4m, H 0.9m) running S from the entrance, then turning into a gallery (L 12.3m overall, Wth 1.4m, H 0.9m) which runs E and then gently curves S. At the junction of the passage and gallery are niches in the walls from floor to roof which probably represent door jambs.				
LH007-082----	Souterrain	Marshes Upper	706308, 804591	c. 235m
Excavated by M. Gowen in 1982 in advance of construction work. Situated NW of four other excavated souterrains (LH007-083----, LH007-084----, LH007-085----, LH007-086----), apparently in isolation at the base of a small hillock. The souterrain consisted of a passage (L 10m, Wth 0.7-0.9m) at the N end of which was a small recess and a chamber (L 4m, Wth 1m) running at right angles to it towards the W.				
LH007-083----	Souterrain	Marshes Upper	706328, 804561	c. 200m
Excavated by M. Gowen in 1982 in advance of construction work. The site consisted of two souterrains within an oval enclosure (diam. 40m by 60m) (LH007-139----). The first souterrain (LH007-083----) T-shaped in plan, consisted of a passage (L 11m, Wth 1.1-5m) running W from the original rock-cut ramp entrance at the E. At the W end of the passage is gallery (L 18m, Wth 1.3-1.7m) ran S and another section of the same gallery (L 10m, Wth 1.6-2m) ran NW. The second souterrain (LH007-084----), roughly U-shaped in plan, consisted of a simple passage (L 25m, Wth 0.6-1m, H 1.4-1.6m) curving gently N-WSW.				
LH007-084----	Souterrain	Marshes Upper	706358, 804541	c. 165m
Excavated by M. Gowen in 1982 in advance of construction work. The site consisted of two souterrains within an oval enclosure (diam. 40m by 60m) (LH007-139----). The first souterrain (LH007-083----) T-shaped in plan, consisted of a passage (L 11m, Wth 1.1-5m) running W from the original rock-cut ramp entrance at the E. At the W end of the passage is gallery (L 18m, Wth 1.3-1.7m) ran S and another section of the same gallery (L 10m, Wth 1.6-2m) ran NW. The second souterrain (LH007-084----), roughly U-shaped in plan, consisted of a simple passage (L 25m, Wth 0.6-1m, H 1.4-1.6m) curving gently N-WSW.				
LH007-085----	Souterrain	Marshes Upper	706398, 804491	c. 95m
Excavated by M. Gowen in 1982. The site consisted of an enclosure (LH007-140----) (diam. c. 60m) within which were two souterrains, the second of which was cut by the enclosure ditch and must pre-date it. The first souterrain (LH007-085----) was roughly S-shaped in plan, consisting of a passage (L 22.5m, Wth 1-1.4m, H 1.7m) running E from the original rock-cut ramp entrance, then turning N and terminating at the E end in a sub-rectangular chamber (L 12.5m) aligned E-W. There were a pair of door slots in the walls at the junction of the passage and chamber. The second souterrain (LH007-086----) had a rock-cut ramp entrance 3m S of the entrance to the first souterrain, and consisted of a passage (L 24m, Wth 1-1.1m, H 1.2m) running SSW, with a slight terminal bulge forming a chamber at the SSW end. There was a trap 3.4m from the entrance at the NE end.				
LH007-086----	Souterrain	Marshes Upper	706418, 804471	c. 75m

Excavated by M. Gowen in 1982. The site consisted of an enclosure (LH007-140----) (diam. c. 60m) within which were two souterrains, the second of which was cut by the enclosure ditch and must pre-date it. The first souterrain (LH007-085----) was roughly S-shaped in plan, consisting of a passage (L 22.5m, Wth 1-1.4m, H 1.7m) running E from the original rock-cut ramp entrance, then turning N and terminating at the E end in a sub-rectangular chamber (L 12.5m) aligned E-W. There were a pair of door slots in the walls at the junction of the passage and chamber. The second souterrain (LH007-086----) had a rock-cut ramp entrance 3m S of the entrance to the first souterrain, and consisted of a passage (L 24m, Wth 1-1.1m, H 1.2m) running SSW, with a slight terminal bulge forming a chamber at the SSW end. There was a trap 3.4m from the entrance at the NE end.				
LH007-139----	Enclosure	Marshes Upper	706328, 804561	c. 200m
Oval area enclosed by single ditch. Excavated by M. Gowen in 1982. Two souterrains (LH007-083----, LH007-084----) within enclosure.				
LH007-140----	Enclosure	Marshes Upper	706398, 804491	c. 95m
Roughly circular area enclosed by single ditch. Excavated by M. Gowen in 1982. Two souterrains (LH007-085----, LH007-086----) within enclosure.				
LH012-006----	Souterrain	Haggardstown	705788, 804061	c. 780m
Reputed site of a souterrain. (CLAJ 1934, 210-11)				
LH012-013----	Souterrain	Haggardstown	707558, 803821	c. 594m
Local tradition of a souterrain.				
LH012-011----	Souterrain	Haggardstown	706568, 803291	c.735m
Local tradition of a souterrain.				
LH012-069001-	Ringfort - rath	Haggardstown	706915, 803076	c. 997m
Discovered as a result of land reduction for development (Excavation Licence No. 95E0126). Prior to arrival of an archaeologist on site, the capstones of a souterrain (LH012-069002-) had been disturbed causing it to collapse in on itself. A number of trenches were excavated around the souterrain to reveal an enclosing ditch with a diam. of c. 30m. The ditch was not evident in the S, leading to the suggestion that this was perhaps the location of the entrance. The fill contained a large quantity of bone and shell.				
LH012-069002-	Souterrain	Haggardstown	706915, 803076	c. 997m
Discovered as a result of land reduction for a development (Excavation Licence No. 95E0126). Prior to the arrival of an archaeologist on site, the capstones had been disturbed causing it to collapse in on itself. A passageway ran E-W for 10m, then it turned S and continued for 11m leading to a collapsed chamber. The walls of the passage were of drystone construction using shale and slate.				
LH012-063----	Souterrain	Haggardstown	706478, 803121	c.1000m
Local tradition of a souterrain in St. Fursey's graveyard (LH012-014----).				
LH012-012----	Castle - unclassified	Haggardstown	706298, 803181	c.900
Site of castle now occupied by farm buildings which may incorporate fabric from the monument. No visible trace.				
LH012-014001-	Church	Haggardstown	706428, 803101	c.780m
Chancel narrower than nave (int. dims. of chancel 4m N-S by 4.4m; nave 10.5m by 5.6m), built of limestone blocks and greywacke and more or less completely covered with ivy. Opposing doorways in nave and double bellcote in W gable. The most westerly window in the S wall of the chancel has a two-centred arch constructed of two rounded punch-dressed blocks, one of sandstone, the other of limestone. Its two western jambs and sill stone are granite. The E jamb is limestone, has bar holes and was originally a sill stone. The remaining two windows in the S wall and the E window have been destroyed and there are no surviving remains of cut stone. The doorways are lintelled and featureless. The church was repaired in 1622 and was in ruins in 1692. The opposing doorways, bell-gable and two-centred window arch indicate a fifteenth- or sixteenth century building.				

LH012-014002-	Graveyard	Haggardstown	706428, 803101	c.1000m
Sub-rectangular shaped graveyard (map dims. c. 52m x 42m) bounded on W side by roadway with church (LH012-014001-) in N half. Earliest headstone noted dates to 1770.				
LH012-010----	Castle - unclassified	Haggardstown	706114, 803340	c.900m
Site of castle known as 'Caislean Uachtrach Baile Sagairt'. No visible surface trace.				
LH012-008----	Redundant record	Haggardstown	705938, 803551	c.900m
Listed in the SMR for Louth (1984) as a possible souterrain. This location was subject to extensive archaeological testing in 2002and no evidence of the possible souterrain was uncovered. See Excavation Licence number 02E0549.				
LH012-093----	Excavation - miscellaneous	Haggardstown	706027, 803645	c. 700m
Test excavations were carried out in advance of proposed development at this location in 2002 (Excavation Licence No. 02E0549). Spreads of charcoal rich clay and heat fractured stones, linear features of probable early medieval date and a number of possible pits were identified. Finds included a number of sherds of coarse, early medieval pottery and numerous pieces of metal slag. Further testing in 2006 did not reveal any archaeological material.				
LH012-007----	Enclosure	Haggardstown	705958, 803811	c.700m
Complex series of cropmarks bounding roughly circular enclosure (max. diam c. 48m) on aerial photograph (CUCAP, AYM 58).				
LH012-109----	Enclosure	Haggardstown	705717, 804086	c.800m
Aerial photograph (GB89.B.16) shows cropmark of a circular enclosure defined by a fosse. A possible pit is located at the centre of the enclosure.				

Table 1: Archaeological sites adjacent to the proposed development

3.3 Topographical Files

The National Museum of Ireland Topographical Files is the national archive of all known antiquities recorded by the National Museum listed by county and townland/ street. These files relate primarily to artefacts but also include references to monuments and contain a unique archive of records of previous archaeological excavations. The Museum files present an accurate catalogue of objects reported to that institution from 1928. The stray finds recorded at Haggardstown Td indicate human activity in the medieval and post-medieval periods. None however, can be directly related to the subject site.

Museum No.	Location	Description
-	Haggardstown	Faunal remains from midden
1978:272-274	Haggardstown	Plough pebble and 2 pot sherds from St Fursey's Graveyard
1978:129	Haynestown	Medieval pottery rim sherd from vicinity of Souterrain
-	Haggardstown	4 stone whorls
2012:23-27	Haggardstown	Ceramic. Sherd of brown glazed ware, wheel thrown, probably 19thC
2004:141	Haggardstown	Semi elliptical white quartz plough pebble
1999:12	Haggardstown	Six conjoined sherds of a glazed jug found in Quarry face

Table 2 Topographical files

3.4 Cartographic Sources

Analysis of historic mapping can show human impact on landscape over a prolonged period. Large collections of historical maps (pre- and early Ordnance Survey maps as well as estate or private maps) are held at the Glucksman Map Library, Trinity College and other sources (UCD Library, Ordnance Survey Ireland, local libraries and published material). Several historical maps were consulted in the compilation of this assessment. No previously unrecorded archaeological or cultural heritage features were recorded within the proposed site which has been previously disturbed in the course of adjacent developments. Analysis of historical mapping is listed in Table 3 below and Figure 3.

Map	Date	Description
1st Edition Ordnance Survey Map (6-inch)	1835	The site is shown as agricultural land with no specific features marked that might point to archaeological potential
3rd Edition Ordnance Survey Map (25-inch)	1907–9	Some minor changes to field boundary layout. Otherwise, no major changes from 1835

Table 3: Cartographic sources relating to the site

3.5 Aerial Photographs

Aerial photography (or other forms of remote sensing) may reveal certain archaeological features or sites (earthworks, crop marks, soil marks) that for many reasons may not be appreciated at ground level. There are a number of available collections including the National Monuments Section, Geological Survey of Ireland (1970–73), Ordnance Survey of Ireland (1995, 2000, 2005), National Museum of Ireland (St Joseph CUCAP Collection) and Air Corps (1950's–1970's).

Ortho-rectified raster colour and black and white photography held by the Ordnance Survey of Ireland (2005, 2000, 1995 & Digital Globe 2007-2013) were consulted along with recent aerial imagery viewed on Google Earth, but identified no archaeological features (Figure 4).

3.6 Previous Archaeological Investigations

The Excavation Bulletin is a database of summary accounts of archaeological excavations in Ireland and Northern Ireland from 1970 to 2017. Summaries relating to archaeological excavations undertaken by the National Roads Authority are also available on-line and were consulted for any adjacent sites. Reports on licensed archaeological works are also held by the Archive Unit of the National Monuments Section. No excavations have been undertaken within the subject site.

Licence	RMP No	OS Ref	Townland	Ex. Bull. Ref.	Author
-	LH012-010	J062032	Haggardstown	1994:178	D Murphy
Unlicensed monitoring in advance of single dwelling. 2 pits, 1 ditch and a stone filled trench of uncertain date and function recorded.					
94E197 99E0683	LH012-019 LH012-009 LH012-027	J067026	Haggardstown	1994:180 1999:544	K Campbell F O'Carroll
Testing in advance of housing development. A possible ringfort c. 40m x 45m was recorded. 3 ditch like features may have indicated souterrain(s). 2nd phase of work in 1999; monitoring of entire 16 hectare site. 1 x shell midden, 3 x burnt spreads, 1 x pit filled with burnt mound material, 1 x field boundary ditch and 1 x keyhole type kiln were recorded in addition to a concentration of features in an area not proposed for development.					
95E126	-	J068030	Haggardstown	1995:220	C McConway
A souterrain was uncovered during a housing development. Machine assisted excavation revealed its extent and an enclosing ditch c. 30m in diameter.					
98E0440 00E0132	LH007-095	J05250438 30539 30364	Mullagharlin & Haggardstown	1998:468 1998:469 1999:610 2000:0684	D Moore A Gahan C McLoughlin
Testing in advance of Xerox Industrial Park. 28 trenches excavated. Archaeology recorded in 3 trenches comprising 1 x horseshoe shaped ditch (possible remains of ringfort; LH007-095) and 3 burnt spreads. Further testing undertaken at the enclosure. 1 small charcoal spread close to the enclosure Monitoring and full excavation at the 100 acre site in 1999. This revealed 3 x fulachta fiadh, 1 x hearth, 2 houses (all Bronze Age), 1 x corn drying kiln, a range of pits and ditches and, 1 x souterrain. In 2000 one of the fulachta fiadh found in 1999 excavated under a new licence.					
01E0015	LH012-006	O30586 30405	Haggardstown	2001:858	D Moore
Test-trenching was carried out in advance of a development. A possible multi period enclosed settlement was recorded.					
02E0549	LH012-008	30601 30354	Haggardstown	2002:1348 2006:1365	F Walsh G McLoughlin
Testing undertaken on site adjacent to Xerox campus (see 98E0440 & 00E0132 above) to ascertain its archaeological potential. 5 areas of archaeological activity across the site: 1): early medieval settlement activity; 2): 1 pit; 3): Fulacht fiadh; 4): Fulacht fiadh & 5): pits and gullies. Second phase of testing in 2006 undertaken by G McLoughlin. This revealed a series of spreads, layers and linear features of probable early medieval date, the possible remains of a burnt mound and a pit. No evidence of the possible souterrain site (LH012–008) was uncovered in either testing programme.					
04E0252	-	30620 30331	Haggardstown	2004:1073	D Sweetman
Monitoring of groundworks for a one-off house produced nothing of archaeological interest.					
04E0876	-	J03970216 30611 30242	Haggardstown	2004:1110 2004:1111	E Halpin E Corcoran
Testing of features recorded in geophysical survey over a 14.5ha site. Only gullies and a spread were recorded. Full excavation undertaken under same licence. 3 heavily truncated fulachta fiadh					
05E0963 06E0485 06E0484 06E0483 06E0270	-	30580 30270	Haynestown & Haggardstown	2005:1078 2006:1367 2006:1368 2006:1369 2006:1366	G McLoughlin R Lynch
05E963 GMcL: Testing of a 57ha greenfield site following geophysical survey (05R087). Numerous areas of archaeological potential noted and excavated under separate licences (below). 06E485 GMcL: Full excavation of 1 archaeological area within the site revealed a late Bronze Age enclosure (47m x 45m), a neolithic house (8.9m x 3.8m) and 2 earth cut figure of eight cereal drying kilns. 06E484 GMcL: Full excavation of 1 archaeological area within the site revealed 2 Bronze Age roundhouses and					

associated features. 06E483 GMcL: Full excavation of 1 archaeological area within the site revealed an earth cut figure of eight cereal drying kiln 06E270 GMcL & RL: Monitoring followed by full excavation of smaller areas within the scheme. Numerous pits postholes stakeholes kilns gullies and linear features were recorded in 6 separate concentrations.					
08E0743	-	30570 30285	Haggardstown	2008:845	S Delaney
2 previously unknown souterrains disturbed during construction work and subsequently excavated under licence. A hollow area between the 2 may indicate the location of a 3rd souterrain with stone lining robbed out.					
10E0054	-	705718, 803913	Haggardstown	2010:461	G McLoughlin
Assessment in advance of residential development. 5 archaeological areas noted; 2 burnt mounds and 3 isolated pits. Numerous field boundary ditches also noted across the site.					
11E0095	-	705719, 803913	Haggardstown	2011:428	D Sweetman
Testing in advance of housing development. No archaeology noted.					
12E0290	-	705682, 803559	Haggardstown	2012:427	A O'Connell
Monitoring of site investigations works in advance of watermain. No archaeology noted.					

Table 4: Previous archaeological excavations adjacent to the site

3.7 Geophysical Survey

Geophysical survey (Magnetic Gradiometer) was undertaken across the site by J Nicholls of Target Archaeological Geophysics on 12-13 March 2018 under licence 18R0036 (Nicholls 2018; see Figure 5). The survey area was divided into 2 sections (M1 east & M2 west). The results from survey in M1-M2 displayed no clear evidence of archaeological activity within the proposed development boundary. No definitive patterns of archaeological settlement, enclosure remains, or concentrations of archaeological activity were recorded. Small-scale positive responses and weak trends were apparent in the data. While a possible archaeological interpretation for these anomalies could not be entirely dismissed these response were largely expected to derive from a combination of natural soil/geological variation, recent landuse and/or modern ferrous. Elsewhere the survey results from M1-M2 highlight extensive natural soil/geological variation, which is typical for the region surrounding Dundalk, responses from former cultivation, and remains of several former boundaries.

3.8 Test Trenching

3.8.1 Methodology

The aim of the current programme of test trenching was to target various anomalies recorded in the course of geophysical survey and to reveal the horizontal extent of all associated archaeological sites/features/deposits and the vertical extent of any archaeological stratigraphy. The excavations were licensed (18E071) by the DCHG and NMI under National Monuments Acts 1930–2004 and carried out on 21 August 2018. Fifteen test trenches (250 linear metres) were opened and closed by a 13t mechanical excavator fitted with a 1.8m wide ditching bucket under constant archaeological supervision (Figure 6; Plates 1-12). Trenches were situated in locations agreed with the Department of Culture, Heritage and the Gaeltacht and set out with a Geomax Zenith 15 Rover GPS. Excavation proceeded in level spits no greater than 0.20m and each revealed surface was inspected for archaeological remains.

3.8.2 Results

Test trenches were excavated within the site at locations agreed with the Department of Culture, Heritage and the Gaeltacht. Subsoil consisted of compact orange/brown stony clay. There were no archaeological features or artefacts recorded in the course of testing. Bedrock was observed close to the subsoil surface at various locations. No archaeological features were noted. The results are listed in Table 5 below.

Trench	Dimensions (m)	Notes	Plate Ref.
1	10 x 1.8 x 0.45	No archaeological features recorded.	Plate 1
2	10 x 1.8 x 0.42	No archaeological features recorded.	Plate 2
3	10 x 1.8 x 0.44	No archaeological features recorded.	-
4	10 x 1.8 x 0.44	No archaeological features recorded.	Plate 3
5	50 x 1.8 x 0.0.15-0.46	No archaeological features recorded. Outcrop of bedrock at eastern side of trench corresponding with geophysical anomaly	Plate 4
6	10 x 1.8 x 0.44	No archaeological features recorded.	Plate 5
7	10 x 1.8 x 0.48	No archaeological features recorded.	Plate 6
8	10 x 1.8 x 0.42	No archaeological features recorded.	-
9	10 x 1.8 x 0.50	No archaeological features recorded.	-
10	20 x 1.8 x 0.48	No archaeological features recorded.	Plate 7
11	10 x 1.8 x 0.50	No archaeological features recorded.	Plate 8
12	10 x 1.8 x 0.47	No archaeological features recorded.	Plate 9
13	15 x 1.8 x 0.44	No archaeological features recorded.	Plate 10
14	50 x 1.8 x 0.41	No archaeological features recorded.	Plate 11
15	15 x 1.8 x 0.44	No archaeological features recorded.	Plate 12

Table 5: Testing Results

5. IMPACTS

The archaeological assessment of an 18.2 hectare site contained in this report indicates the following:

- There are no recorded archaeological sites within the proposed site. The closest listed site is a possible early medieval souterrain (LH012-013) located c. 400m east of the subject site.
- No stray finds recorded in the topographical files of the National Museum of Ireland can be directly associated with the subject site.
- No previously unrecorded archaeological or cultural heritage features were recorded in historic maps
- No new features of archaeological or cultural heritage interest were identified in aerial photographs.
- No previous excavations have been undertaken within the subject site.
- Geophysical survey undertaken across the site displayed no clear evidence for archaeological activity
- Test trenching targeted on various geophysical trends and anomalies recorded no archaeological features
- Test trenching was not undertaken in order to establish the archaeological potential of the remainder of the site.

There will be no impact on known archaeological remains from proposed development works at this location. However, it is possible that buried archaeological deposits remain within the site outside of the 15 tested locations.

6. RECOMMENDATIONS

While no archaeological material was noted in this assessment, it is noted that the site is large in scale and potentially contains buried archaeological deposits at locations which were not subject to test trench assessment in the course of this study. It is therefore recommended that **any future development works carried out at the subject site be monitored by a suitably qualified archaeologist under licence** to the Department of Culture, Heritage and the Gaeltacht in consultation with the National Museum of Ireland. It is further suggested that particular attention should be paid to those areas adjacent to and covering the laneway to the north of the site which may be the location of an ancient roadway.

NOTE: All conclusions and recommendations expressed in this report are subject to the approval of The Department of Culture, Heritage and the Gaeltacht (DCHG) and the relevant local authorities. As the statutory body responsible for the protection of Ireland's archaeological and cultural heritage resource, the DCHG may issue alternative or additional recommendations.

7 REFERENCES

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7.2 Other sources

Louth County Development Plan 2009–2015

7.3 Web references

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Online Archaeological Survey of Ireland www.archaeology.ie [accessed 29 Aug 2018]

Signed

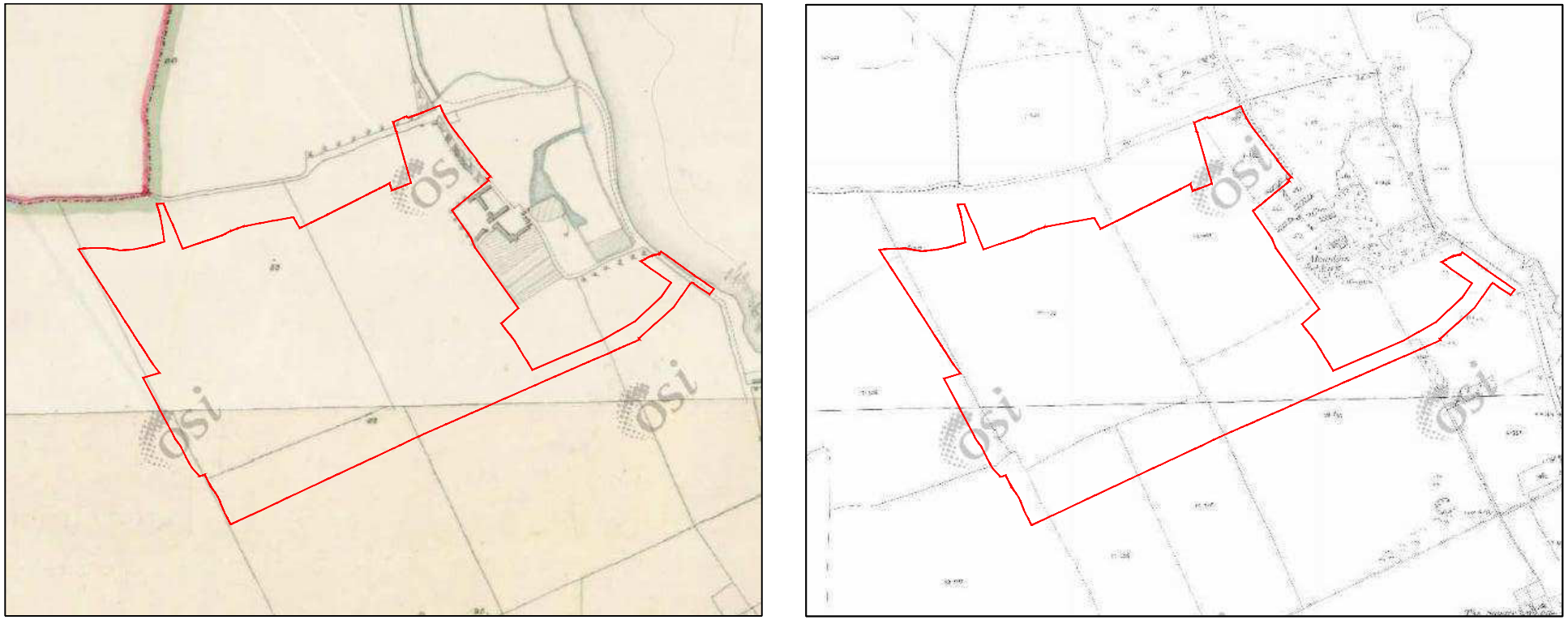
Aidan O'Connell

29th August 2018

Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Haggardstown, Co. Louth Archaeological Assessment	Scale: 1:10,000 A4
			Date: August 2018
		Client: Kingsbridge Consultancy	Origin: archaeology.ie
			Ref: 2017_44_Ass_01

Figure 1: Location of site and surrounding RMP's

Figure 2: Proposed site layout plan



(l) 1st Edition OS Map (1835)

(r) 25 inch OS Map (1907-09)

Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Haggardstown, Co. Louth Archaeological Assessment	Scale: Not to scale Date: Aug 2018
		Client: Kingsbridge Consultancy	Origin: OSI Ref: 2017_44_Ass_03

Figure 3: Extracts from early historical maps

(l) OSI 2005

(r) Google Earth 06.2017

Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Haggardstown, Co. Louth Archaeological Assessment	Scale: Not to scale Date: August 2018
		Client: Kingsbridge Consultancy	Origin: OSI & Google Earth Ref: 2017_44_Ass_04

Figure 4: Extracts from aerial photographic sources

Figure 5: Results of geophysical survey

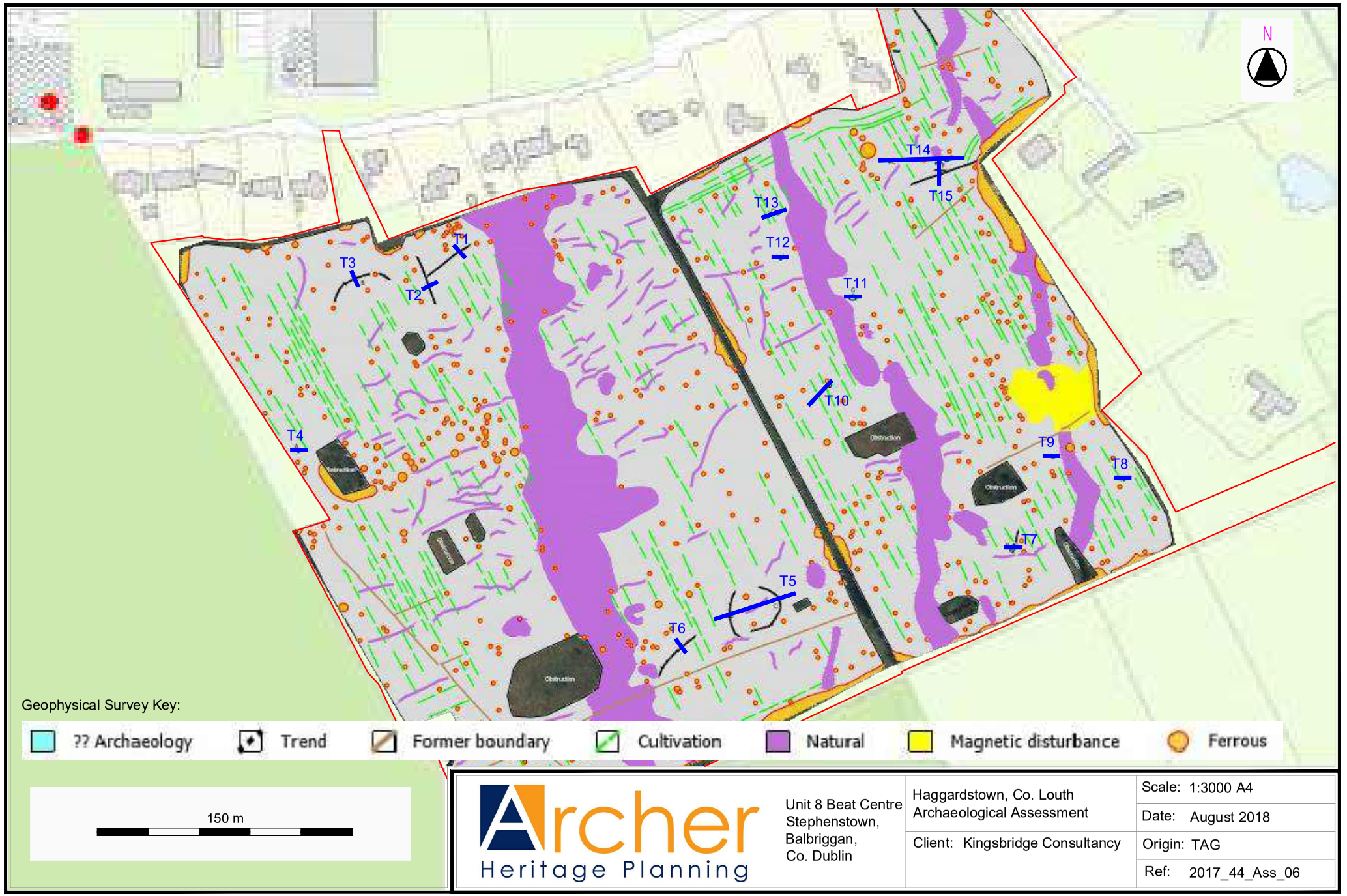


Figure 6: Trench Layout in relation to results of geophysical survey


Plate 1: Trench 1 from north


Plate 2: Trench 2 from west


Plate 3: Trench 4 from west


Plate 4: Trench 5 from west


Plate 5: Trench 6 from north


Plate 6: Trench 7 from west


Plate 7: Trench 10 from west


Plate 8: Trench 11 from west


Plate 9: Trench 12 from east


Plate 10: Trench 13 from east


Plate 11: Trench 14 from east


Plate 12: 15 from south

Geophysical Survey Report

Lands in Haggardstown, Blackrock, Co. Louth

Detection License
18R0036

Client
Archer Heritage Planning Ltd
on behalf of Kingsbridge Consultancy Ltd

Date
March 2018

Project
TAG1800IE8

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TARGET REPORT 1800IE8

LANDS IN HAGGARDSTOWN, BLACKROCK, CO. LOUTH

PROJECT BACKGROUND

Geophysical survey was undertaken in connection with proposed development of lands situated c.0.75km N of Blackrock, in Haggardstown townland, County Louth. The investigation area comprised c.17.5ha of land located E of Dundalk golf course, S of Bothar Maol, W of Blackrock Road, and N of Birches lane. Survey extended across 2 adjacent fields, covering all available lands at the site, completing a total 15.72ha of magnetic gradiometry.

This survey was commissioned by Archer Heritage Planning Ltd on behalf of Kingsbridge Consultancy Ltd, and follows a recent archaeological impact assessment completed in relation to proposed development at the site. The survey objectives were to identify the location, form and extent of buried archaeological remains, where present within the site boundary, and advise further archaeological works, prior to proposed development at the site.

Coordinates	306887 304295 (Irish Grid)
Townland(s)	Haggardstown
County	County Louth
Landuse	Arable land
Landscape, soils geology	Gently undulating lowland occupied by fine loamy soils of the Ballylanders (1100e) soil series overlying shale and slate (Irish National Soils Map, 1:250,000k, V1b, 2014). Bedrock comprises calcareous red-mica greywacke of the Clontail Formation (Geological Survey Ireland Spatial Resources, Public Data Viewer Series).
Archaeology	No recorded monuments and places (RMP) are located within the site boundary. However, the site does lie in proximity to 2 enclosure sites (LH007-139 and LH007-140), and 3 souterrains (LH007-82, LH007-084, LH007-086), situated c.250m to the NW. Further RMPs are also located within c.1km radius, including two enclosures and a souterrain. Summary details of all RMPs situated within 1km of the site boundary are provided below:

SMR NO.	CLASS	TOWNLAND	IT EASTING	ITM NORTHING
LH007-080----	Souterrain	Marshes Upper	306570	304960
LH007-081----	Souterrain	Marshes Upper	306130	304820
LH007-082----	Souterrain	Marshes Upper	306380	304580
LH007-083----	Souterrain	Marshes Upper	306400	304550
LH007-084----	Souterrain	Marshes Upper	306430	304530
LH007-085----	Souterrain	Marshes Upper	306470	304480
LH007-086----	Souterrain	Marshes Upper	306490	304460
LH007-139----	Enclosure	Marshes Upper	306400	304550
LH007-140----	Enclosure	Marshes Upper	306470	304480
LH012-007----	Enclosure	Haggardstown	306030	303800
LH012-013----	Souterrain	Haggardstown	307630	303810

Fieldwork	12-13 March 2018
Report issue	15 March 2018
Author	John Nicholls MSc
Detection license	18R0036
Client	Archer Heritage Planning Ltd on behalf of Kingsbridge Consultancy Ltd
Technique	Magnetic gradiometry

© TARGET

1 TECHNICAL SURVEY INFORMATION

1.1 Survey methodology

1.1.1 Magnetic gradiometer survey was conducted across all available portions of the proposed development undertaking a total 15.72 ha of survey in 2 areas (M1-M2). The survey employed an advanced multichannel fluxgate gradiometer system combined with survey grade GPS. Magnetic gradiometer and GPS data were recorded simultaneously at rates of 30Hz and 1Hz respectively, conducting parallel instrument traverses 3.5m in width across the site.

1.2 Geophysical instrumentation

1.2.1 Details of the instrumentation employed for this project are provided below:

Technique(s)	Sensor spacing	Sample rate	Instrumentation	Sensitivity / precision
Fluxgate gradiometry (magnetometry)	0.5m	30Hz	8 x Foerster Ferex Con650 (Archaeology) gradiometers combined with a 10-channel data logger	<35pT/√Hz at 1Hz (650mm baseline)
GPS	4.0m	1Hz	Trimble R4 GLONASS GPS system operating in VRS mode	<0.1m (vertical & horizontal)

1.3 Data processing

1.3.1 Survey data were processed using in-house, open-source and commercial software. Following GPS and fluxgate gradiometer measurements on site all data was processed as follows:

Process	Description
1	Drift & zero median correction to balance data from entire sensor array
2	Gridding of corrected data via nearest neighbour interpolation
3	Greyscale generation at optimum range & export to tiff-format (.tiff & .wld)

1.3.2 To assure integrity of the processed data and maintain close correlation with the original raw on-site measurements no additional smoothing, low or high pass filters were applied proceeding steps 1-3.

2 GENERAL CONSIDERATIONS & COMPLICATING FACTORS

2.1 Access & ground conditions

2.1.1 Survey in M1-M2 extended across gently undulating arable low land bound by several dwellings to the N and a driving range to the south. The site is occupied by a number of shale outcrops which remained unavailable for survey due to dense vegetation. No major obstructions to survey were noted at the time of feldwork.

2.2 Modern interference

2.2.1 Numerous small-scale ferrous responses are evident throughout the results from M1-M2 . Ferrous responses are a common occurrence in magnetic survey data, and in most cases represent modern metal debris contained within the topsoil. Broad zones of ferrous response evident at the edges of survey derive from modern metal debris, metal fencing, gates and modern ferrous surfaces bordering the site perimeter.

2.2.2 A large zone of magnetic disturbance at the eastern survey edge in M2 represents modern debris which likely derives from a disused farm located at the eastern site edge.

2.3 Responses from recent landuse

2.3.1 Remnants of former cultivation are visible throughout M1-M2 as closely spaced parallel linear responses, which are aligned mostly NW-SE.

2.4 Responses from natural soil/geological variation

2.4.1 The results from survey in M1-M2 highlight extensive natural soil/geological variation throughout. This is visible as positive/negative mottling within the +/-1.5nT range, numerous small-scale positives, and broader strongly magnetic positive/negative banding extending NNW-SSE. This pattern of natural soil/geological variation is common to much of the region surrounding Dundalk. The potential that subtle variations in response associated with buried archaeological remains may have been masked by the strongly magnetic natural soil/geological variations on site should not be dismissed.

3 MAGNETOMETIC GRADIOMETRY RESULTS

3.1 M1

3.1.1 The results from survey in M1 are dominated by patterns of former cultivation and responses from natural soil/geological variation. No definitive archaeological responses are indicated by the results from M1. A small-scale positive anomaly at the north-western survey edge is expected to represent soil/geological variations continuing across M1.

3.1.2 Weak trends of potential significance have also been recorded in M1, notably to the NW (B) and SE (C). The potential that trends B & C represent weakly magnetic enclosure/ditch remains levelled by intensive ploughing should not be dismissed. An archaeological interpretation for B & C remains highly tentative.

3.1.3 A network of probable former boundaries has been identified extending across the southern/south-western portion of M1.

3.1.4 No responses of clear archaeological significance are evident in the results from survey in M1.

3.2 M2

3.2.1 The results from survey in M2 demonstrate a continuation of anomalies associated with former cultivation and natural soil/geological variation. No responses of definite archaeological character have been recorded from survey in this M2.

3.2.2 The results from M2 are punctuated by a number of discrete positive anomalies. The potential that a number of these represent pit locations or significant linear remains should not be ignored. The most notable of these responses include D, E, F to the N/NW; G NW of survey centre; and H to the S. Given the absence of any clear archaeological patterns in the results from M2 anomalies D-H are expected to represent responses from modern ferrous debris contained in the topsoil and/or continuing soil/geological variation.

3.2.3 Remnants of several former boundaries are indicated in M2 to the NE & SE.

3.2.3 No responses of archaeological significance are evident in the results from survey in M2.

4 CONCLUSION

4.1 The results from survey in M1-M2 display no clear evidence of archaeological activity within the proposed development boundary. No definitive patterns of archaeological settlement, enclosure remains, or concentrations of archaeological activity have been recorded.

4.2 Small-scale positive responses and weak trends are apparent in the data. While a possible archaeological interpretation for these anomalies should not be entirely dismissed these response are largely expected to derive from a combination of natural soil/geological variation, recent landuse and/or modern ferrous.

4.3 Elsewhere the survey results from M1-M2 highlight extensive natural soil/geological variation, which is typical for the region surrounding Dundalk, responses from former cultivation, and remains of several former boundaries.

*** This conclusion must be read in conjunction with the detailed discussion of the results included in the main section of this report.**

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LIST OF FIGURES

APPENDIX

APPENDIX 1: TECHNICAL INFORMATION

INSTRUMENTATION

GPR/Ground Penetrating Radar: GPR systems comprise a configuration/data acquisition unit, a transmitting/receiving antenna (250-500mhz), and a cart with an odometer or integrated GPS. The technique is used for identifying remains of buried foundations, structures and cavities. GPR systems transmit a continuous electromagnetic wave of energy into the ground and record reflections of that energy as it interacts with the stratigraphy and structures below the surface. Data is acquired along parallel transects, 0.5m or 1m apart, and recorded as a function of the elapsed time for the energy wave to travel from transmitter to reflector and back to the surface. The strength of reflections recorded from GPR survey is proportional to the conductive and dielectric properties of the buried objects with which the transmitted energy is incident.

Gradiometry/Magnetometry (6 sensor gradiometer system combined with GPS): Gradiometry is the most widely applied technique in archaeological prospection, and is regularly used on sites 1-100ha in size to locate and characterize buried remains of enclosure ditches, pits, hearths, furnaces and kilns. These remains often produce magnetic contrasts above localized soil/geological variation due to enhancement from burning activity and organic enrichment of the soil during archaeological settlement. Mapping of these contrasts is undertaken using an array of either caesium or fluxgate magnetometer sensors for measurement of the earth's total field or variations in its vertical component. Target uses a 6 sensor gradiometer system combined with cm precision GPS to measure magnetic anomalies from buried archaeological remains in detail, collecting data along parallel lines 0.5m or 0.75m apart, at 10-12cm intervals along each line.

Electrical Resistivity: Electrical resistivity is generally used to map locations of buried structures, including foundation remains, walls, burial cairns, and existing earthworks. Using an array of electrodes mounted on a portable frame a small electrical current is passed through the ground at regular intervals via *current* emitting probes. Variations in resistance to the flow of this electrical current as it passes through the ground are measured by *potential* probes. Single or parallel twin arrays use 1 or 2 pairs of current and potential probes fixed to a mobile frame, with 1 remote *current* and 1 *potential* probe maintained stationary 20m from the survey limit. Resistivity surveys are normally conducted at 0.5m x 1m or 1m x 1m intervals.

EMI/Electromagnetic Induction (EMI sled system combined with GPS): EMI is suitable for detection of buried remains including foundations, enclosures, ditches, pits, and kilns. The technique measures variations in both the electrical conductivity and magnetic susceptibility of the soil. EMI systems comprises of 1 transmitting and 2-4 receiving coils, providing 2-8 data sets from below surface. The transmitting coil generates a time varying primary magnetic field which propagates above and below ground, generating alternating (eddy) currents within the soil and the objects it contains. These create a secondary magnetic field proportional to the rate of change of the magnetic field, which is measured by receiving coils 0.5m and 1m from the transmitting coil. Target's EMI sled system is used to survey in vertical or horizontal modes along 0.5m, 0.75m or 1m spaced lines at 10-12cm intervals along each line.

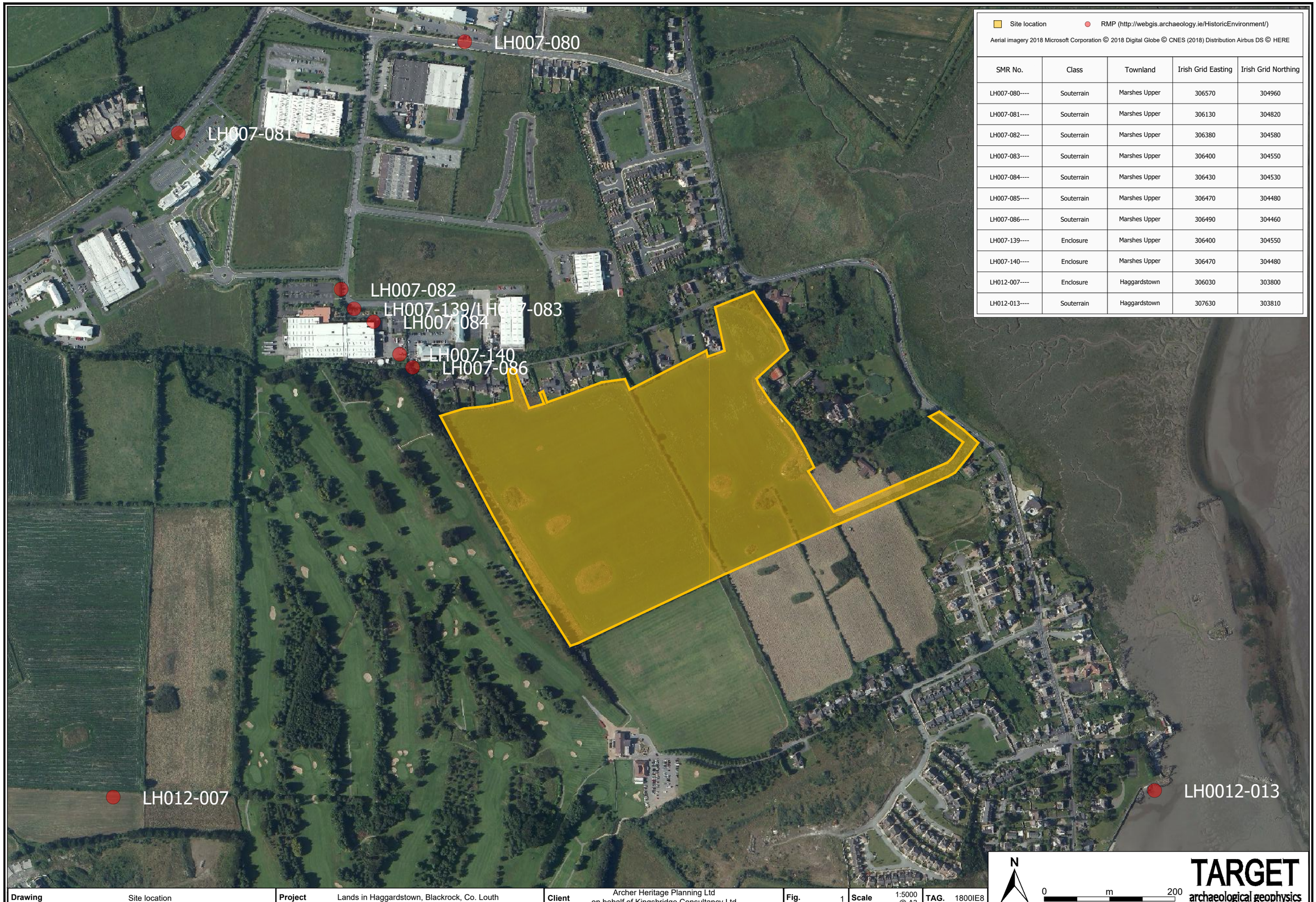
DISPLAY

Greyscale: 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 a given data set. This display method also enables the identification of discrete responses barely above localized soil/geological variations.

Colour Plot: Colour plots comprising RGB values linearly interpolated between a user-specified range of values can provide further insight into the varying anomalies within a given data set. Colour plots are particularly useful for EMI data where presentation of results within a confined range of values is not always feasible with other formats.

XY Trace: XY Trace displays provide a near-perspective representation of responses recorded along each instrument traverse. The format is used mainly for locating responses from modern ferrous, but can assist in identifying magnetically strong anomalies relating to hearth, kiln and furnace remains. Ferrous anomalies can also be identified via a search of the attribute table in a GIS extracting readings beyond a specified range (e.g. where z<= -15 and where z>=15), and then combining this layer with other display formats for interpretation.

Time-slice: Radargrams collected from grid based survey or parallel transects can be compiled as a 3D volume, then re-sampled to produce a series of 2D plans at incremental depth/time offsets. A series of Time-slice displays at 25-50cm offsets permits analysis of the pattern and depth of reflections within a given GPR survey area.



Site location

RMP (http://webgis.archaeology.ie/HistoricEnvironment/)

Aerial imagery 2018 Microsoft Corporation © 2018 Digital Globe © CNES (2018) Distribution Airbus DS © HERE

SMR No.	Class	Townland	Irish Grid Easting	Irish Grid Northing
LH007-080----	Souterrain	Marshes Upper	306570	304960
LH007-081----	Souterrain	Marshes Upper	306130	304820
LH007-082----	Souterrain	Marshes Upper	306380	304580
LH007-083----	Souterrain	Marshes Upper	306400	304550
LH007-084----	Souterrain	Marshes Upper	306430	304530
LH007-085----	Souterrain	Marshes Upper	306470	304480
LH007-086----	Souterrain	Marshes Upper	306490	304460
LH007-139----	Enclosure	Marshes Upper	306400	304550
LH007-140----	Enclosure	Marshes Upper	306470	304480
LH012-007----	Enclosure	Haggardstown	306030	303800
LH012-013----	Souterrain	Haggardstown	307630	303810

Drawing	Site location	**Project**	Lands in Haggardstown, Blackrock, Co. Louth	**Client**	Archer Heritage Planning Ltd on behalf of Kingsbridge Consultancy Ltd	**Fig.**	1	**Scale**	1:5000 @ A3	**TAG.**	1800IE8

N

0 m 200

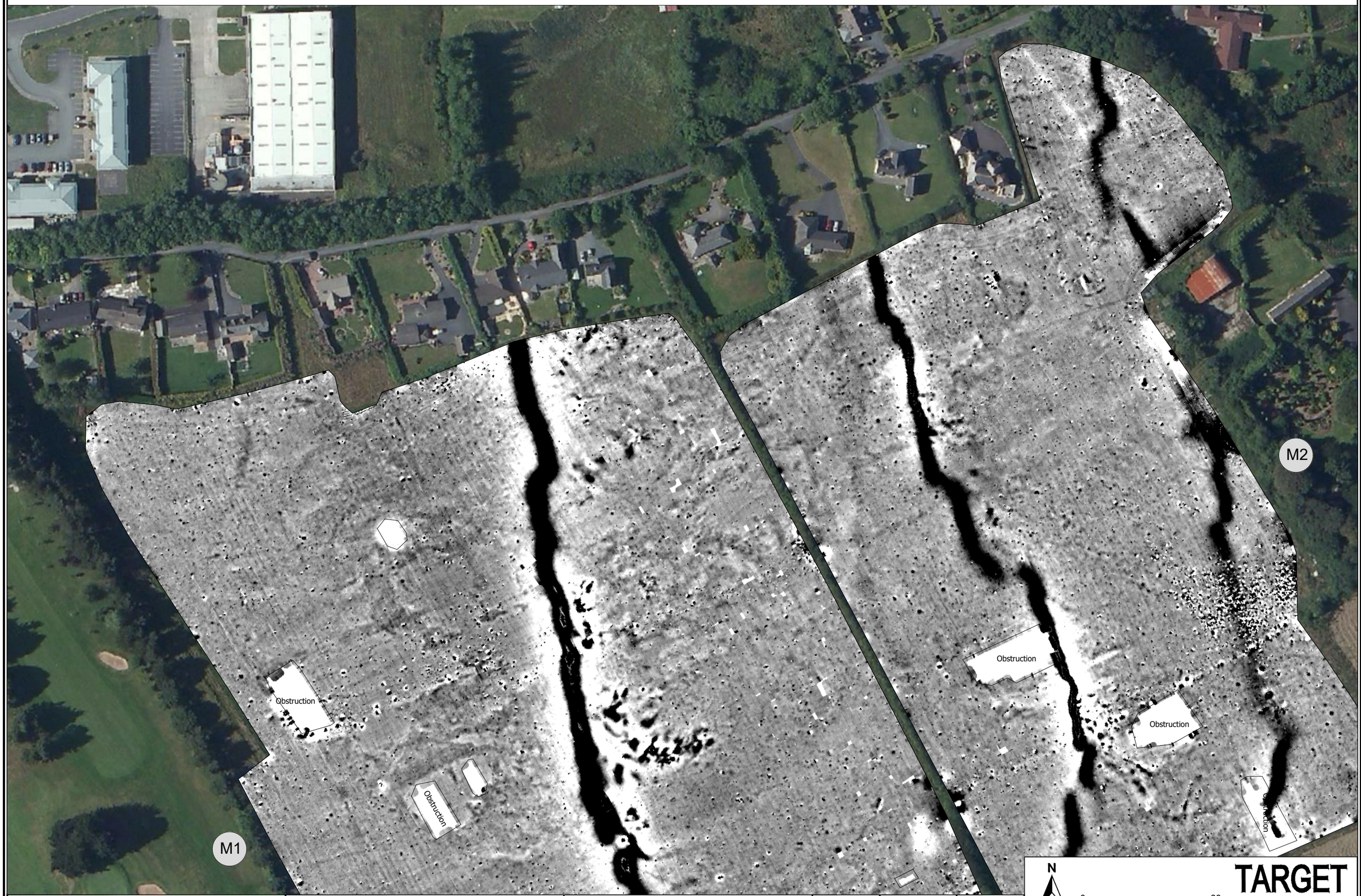
TARGET
archaeological geophysics

Drawing	Greyscales M1-M2	**Project**	Lands in Haggardstown, Blackrock, Co. Louth	**Client**	Archer Heritage Planning Ltd on behalf of Kingsbridge Consultancy Ltd	**Fig.**	2	**Scale**	1:2000 @ A3	**TAG.**	1800IE8

N

0 m 80

TARGET
archaeological geophysics



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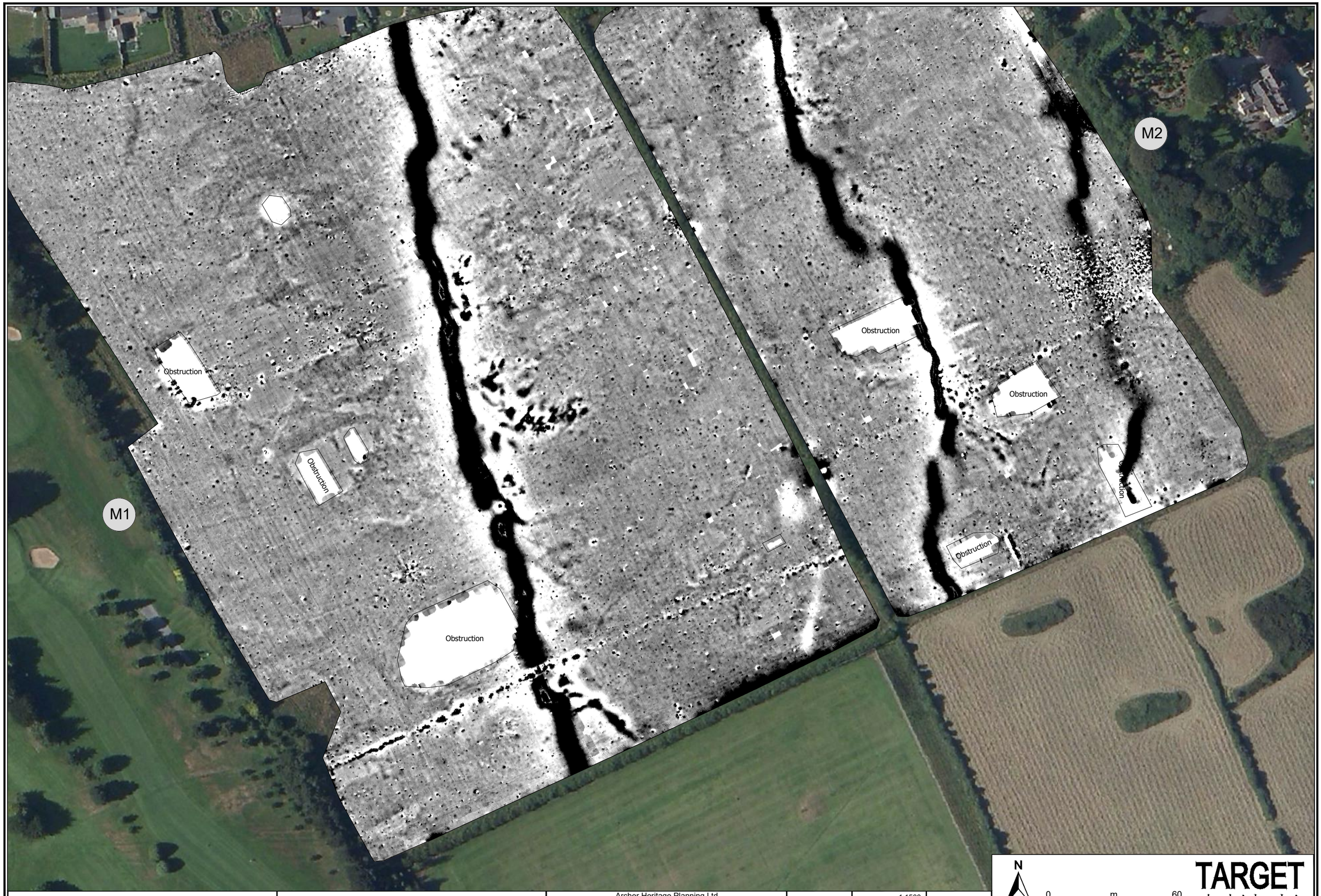
TARGET
archaeological geophysics



Drawing	Greyscales M1-M2 south	**Project**	Lands in Haggardstown, Blackrock, Co. Louth	**Client**	Archer Heritage Planning Ltd on behalf of Kingsbridge Consultancy Ltd	**Fig.**	4	**Scale**	1:1500 @ A3	**TAG.**	1800IE8

TARGET
archaeological geophysics

?? Archaeology | Trend | Former boundary | Cultivation | Natural | Magnetic disturbance | Ferrous

Drawing	Interpretation M1-M2	**Project**	Lands in Haggardstown, Blackrock, Co. Louth	**Client**	Archer Heritage Planning Ltd on behalf of Kingsbridge Consultancy Ltd	**Fig.**	5	**Scale**	1:2000 @ A3	**TAG.**	1800IE8

N

0 m 80

TARGET archaeological geophysics

?? Archaeology | Trend | Former boundary | Cultivation | Natural | Magnetic disturbance | Ferrous

Drawing	Interpretation M1-M2 north	**Project**	Lands in Haggardstown, Blackrock, Co. Louth	**Client**	Archer Heritage Planning Ltd on behalf of Kingsbridge Consultancy Ltd	**Fig.**	6	**Scale**	1:1500 @ A3	**TAG.**	1800IE8

N

0 m 60

TARGET archaeological geophysics

?? Archaeology | Trend | Former boundary | Cultivation | Natural | Magnetic disturbance | Ferrous

Drawing	Interpretation M1-M2 south	**Project**	Lands in Haggardstown, Blackrock, Co. Louth	**Client**	Archer Heritage Planning Ltd on behalf of Kingsbridge Consultancy Ltd	**Fig.**	7	**Scale**	1:1500 @ A3	**TAG.**	1800IE8

N

0 m 60

TARGET archaeological geophysics

TARGET

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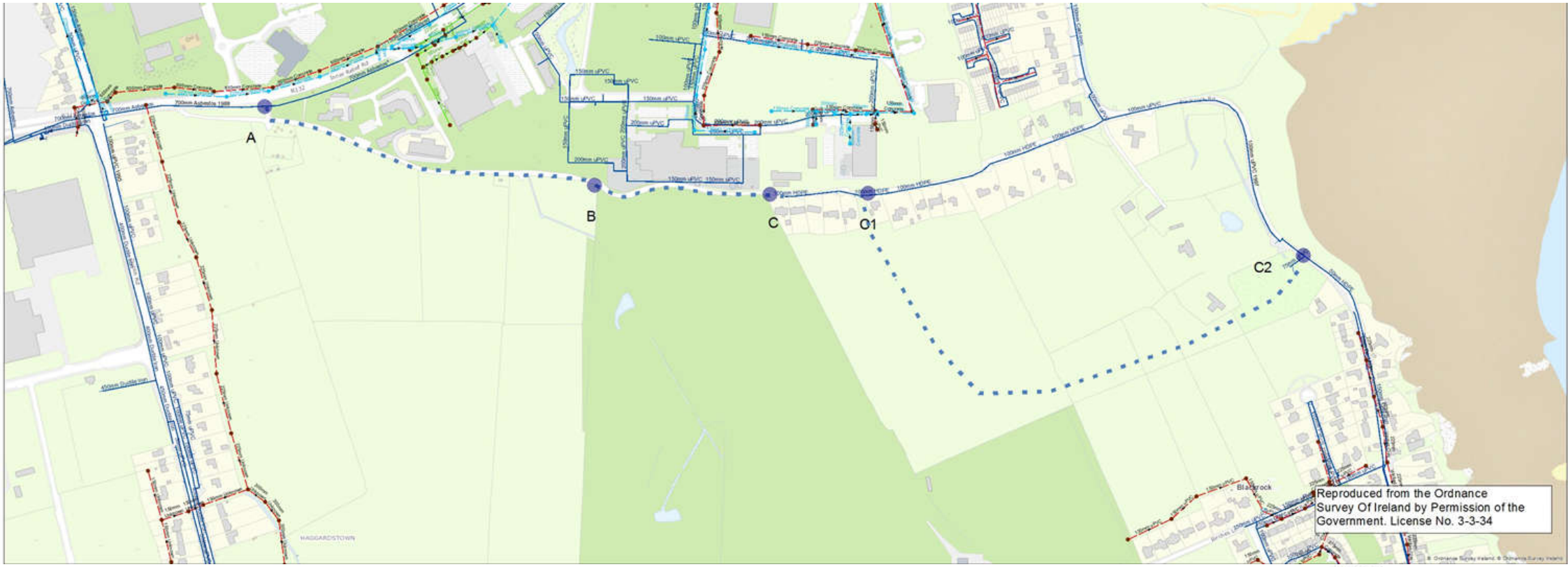
Appendix J. Material Assets

J.1. Existing Utility Plans

J.2. Advice Note – Gas Networks Ireland

J.3. Outline C&D Waste Management Plan (Atkins, 2019)



March 6, 2018

Legend

Gravity Main (Irish Water Owned)
- Surface

Gravity Main (Non Irish Water Owned)
- Surface

Storm Manholes
- Cascade
- Catchpit
- Hatchbox
- Lamphole
- Standard
- Other; Unknown

Storm Inlets
- Gully
- Standard
- Other; Unknown

Storm Fittings
- Vent/Col
- Other; Unknown

Storm Discharge Points
- Outfall
- Overflow
- Soakaway
- Other; Unknown

Storm Culverts

Storm Clean Outs

Sewer Clean Outs
- Rodding Eye
- Flushing Structure
- Other; Unknown
- Sewer Flow Control Valves
- Treatment plant

Sewer Discharge Points
- Outfall
- Overflow
- Soakaway
- Standard Outlet

Sewer Inlets
- Catchpit
- Gully
- Standard
- Other; Unknown

Sewer Manholes
- Cascade
- Catchpit
- Hatchbox
- Lamphole
- Standard
- Other; Unknown

Sewer Fittings
- Vent/Col

Sewer Gravity Mains (Irish Water owned)
- Combined
- Foul
- Overflow
- Unknown

1:5,000

0 0.125 0.25 0.5 mi

0 0.175 0.35 0.7 km

Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland. It should not be relied upon in the event of excavations or other works being carried out in the vicinity of the network. The onus is on the parties carrying out the works to ensure the exact location of the network is identified prior to mechanical works being carried out. Service pipes are not generally shown but their presence should be anticipated. © Irish Water

Irish Water

UISCE ÉIREANN : IRISH WATER

ESB Networks

TITLE: 20181126-016_A3

COLOUR CODE:

- BLACK - 38KV & HIGHER VOLTAGE OVERHEAD LINES
- 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: 26-Nov-2018

** SCALE: 1:2500

** SCALE WHEN PRINTED ON AN A3 PAGE
XY COORDINATES DISPLAYED IN IRISH GRID COORDINATE SYSTEM

Maps reproduced by permission: Ordnance Survey Ireland Licence No. EN0023715-19, Copyright Ordnance Survey Ireland Government of Ireland

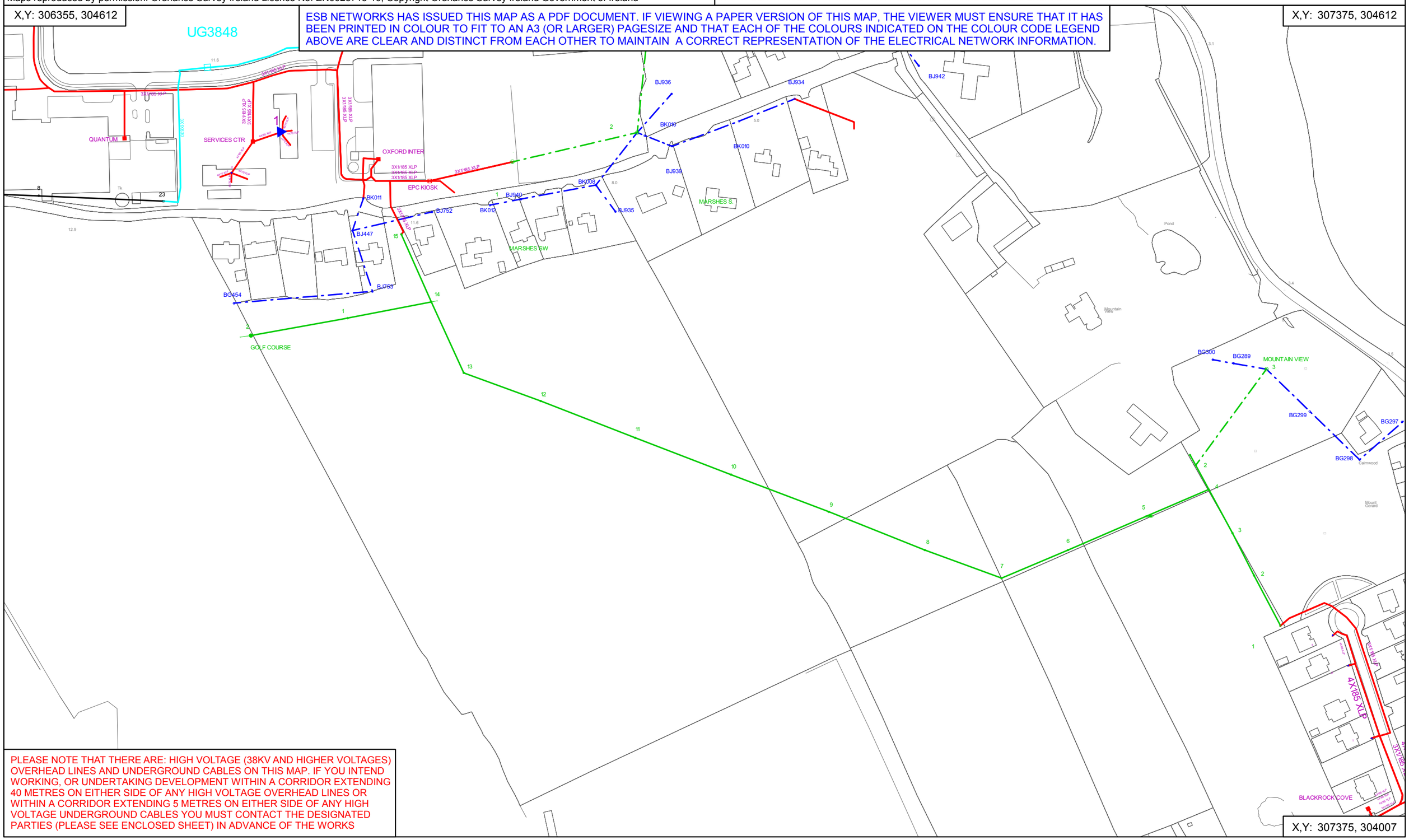
WARNING

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 1850 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.

X,Y: 306355, 304612

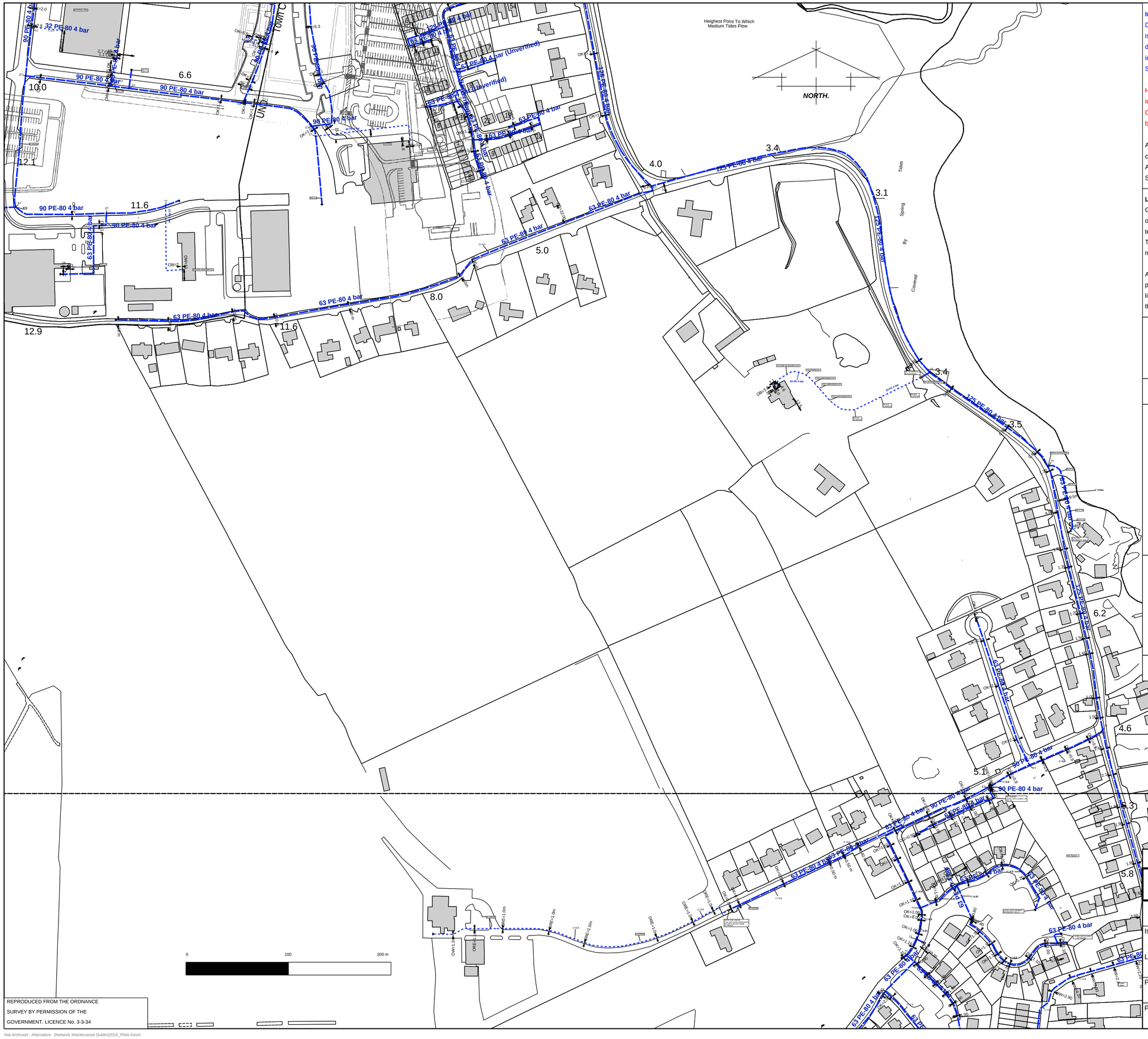
ESB NETWORKS HAS ISSUED THIS MAP AS A PDF DOCUMENT. IF VIEWING A PAPER VERSION OF THIS MAP, THE VIEWER MUST ENSURE THAT IT HAS BEEN PRINTED IN COLOUR TO FIT TO AN A3 (OR LARGER) PAGESIZE AND THAT EACH OF THE COLOURS INDICATED ON THE COLOUR CODE LEGEND ABOVE ARE CLEAR AND DISTINCT FROM EACH OTHER TO MAINTAIN A CORRECT REPRESENTATION OF THE ELECTRICAL NETWORK INFORMATION.

X,Y: 307375, 304612



PLEASE NOTE THAT THERE ARE: HIGH VOLTAGE (38KV AND HIGHER VOLTAGES) OVERHEAD LINES AND UNDERGROUND CABLES ON THIS MAP. IF YOU INTEND WORKING, OR UNDERTAKING DEVELOPMENT WITHIN A CORRIDOR EXTENDING 40 METRES ON EITHER SIDE OF ANY HIGH VOLTAGE OVERHEAD LINES OR WITHIN A CORRIDOR EXTENDING 5 METRES ON EITHER SIDE OF ANY HIGH VOLTAGE UNDERGROUND CABLES YOU MUST CONTACT THE DESIGNATED PARTIES (PLEASE SEE ENCLOSED SHEET) IN ADVANCE OF THE WORKS

X,Y: 307375, 304007



REPRODUCED FROM THE ORDNANCE SURVEY BY PERMISSION OF THE GOVERNMENT. LICENCE No. 3-3-34

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 & 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.

- Aurora Telecom Fibre Optic Cable
- Aurora Telecom Duct
- Aurora Telecom Sub-duct
- Aurora Telecom Inserted Gas Pipe

Contact Aurora Telecom on 1850-427-399 or (01)203-0120.

- 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 Pipe (Medium Pressure)
- Inserted Pipe (Low Pressure)
- Distribution Pipe (Abandoned)

.C=?	Cover (depth in meters)		Pressure Monitor
CP	CP Test Point		Protection (Sleeve)
	End Cap		Protection (Slabbing)
	Hot Tap		Reducer
	Installation		Service Terminator
	Valve		Tee
	Mains Verification **		Transition

** Please contact GNI on 1850-427747 for specific information.

Design Department - DUBLIN

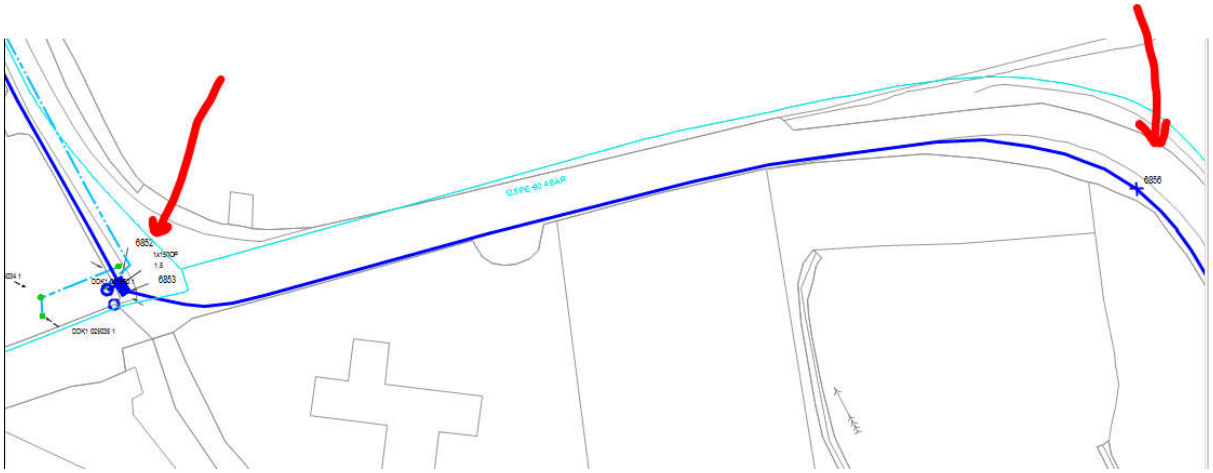
Gas Networks Ireland

GAS NETWORK INFORMATION

Issue: Atkins Global	
Location: Blackrock, Dundalk, Co. Louth	
Plot Date: 21/09/2018	Contact: A McCollom
Plotted by: KOC	Scale: 1:2500

Not Archived - Alternative : |Network Maintenance Dublin|2018_Plots Kevin

Eircom Utilities in the vicinity of the Site

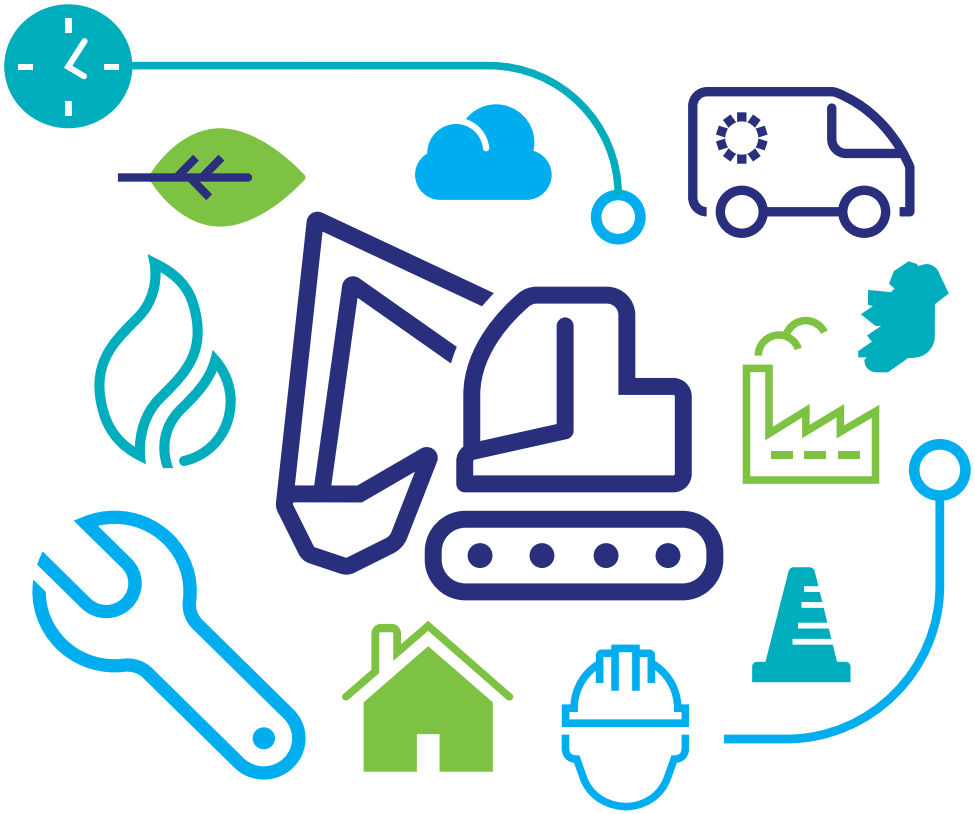


Safety information

Gas Networks Ireland

Safety advice

for working in the vicinity of natural gas pipelines



Important safety information

When planning any excavation works dial

1850 42 77 47

to obtain up to date gas network maps.

Monday to Friday 9am – 5.30pm

You can also contact us on

dig@gasnetworks.ie

If you have damaged a gas pipe call

1850 20 50 50

immediately, even if you do not suspect that gas is leaking

24 hours, 7 days a week

If you smell gas call

1850 20 50 50

24hr emergency service

Contents

This booklet contains important safety advice.
Please read the following before you start work:

Natural gas **characteristics and behaviour**

Characteristics

Natural gas is:

- a highly flammable gas;
- lighter than air and will rise when released;
- nontoxic (but can suffocate in enclosed or confined spaces); and
- made up mostly of methane and has a smell added for safety purposes.

Behaviour

During an uncontrolled escape, natural gas will behave in the following ways:

- In open excavations, where there is a clear path to the atmosphere, natural gas will rise, dilute and disperse into the air.
- If the path to the atmosphere is blocked, the gas will travel through soil, ducts, drains, sewers and voids. It can also follow the line of other buried utility services. This can lead to gas entering a building or other confined spaces, and may lead to a fire or explosion.

Note: Never cover a damaged gas main or service; or attempt to carry out a repair. Call 1850 20 50 50 immediately.

Risks of **damaging a gas pipe**

The risks of damaging a gas pipe can be classified as:

Highest Risk

Mechanical excavators pose the highest risk and "should not be used within 500 mm of a gas distribution pipe."

(HSA Code of Practice)

Mechanical excavators must not be used within 3 metres of a Transmission pipeline.

(Refer to Code of Practice for Working in the Vicinity of the Transmission Network - AO/PR/127)

High Risk

Hand held power tools should not be used directly over the line of a gas pipe, unless the gas pipe has been positively located by hand and a safe working distance has been established.

Use of handheld power tools is not permitted within 1.5 m of a Transmission pipeline.

(Refer to Code of Practice for Working in the Vicinity of the Transmission Network - AO/PR/127)

Damage to gas pipes from power tools presents a high risk to the operatives involved in the work.

Low Risk

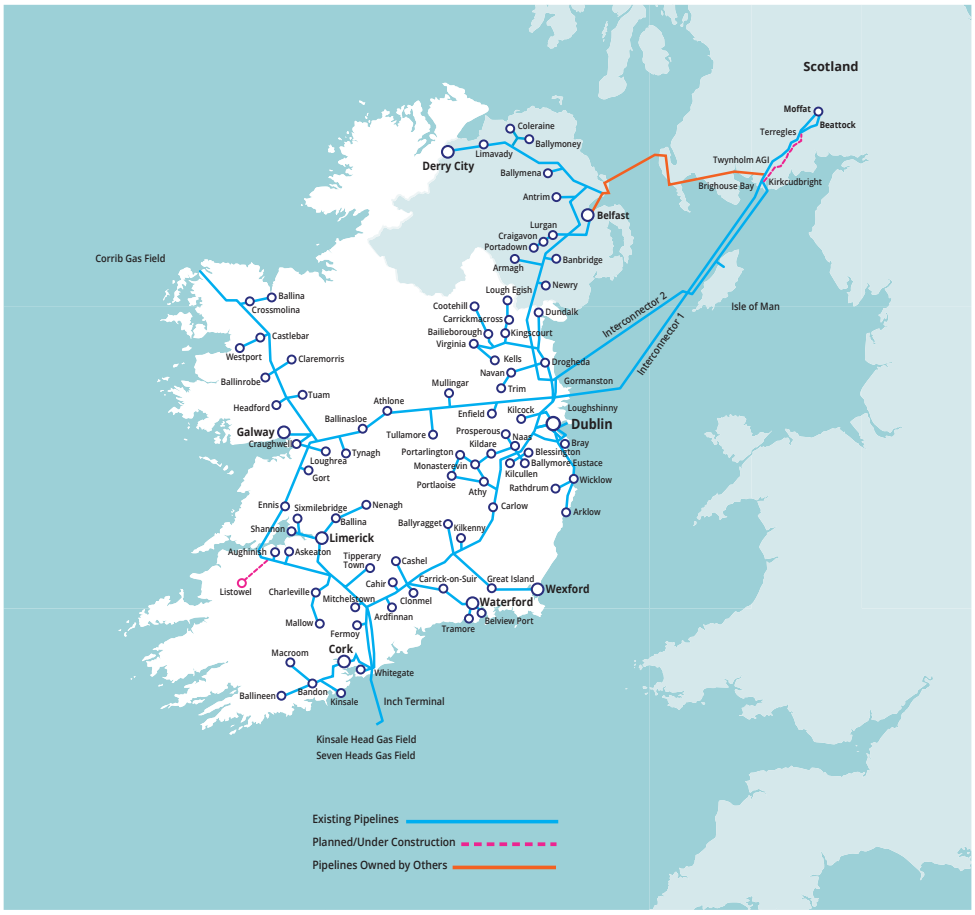
Hand digging using shovels and spades presents the lowest risk of damaging a gas pipe.

This is the method that should be used where the presence of gas pipes is suspected or close to a known gas pipe.

Risks from a **damaged gas pipe**

- Remember when gas escapes, or is released in an uncontrolled way; it can fuel a fire, give rise to an explosive atmosphere or cause asphyxiation.
- If you suspect there is a gas leak, immediately call Gas Networks Ireland's 24hr Emergency Service on **1850 20 50 50**.
- Gas can quickly fill underground cavities and travel into buildings through soil, or following the line of other buried utilities.
- Gas can only burn if exposed to an ignition source:
  - Do not turn electrical switches on or off
  - Do not operate any plant or equipment
  - Do not use naked flames or smoke
  - Do not use mobile phones in the vicinity.
- Move people away from, and upwind of, the affected area.
- If gas has entered a confined space or building:
  - Open doors and windows
  - Turn off the gas supply at the meter
  - Do not expose to an ignition source.

Gas Networks Ireland **transmission network**



Gas Networks Ireland transports gas in Ireland through a network of steel and polyethylene (PE) pipes. The network operates at pressures between 20 mbar and 85 bar and is split between Transmission and Distribution pipelines.

The **Transmission** system is made up of steel pipes and operates from 7 bar to 85 bar.

The **Distribution** system is made up mostly of polyethylene pipes and operates from 20 mbar to 7 bar.

The **network**

The network is made up of three elements:

- Transmission pipes
- Distribution pipes
- Pressure Regulating Installations

Transmission pipes

These are high pressure pipelines that transfer gas across the country. They are constructed from steel, with a black, white, cream, yellow or concrete coating, and may have marker posts at intervals along their length, particularly at field boundaries and road crossings.

If a transmission pipeline is identified near intended excavations then work must not proceed until Gas Networks Ireland Transmission has been consulted on 1850 42 77 47.

The **network**

Distribution pipes

These are medium or low pressure pipelines within urban areas. They are mainly constructed from Polyethylene (PE) and are predominantly yellow in colour, but may have brown or black stripes. There are two types – Mains and Services.

Mains gas pipes usually run parallel to property in the footpath, grass verge or road and range in size from 63 mm to 400 mm diameter.

Service gas pipes are connected to mains and run to a meter position at the property, and range in size from 20 mm to 63 mm diameter.

Note: There is a limited use of steel pipes in areas like bridges or where only shallow depths can be achieved.

There are still a small number of ductile and cast iron gas mains in use, ranging in size from 3 inch (75 mm) to 24 inch (600 mm) in diameter (these mains are similar in appearance to metal water mains). Steel and PE gas services are run from these metal mains to the meter location at each building.

These ductile and cast iron mains and services have been largely replaced with PE pipes. In urban areas a large number of redundant ductile or cast iron pipes are utilised as carrier pipes for new PE pipelines.

District Regulating Installation (DRI)

Pressure Regulating Installations

There are two types: Above Ground and Under Ground

Above Ground Installations (AGI) / District Regulating Installations (DRI)

An AGI/DRI is a fenced area containing a visible arrangement of pipework and ancillary equipment and will be clearly marked with Gas Networks Ireland signage. Some DRI's can be housed in a steel unit with no fencing surround.

Under Ground Installations (UGI /DRIug)

Gas Networks Ireland also have underground pressure regulating installations which have metal or concrete cover plates. There will be no visible arrangement of pipework etc, as this will be contained within the chamber.

If an AGI/DRI or UGI/DRIug is identified near intended works, then work must not proceed until Gas Networks Ireland has been consulted.

Gas Networks Ireland **construction methods**

Gas Networks Ireland use three main construction methods:

'Dig' Technique

Open Cut – installing pipe using standard trenching techniques. Pipe is laid with a sand or pea gravel surround and gas marker tape is laid above the sand.

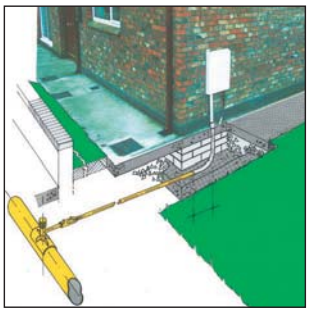
'No-Dig' Techniques

Insertion – utilising existing metal gas mains / services as a carrier for new PE pipes. Inserted PE may be a close or loose fit. The carrier pipe is broken out at connection points, i.e. at pipe joints or where a gas service pipe is connected.

Moling/Directional Drilling – installing mains/ services where a 'moling' machine drills from one location to another pulling the pipe behind it using "no-dig" technology.

Note: Where pipe has been installed using "no-dig" techniques, the gas pipe will not have sand surround or marker tape.

Gas Networks Ireland construction – **depth of cover**



Typical service arrangement

Service Connection

Purge Point

New Mains – Normally 750 mm in roads and 600 mm in footpaths. (1.1 m in open fields)

New Services – 450 mm rising to 375 mm within 1.5 m of the building line. In some cases these depths are not achievable.

Note:

Older mains and services may have reduced cover.

Services and other connections are taken from the top of the main and will therefore have a reduced depth of cover.

Alteration since original installation – roads, footpaths and grass verges may have been altered since the gas main or service was laid and reduced the depth of cover.

Purge Points and Test Caps – Mains are laid with "purge points" and/or test caps at the ends. These may also rise above the top of the main.

Gas Valve Covers –Gas valves are a key safety component part of the gas network.

Some gas mains and services have valves installed below ground with valve covers marked "GAS".

Do not cover over or remove gas valve covers.

The risk of a gas valve cover being removed or covered over is particularly high during resurfacing or reinstatement works.

Even shallow excavation techniques such as road planing can damage gas pipelines with reduced cover.

Requesting **Gas Networks Ireland maps**

Gas Networks Ireland operates a **Dial Before You Dig** service to enable those involved in excavations to obtain natural gas network maps prior to starting work.

This service operates from 9am to 5.30pm, Monday to Friday.

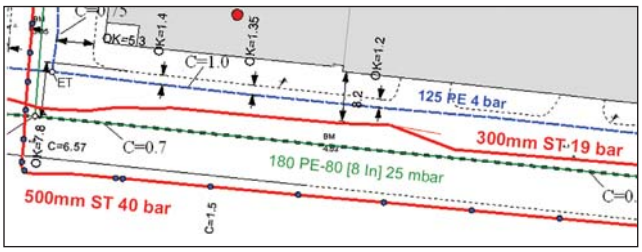
You can also email your enquiry to:
dig@gasnetworks.ie

Maps will be sent out by post or by email where appropriate. When you contact Gas Networks Ireland to request a map, ensure you give the precise location of the intended works. You may be required to give some information regarding the nature of the planned work, i.e. start date, any high risk activity, etc.

Ensure you have allowed enough time for the maps to be obtained and to organise for the pipe location to be marked out if transmission pipelines are involved.

Note: Typical turnaround for maps is five working days.

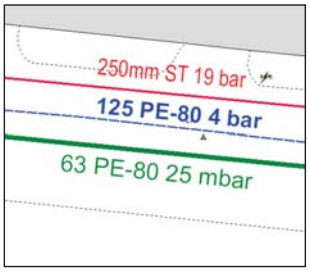
Organisers or planners of any work should ensure that the map is made available to personnel on-site.



Excerpt from a Gas Networks Ireland map.

Reading **Gas Networks Ireland maps**

Note: Natural Gas Network maps will only show mains and not services.
See page 16 for more information on service pipe locations.



The colour coding is as follows:

Red = Transmission Main*
= 7 to 85 bar.

Blue = Distribution Medium Pressure
= 100 mbar to 7 bar.

Green = Distribution Low Pressure
= up to 100 mbar.

Typical AGI

Pressure regulating installations are marked as:

DRI – District Regulating Installation (Above Ground).

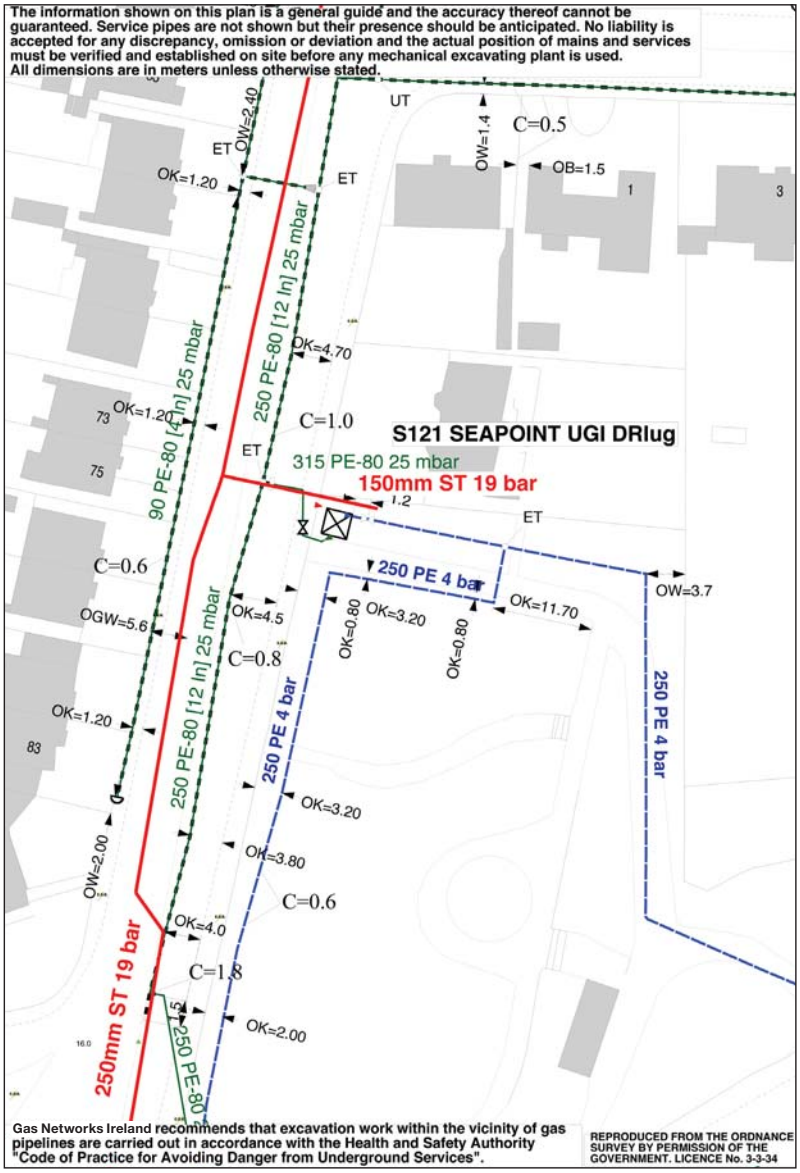
DRIug - District Regulating Installation (Under Ground).

UGI – Under Ground Installation.

AGI – Above Ground Installation.

** If you obtain a natural gas network map that shows a **red** Transmission main in the area of the proposed works, consultation with Gas Networks Ireland **must** take place **before** starting works. Gas Networks Ireland will advise you on the safety measures required and will arrange for the exact location of the pipe to be marked out on site.*

Reading **Gas Networks Ireland maps**

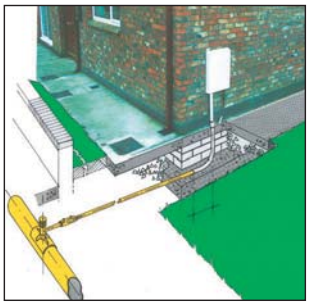


Example of a Gas Networks Ireland map

Abbreviations

OK = Kerb, Curb
ORE = Road Edge
ORB = Rail Base
OB = Building
OW = Wall
OF = Fence
ODW = Dividing Wall
OGW = Garden Wall
RD = Road
BR = Branch
RED = Reducer
C = Cover to top of pipe
LH = Left Hand
RH= Right Hand
SWP = Sweep
CNR = Corner
S = South
N = North
E = East
W = West
No. = Number
Ctr = Centre
CL = Centre Line
Trans = Transition
DIV = Dividing
PK = Park
Conn = Connection
Opp = Opposite
Cplg = Coupling
ST = Steel
PE = Polyethylene

Gas **services**



Typical service arrangement

Service riser cover

Natural gas services are not normally identified on network maps, but their presence should be assumed. Services will normally, but not always, run at right angles from the main to the meter point.

To assist in determining the approximate position of gas services ensure you:

- Obtain a natural gas network map to identify the position of the gas main.
- Complete a site survey looking for gas meter boxes/cabinets, house entry points, service risers and gas valve covers.
- Older buildings may have no visible signs of a service, as the service may run directly into the building underground, with the meter fitted internally. In these cases a check should be made inside the building to identify the meter position.

Note: Ensure you utilise safe digging practices to locate the exact position of gas services.

Domestic meter box

Six meter cabinet

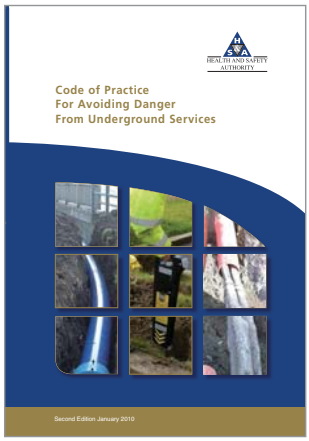
Purpose built multi-meter house (apartment complex).

Safe systems of work

Safe systems of work, as recommended by the Health and Safety Authority (HSA) should be employed on all projects.

Guidance on this can be found in the:

HSA: Code of Practice for Avoiding Danger from Underground Services.



Available from HSA website: **www.hsa.ie**

A safe system of work will include the following elements:

- Planning.
- Obtaining and using utility maps.
- Identifying pipes/services.
- Safe digging practices.
- Explosives must not be used within 30 m of any gas pipe (400 m for Transmission Pipelines), without prior consultation with Gas Networks Ireland.
- Piling, directional drilling or boring must not take place within 15 m of a gas pipe unless Gas Networks Ireland has been consulted.
- Extra care should be exercised when performing 'hot work' (such as welding) where a gaseous atmosphere could exist. If this potential exists Gas Networks Ireland must be consulted.
- Extra care should also be taken when using welding equipment, burners, torches or other heat generating equipment near pipelines (even if there is no potential for a gaseous atmosphere to exist) to ensure that the heat or sparks generated do not lead to the melting of polyethylene pipes or damage to pipeline coatings.

Contact Gas Networks Ireland for general enquiries on:
1850 20 06 94

Safe systems of work

Planning

- Early contact should be made with Gas Networks Ireland to obtain a Natural Gas Network map.
  Dial Before You Dig 1850 42 77 47
- Work involving piling, demolition, directional drilling, use of explosives or 'hot works' should be mentioned, as this may necessitate a site visit from Gas Networks Ireland personnel.
- Ensure you have allowed enough time to obtain the maps.

Maps

- Gas Networks Ireland will issue maps as outlined in this booklet. It is imperative that these maps are available for the operatives on-site for the duration of any works.
  The responsible person should ensure that operatives on-site understand the maps.

Identifying Pipes

- Steel, cast iron and ductile iron gas pipes can usually be traced using a conventional pipe/cable locating device set to "R" (Radio) mode.
- Polyethylene mains and services cannot be traced using conventional devices, so it is essential that maps are used and site surveys for meter boxes, valve covers, service risers, reinstatement scarring and other signs are completed.
- During the progress of works ensure no gas valve covers or markers are covered over.
- The position of gas mains and services should be marked out as they are located.

Note: Transmission pipelines must be marked out by a Gas Networks Ireland inspector.

Safe systems of work

Safe Digging Practices:

- As per the HSA Code of Practice, gas mains and services should be located by digging trial holes by hand. Mechanical excavators should not be used within 500 mm of any gas main.
  Mechanical excavators MUST NOT be used within 3 m of a Transmission pipeline.
  (Refer to Code of Practice for Working in the Vicinity of the Transmission Network - AO/PR/127)
- Never use hand held power tools directly over gas pipes unless precautions to prevent damage have been made and the pipe has been positively located.
  Use of handheld power tools is not permitted within 1.5 m of a Transmission pipeline.
  (Refer to Code of Practice for Working in the Vicinity of the Transmission Network - AO/PR/127)
- Do not leave a polyethylene gas pipe exposed.
- Provide adequate support for any gas pipe uncovered during the work.
- Report any damage, no matter how minor it may appear, to **1850 20 50 50.**
- If you have any concerns regarding safety around gas pipes contact Gas Networks Ireland for advice on **1850 20 06 94**.

What to do if a gas pipeline is damaged

(or if you smell gas in the area)

- Do not turn any electrical switches on or off, e.g. ignition switches.
- Do not operate any plant or equipment.
- Move people away from, and upwind of, the affected area. Restrict employee and public access to the affected area.
- Prevent smoking, the use of naked flames, the use of mobile phones and other ignition sources in the vicinity of the leak.
- Report the leak/damage immediately to:
  Gas Networks Ireland 24hr Emergency Service on 1850 20 50 50.
- Provide accurate information on your location and the nature of the incident.
- Do not attempt to repair the damage.
- Do not cover up a damaged main or service, this may lead to the gas travelling through soil, ducts, sewers, chambers or voids and potentially building up inside a premises or confined space.
- Do not turn off any gas valves in the road or footpath (you may be causing further problems by doing so).
- Assist Gas Networks Ireland emergency personnel as required.
- Remember any damage to gas pipes, even if the pipe does not appear to be leaking, must be reported to Gas Networks Ireland.

If you smell gas call

1850 20 50 50

24hr emergency service

Gas Networks Ireland contacts

The main contact numbers for
Gas Networks Ireland are

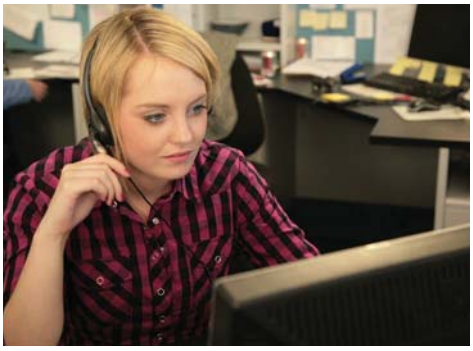
24hr Emergency Service
1850 20 50 50
24 hours, 7 days a week

Dial Before You Dig
1850 42 77 47
Monday to Friday 9am – 5.30pm

General Enquiries
1850 200 694
Monday to Friday 8am – 8pm
Saturday 9am – 5.30pm

gasnetworks.ie

For "Dial Before You Dig" posters or stickers for your workplace call: **1850 20 06 94**



Other useful publications

HSA: Code of Practice for Avoiding Danger from Underground Services

HSA: Guide to Safety in Excavations

both are available free of charge from:
Health and Safety Authority on **1890 289 389**
www.hsa.ie

ESB Networks: Avoidance of Electrical Hazards When Digging

available free of charge from:
ESB Networks on **1850 37 27 57**
esb.ie/esbnetworks

Gas Networks Ireland

The main contact details for Gas Networks Ireland are:

General Enquiries
1850 200 694

Dial Before You Dig
1850 42 77 47

24hr Emergency Service
1850 20 50 50

networksinfo@gasnetworks.ie

gasnetworks.ie

Guideline No: HSQE/GU/016 Rev 1 Date: September 2017

Luminaire Location Summary

LumNo	Label	X	Y	Z	Orient	Tilt
1	T20W	438.8	550.4	6	130	5
2	T20W	457.173	492.882	6	216.466	5
3	T20W	92.8	433.4	6	196	5
4	T20W	457.8	420.3	6	320	5
5	T20W	423.6	394.8	6	134	5
6	T20W	437.4	381.5	6	137.6	5
7	T20W	114.6	375.6	6	23	5
8	T20W	375.9	365.8	6	117	5
9	T20W	396.2	352.3	6	301	5
10	T20W	353.162	350.483	6	118	5
11	T20W	219.808	340.216	6	16.708	5
12	T20W	281.8	338.3	6	90	5
13	T20W	355.57	334.082	6	286.459	5
14	T20W	142	332.8	6	205.5	5
15	T20W	288.528	329.746	6	268.393	5
16	T20W	249.151	328.585	6	272.769	5
17	T20W	319.9	328.5	6	205	5
18	T20W	424.6	326.7	6	190	5
19	T20W	214.9	319.4	6	101.5	5
20	T20W	469.2	314.2	6	120	5
21	T20W	166.7	304.6	6	120	5
22	T20W	335.66	297.973	6	205	5
23	T20W	426.8	295.9	6	110	5
24	T20W	202.2	291.9	6	78	5
25	T20W	219.638	286.609	6	79.007	5
26	T20W	185.5	285.9	6	172	5
27	T20W	371.5	281	6	105	5
28	T20W	113.5	277.5	6	122	5
29	T20W	276.217	277.068	6	81.24	5
30	T20W	335.16	276.856	6	86.299	5
31	T20W	99.2	256.6	6	206.1	5
32	T20W	374.8	226.8	6	205	5
33	T20W	390.9	190.5	6	205	5
34	T20W	411.5	151.6	6	205	5
35	T20W	242.173	281.373	6	352.909	5
36	T20W	436.717	518.229	6	206.685	5
37	T20W	309.518	275.523	6	173.313	5
38	T27F	401.3	471.4	6	296	5
39	T27F	433.3	471.4	6	40	5
40	T27F	424.8	465.1	6	310.365	5
41	T27F	333.1	449.3	6	296	5
42	T27F	534.1	347.3	6	215	5
43	T27F	204.5	157.953	6	86	5
44	T27F	230.876	156.503	6	86	5
45	T27F	261	154.6	6	86	5
46	T27F	265	151.4	6	85	5
47	T27F	302.912	149.261	6	85	5
48	T27F	327.303	147.268	6	85	5
49	T27F	134.4	98.2	6	25	5
50	T27F	141.628	290.487	6	299.134	5
51	T27F	244.931	338.932	6	95.292	5
52	T27F	308.678	356.057	6	23	5
53	T27W	409.1	443.7	6	305	5
54	T27W	349.4	425.4	6	205.504	5
55	T27W	385.8	421.2	6	298	5
56	T27W	269.7	418.3	6	208.346	5
57	T27W	206.5	406.5	6	208	5
58	T27W	189.2	397.6	6	25	5
59	T27W	284.4	396.7	6	197	5
60	T27W	360.9	394.8	6	118	5
61	T27W	88.8	391.9	6	120	5
62	T27W	322.9	389	6	291	5
63	T27W	390.1	382.4	6	222.669	5
64	T27W	137.2	381.7	6	208	5
65	T27W	250.2	374	6	289	5
66	T27W	47.4	372.4	6	120	5
67	T27W	285.9	369.1	6	101	5
68	T27W	423.9	367	6	256.144	5
69	T27W	212.4	357.7	6	298	5
70	T27W	457.1	356.3	6	239	5
71	T27W	148.2	352.5	6	203.587	5
72	T27W	500.1	349	6	303	5
73	T27W	172	338.5	6	298	5
74	T27W	485.4	334.2	6	222.669	5
75	T27W	515.3	326.3	6	125	5
76	T27W	141.1	316.2	6	310	5
77	T27W	509.8	309.7	6	220	5
78	T27W	478.8	303.2	6	290	5
79	T27W	102.5	293.8	6	295	5
80	T27W	535.3	283.2	6	220	5
81	T27W	396.967	270.092	6	290	5
82	T27W	442.7	263.9	6	21.069	5
83	T27W	83.9	255.3	6	203.236	5
84	T27W	263	253.2	6	355	5
85	T27W	347.1	252.2	6	113.152	5
86	T27W	280.7	250.8	6	177	5
87	T27W	541.5	239.4	6	158	5
88	T27W	120.5	234.8	6	115	5
89	T27W	224.5	232.2	6	85	5
90	T27W	159.9	230.6	6	205	5
91	T27W	574.6	229.5	6	211	5
92	T27W	256.5	228.1	6	85	5
93	T27W	294.4	223.7	6	82	5
94	T27W	83.8	217.7	6	115	5
95	T27W	356.7	212.9	6	25	5
96	T27W	543	211.2	6	208	5
97	T27W	399.7	206.6	6	200	5
98	T27W	476.8	199.8	6	115	5
99	T27W	256.4	196.1	6	355	5
100	T27W	274.7	194.2	6	177	5
101	T27W	176.5	192	6	205	5
102	T27W	371.3	180.4	6	25	5
103	T27W	437.3	182.5	6	115	5
104	T27W	124.888	174.93	6	26.565	5
105	T27W	156.164	170.299	6	115.001	5
106	T27W	394.7	162.6	6	115	5
107	T27W	185.3	149.8	6	26.565	5
108	T27W	358.8	145.9	6	115	5
109	T27W	211.347	129.755	6	115	5
110	T27W	314.6	125.3	6	115	5
111	T27W	169.8	110.5	6	115	5
112	T27W	276.2	107	6	115	5
113	T27W	162.2	82.7	6	25	5
114	T27W	246.4	80	6	25	5
115	T27W	178.2	46.6	6	25	5
116	T27W	333.186	221.099	6	105	5
117	T27W	135.149	152.905	6	26.565	5
118	T27W	53.864	335.963	6	31	5
119	T27W	73.34	294.481	6	28	5
120	T27W	27.139	377.731	6	31.452	5
121	T27W	201.466	259.67	6	355	5
122	T27W	218.223	257.499	6	177	5
123	T27W	436.721	286.72	6	290	5
124	T27W	558.672	254.686	6	211	5
125	T27W	423.007	421.739	6	44	5
126	T27W	435.491	433.537	6	220	5
127	T27W	454.791	231.384	6	30	5
128	T27W	176.8	236.893	6	80	5
129	T27W	365.641	249.346	6	116	5
130	T27W	143.365	258.53	6	352.334	5
131	T27W	421.29	493.777	6	23.936	5
132	T27W	217.415	372.42	6	208	5
133	T5F	773.9	356.7	6	325	0
134	T5F	760.1	333.5	6	325	0
135	T5F	747.7	318.7	6	320	0
136	T5F	733.5	304.5	6	311	0
137	T5F	714.5	289.6	6	311	0
138	T5F	691.5	276.6	6	296	0
139	T5F	666.3	263.8	6	295	0
140	T5F	640.3	252.1	6	295	0
141	T5F	614.4	241	6	295	0
142	T5F	588.4	229.7	6	295	0

Total Quantity: 142

Calculation Summary

Description	Class (BS5489-1:2013)	Avg	Max	Min	Min/Avg	Min/Max	Units	PtSpcLr	PtSpcTb	# Pts
Entrance Road	P2	9.75	32.6	1.7	0.17	0.05	Lux	1.5	1.5	1463
Road 1	P4	4.52	17.3	0.8	0.18	0.05	Lux	1.5	1.5	9924
Road 2	P4	4.68	18.5	0.8	0.17	0.04	Lux	1.5	1.5	6071
Cycle/Pedestrian Routes	P5	3.43	11.4	0.4	0.12	0.04	Lux	1.6	1.5	1949
Path 1	P5	2.81	10.7	0.6	0.21	0.06	Lux	1.5	1.5	296
Path 2	P5	3.20	10.2	0.5	0.16	0.05	Lux	1.5	1.5	188
Light spill 1		0.05	3.5	0.0	0.00	0.00	Lux	4	4	930
Light Spill 2		0.01	0.4	0.0	0.00	0.00	Lux	4	4	161

Luminaire Schedule

Symbol	Qty	Label	Lum. Lumens	MF	S/P Ratio	Description	Filename
	80	T27W	3120	0.750	1.40	Tech 27w 16LED 500mA Street Optic Wide A8	5TCA11GLB-STW.IES
	15	T27F	3120	0.750	1.40	Tech 27w 16LED 500mA Forward Throw Optic A9	5TCA11GLB-FT.ies
	37	T20W	2050	0.720	1.40	Tech 20w 8LED 700mA Street Optic Wide A8	5TCA10GLA.IES
	10	T5F	6235	0.750	1.40	Tech 52w 32LED 500mA Forward Throw Optic A9	5TCA13GLA-FT.IES

REV	DATE	DESCRIPTION	DR	CK
P3	JUN 19	DRAWING UPDATED TO SUIT COMMENTS	LW	PON
P2	APR 19	DRAWING UPDATED TO SUIT NEW SITE LAYOUT	LW	PON

Caldwell

ARCHITECT
FINN DESIGN

JOB
RESIDENTIAL DEVELOPMENT
BLACKROCK
DUNDALK, CO LOUTH

DRAWING
ELECTRICAL SERVICES INSTALLATION
PROPOSED STREET LIGHTING
INSTALLATION

DRAWING NO./REVISION
3889/E100 P3

SCALE/PRINTED AT	DATE	DRAWN	CHECKED
NTS/A1	NOV 18	LW	MB

UNIT 6 FORESTGROVE BUSINESS PARK
NEWTOWNBREDA BELFAST BT8 6AW
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EMAIL: admin@caldwellconsulting.net

KINGSBRIDGE CONSULTANCY LTD,

HAGGARDSTOWN, BLACKROCK, DUNDALK, CO. LOUTH

STRATEGIC HOUSING DEVELOPMENT (SHD) PLANNING APPLICATION

STREETLIGHTING PROPOSALS

10th June 2019 – Rev 3

Caldwell

Unit 6, Forestgrove Business Park,
Newtownbreda | BELFAST | BT8 6AW

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Table of Contents

1 INTRODUCTION

Caldwell Consulting have been instructed to provide a MEP Design statement in relation to the plant equipment and systems being considered as an integral part of the MEP Services installation to be provided and installed at Haggardstown, Blackrock, Dundalk, Co. Louth, which comprises of 258 dwellings, semi-detached dwellings, Terraced, Duplexes, 12 no. ground floor apartments below duplexes and 213 Apartments and a Creche and is located within the administrative area of Louth County Council and is therefore subject to the land use policies and objectives of the County Development Plan 2015-2021.

https://www.louthcoco.ie/en/Publications/Development-Plans/Louth-County-Council-Development-Plans/Louth-County-Development-Plan-2015-2021.html

The area in the immediate vicinity of the site comprises of a large industrial park, Dundalk Golf Club, residential properties and rural agricultural land.

The proposed streetlighting installation has been designed to provide, as far as is reasonably practical, a safe environment for pedestrians, cyclists and road users whilst making every effort to limit the environmental impact.

1.1 DESIGN CONSIDERATIONS AND REFERENCE MATERIAL

In undertaking the Streetlighting design, Caldwell Consulting referred to and considered the following:

- Louth County Council Public national energy efficiency targets and Guidance
- IS EN 13201-2:2015 – Road lighting performance requirements
- BS 5489-1:2013 – Code of practice for the design of road lighting
- BS 5489-1:2003 + A2:2008 – Code of practice for the design of road lighting, lighting of roads and public amenity areas
- PD CEN TR 13201-1:2014 – Road lighting, Guidelines on selection of lighting classes
- CIBSE Lighting Guide 6 – Outdoor Environment
- ILE Guidance notes – Guidance notes for the reduction of obtrusive light

- CIE 115:2010 (N1) – Lighting of roads for motor and pedestrian traffic
- CSS – Review of the class and quality of street lighting
- The use of LED lamps with 'white' light appearance to provide a feeling of greater safety
- Providing good visibility for all road users
- Limiting the height of lighting columns as far as is reasonably practical with a view to lessening their impact, reducing overspill, glare, upward and nuisance light spill
- Ensuring that the illumination 'Uniformity' is within required limits and shaded/dark areas are eliminated as far as is reasonably practicable
- Biodiversity chapter of the EIAR

Should any Planning Conditions impose 'Curfew Hours' after which dimming of luminaires is required this will be incorporated into a revised design.

1.2 GENERAL DESIGN PARAMETERS

The design parameters in the table below are based on the recommendations of BS 5489-1:2013 and IS EN 13201 and have been used as the basis of the Streetlighting Installation design for this project.

LOCATION	**LIGHTING CLASS**	**MAINTAINED (Eave) LUX LEVELS**	**MAINTAINED (Eamin) LUX LEVELS**
Entrance road	P2 with S/P ratio of 1.4	8.4 lux	1.7 lux
Subsidiary Roads – traffic areas for slow moving vehicles	P4 with S/P ratio of 1.4	3.8 lux	0.8 lux
Cyclist areas	P5 with S/P ratio of 1.4	2.1 lux	0.4 lux
Pedestrian areas	P5 with S/P ratio of 1.4	2.1 lux	0.4 lux

Table A – General Design Parameters

1.3 PROPOSED LIGHTING CLASSES AND SELECTION CRITERIA

The Lighting Classes detailed in 'Table A' have been determined from BS 5489-1:2013 and IS EN 13201 and further information is provided within this report.

The main entrance to the development is proposed as being from the R172 Blackrock Road to the east of the site, a lighting design for this area has not been completed at this time, as a completed drawing of this area would need to be produced to allow an accurate lighting proposal.

This junction would be considered as a conflict area and will therefore be illuminated to a CE series of lighting class chosen from BS EN 13201-2:2015, Table 2 or a C Series lighting class from CIE 115:2010 (N1), Table 5.

- 20 lux with a Uniformity of not less than 0.4 Uo

Guidance on the lighting of conflict area is also given in ILP PLG02 (36). As described in BS 5489-1:2013 a conflict area is;

"Conflict areas are typically junctions, intersections, roundabouts and pedestrian crossings, where significant streams of motorized traffic intersect with each other or with other road users such as pedestrians and cyclists. At conflict areas, the visual task is generally more difficult than on straight roads, and a higher luminance or illuminance class may be selected at the conflict area."

The proposed residential development site will also consist of a cyclist and pedestrian path which will begin at the entrance to the development from the Bothar Maol road, which is located to the north of the site

Recommendations on the lighting design are highlighted in BS 5489-1:2013 and in IS EN 13201 (Table A within this report), with additional Guidance on lighting of pedestrian crossings provided in ILP TR12 (43)

It is proposed to provide Lighting Class P2 with a S/P Ratio of 1.4 to the main road into the development.

It is proposed to provide Lighting Class P4 with a S/P Ratio of 1.4 to subsidiary roads within the development.

It is proposed to provide Lighting Class P5 with a S/P Ratio of 1.4 to cyclist and pedestrian routes within the

development.

1.4 PROPOSED STREETLIGHTING INSTALLATION

The proposed streetlighting installation comprises the following:

142 No. Tech Series LED luminaires mounted on 6 Meter columns, this consists of;

- 95 No. 27 W (80 No. Street Optic wide A8, 15 No. Forward Throw Optic A9) with a 5 Degree tilt,
- 37 No. 20 W street optic wide A8 with a 5 Degree tilt,
- 10 No. 52W forward throw optic A9 with No tilt.

The Column mounted, post-top luminaire proposed is a Tech Series LED external luminaire or similar. This luminaire has been selected to produce the streetlighting illumination design calculations detailed in this report, as its performance minimises upward light spillage and glare onto site boundaries in accordance with the 'Biodiversity Chapter of the EIAR', has the ability to be dimmable and has an LED light source. Please refer to image 1.4A for a photo and detail dimensions of the luminaire below:

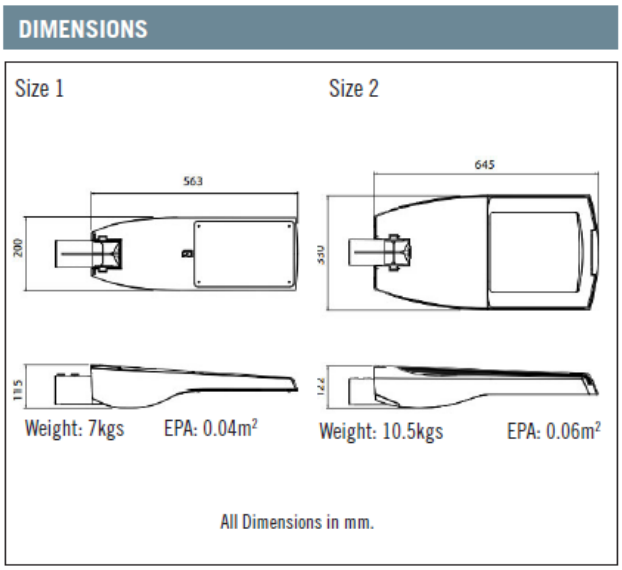

Image 1.4A - Tech series LED external luminaire

It is constructed in a Die-cast aluminium, IP66 and IK08 as standard with the upgrade option of IK10 available on request. The driver and LED modules are accessible for easy maintenance or replacement and

is provided with tempered glass as standard, it is EN 60598, CE compliant and ideal for roadway applications and has been utilised extensively throughout Ireland on adopted streetlighting schemes.

1.4.1 LUMINAIRE/COLUMN AND STREETLIGHTING CONTROL DETAILS

Each luminaire will be controlled by an individual photoelectric control unit, PECU, to limit the operation of the luminaire to between dusk and dawn.

Additional to this, all lamps selected have a DALI driver and are dimmable. Dimming of the lamp is controlled by a Timeclock which can either be integrated into the street lighting circuit or each individual luminaire. The clock is standard in all external luminaires and can be pre-set to determine when the lamp should be switched on and off based on time and date.

A curfew period is recommended in document ILP GN01:2011, however a dedicated time has not yet been discussed with the Local Planning Authorities (LPAs) and if implemented will limit the amount of upward sky glow at night during a pacific time.

1.4.2 PROPOSED STREETLIGHTING LAYOUT

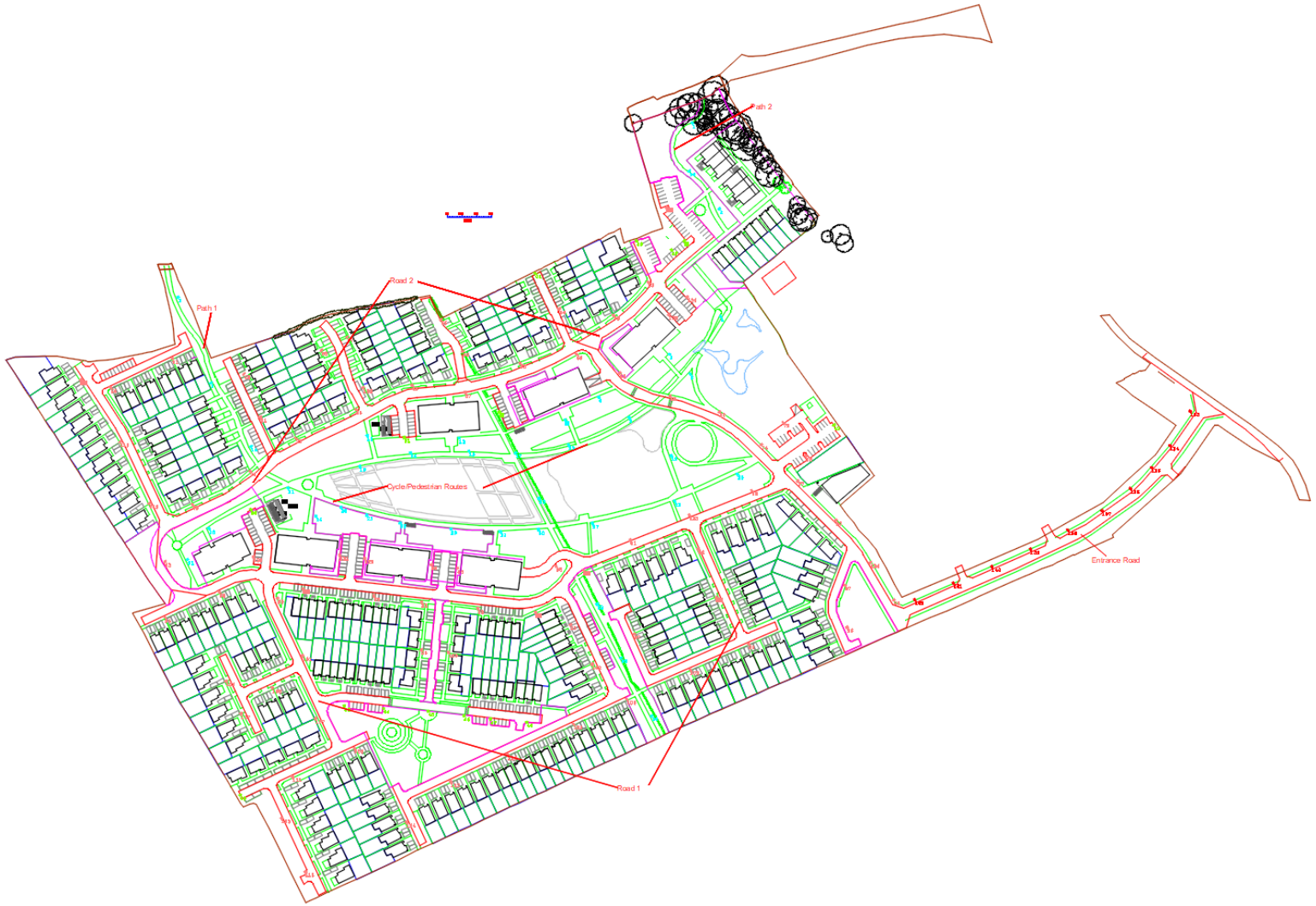

Image 1.4.2A – Proposed street lighting design with isoline remove for clarity

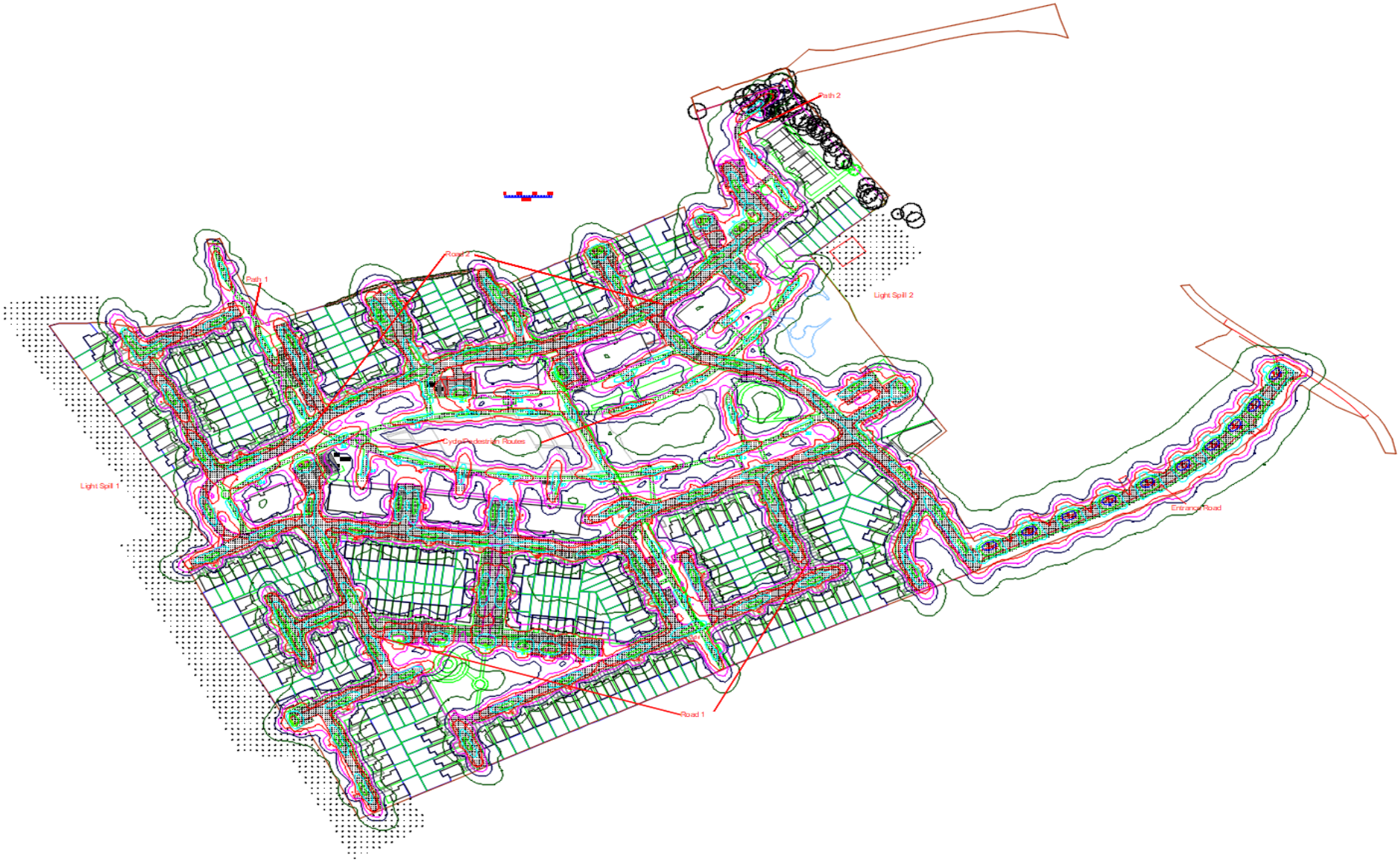

Image 1.4.2B – Proposed street lighting design with isoline

Calculation Summary										
Description	Class (BS5489-1:2013)	Avg	Max	Min	Min/Avg	Min/Max	Units	PtSpcLr	PtSpcTb	# Pts
Entrance Road	P2	9.75	32.6	1.7	0.17	0.05	Lux	1.5	1.5	1463
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Cycle/Pedestrian Routes	P5	3.43	11.4	0.4	0.12	0.04	Lux	1.6	1.5	1949
Path 1	P5	2.81	10.7	0.6	0.21	0.06	Lux	1.5	1.5	296
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Light spill 1		0.05	3.5	0.0	0.00	0.00	Lux	4	4	930
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Luminaire Schedule							
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	10	T5F	6235	0.750	1.40	Tech 52w 32LED 500mA Forward Throw Optic A9	5TCA13GLA-FT.IES

Image 1.4.2C – Proposed street lighting design calculation summary

To ensure that new residential development is not over lit and to reduce light pollution, each development area is categorised into an environmental zone, please refer to Table 2.1 CIBSE Lighting Guide 6 - The exterior environment and ILE Guidance notes for the reduction of light pollution. This site location would be considered as a Class E3 medium brightness district

1.5 CONCLUSION

The proposed streetlighting installation for the new Residential Development at Haggardstown, Blackrock, Dundalk, Co. Louth achieves the following;

- Luminaire selection limits upward light spill and helps control minimal light spillage and glare onto site boundaries in accordance with the 'Biodiversity Chapter of the EIAR'.

- All lamps selected have a DALI driver and are dimmable. If a curfew is implemented, this will limit the amount of upward sky glow at night during a pacific time also helping to reduce running and maintenance costs

- Complies with the recommended illumination levels in accordance with relevant current regulations and standards. The light levels are as follows:

    I. Entrance Road: 9.7 lux average, with a minimum of 1.7 lux. This complies with class P2 of IS EN 13201/BS5489 with a S/P ratio of 1.4 **(8.4 lux average, 1.7 lux minimum)**

    II. Road 1: 4.5 lux average, with a minimum of 0.8 lux. This complies with class P4 of IS EN 13201/BS5489 with a S/P ratio of 1.4 **(3.8 lux average, 0.8 lux minimum)**

    III. Road 2: 4.6 lux average, with a minimum of 0.8 lux. This complies with class P4 of IS EN 13201/BS5489 with a S/P ratio of 1.4 **(3.8 lux average, 0.8 lux minimum)**

    IV. Cycle / Pedestrian Routes: 3.4 lux average, with a minimum of 0.4 lux. This complies with class P5 of IS EN 13201/BS5489 with a S/P ratio of 1.4 **(2.1 lux average, 0.4 lux minimum)**

    V. Path 1: 2.8 lux average, with a minimum of 0.6 lux. This complies with class P5 of IS EN 13201/BS5489 with a S/P ratio of 1.4 **(2.1 lux average, 0.4 lux minimum)**

    VI. Path 2: 3.2 lux average, with a minimum of 0.5 lux. This complies with class P5 of IS EN 13201/BS5489 with a S/P ratio of 1.4 **(2.1 lux average, 0.4 lux minimum)**

- Complies with Uniformity requirements throughout the development to ensure good visibility at night. The final installation will be coordinated with drop kerbs, providing access to dwellings and landscaping to ensure that lighting is not obstructed, nor does it cause a hazard to pedestrians, cyclists or road users.

KINGSBRIDGE CONSULTANCY LTD,

HAGGARDSTOWN, BLACKROCK, DUNDALK, CO. LOUTH

STRATEGIC HOUSING DEVELOPMENT (SHD) PLANNING APPLICATION

MEP DESIGN STATEMENT

10th June 2019 – Rev 4

Caldwell

Unit 6, Forestgrove Business Park,
Newtownbreda | BELFAST | BT8 6AW

Tel. 028 9069 9720 | admin@caldwellconsulting.net

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1 INTRODUCTION

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https://www.louthcoco.ie/en/Publications/Development-Plans/Louth-County-Council-Development-Plans/Louth-County-Development-Plan-2015-2021.html

The area in the immediate vicinity of the site comprises of a large industrial park, Dundalk Golf Club, residential properties and rural agricultural land.

2 UTILITIES

2.1 ELECTRICITY (ESB Networks)

A recent electrical enquiry was made regarding the location of existing ESB electrical network and equipment within the immediate vicinity of the site. Image 2.1A below indicates the approximate location of ESB underground (UG) cables and overhead (OH) lines.

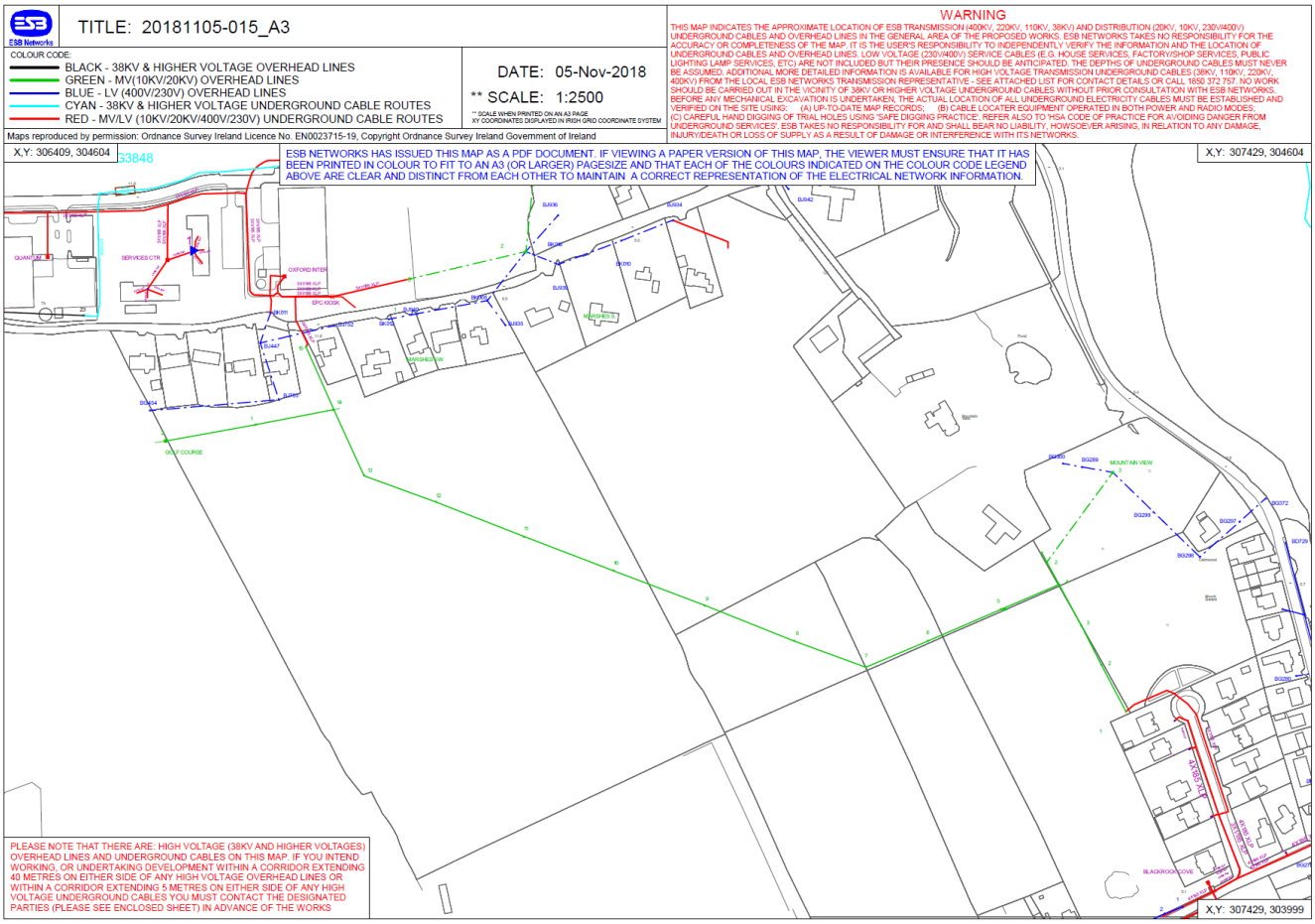


Image 2.1A – ESB Map indicating approximate locations of utility providers equipment

It is noted that ESB Networks currently indicate LV overhead lines (Indicated by dark dashed Blue lines) adjacent to the Bothar Maol road, these appear to be serving the residential properties within this Cul-De-Sac. The large industrial park North of the proposed development site appears to have an underground MV/LV network infrastructure (Indicated by both Red and Cyan lines) which is currently linked to an ESB MV post reference number 15 overhead line located within the vicinity of the proposed Cycle/pedestrian route at the North of the site.

The proposed residential development site has existing ESB poles installed throughout the site area including crossing the entrance of the site at R172 Blackrock Road. The Medium Voltage (MV - 10K/20KV)

and Low Voltage (LV – 400V/230V) overhead lines will either need to be switchout or a diversion implemented, subject to approval by the utility provider.

Image 2.1B – ESB overhead lines located within the vicinity of the proposed Cycle/pedestrian route at the North of the site.

As raised prior, there are high voltage underground and Medium Voltage overhead lines in the development area concerned and in accordance with ESB terms and conditions, that if development is intending to be undertaken within a 80 meter corridor of this infrastructure, the developer must immediately contact the local Transmission representative to agree safe working procedures and necessary clearances between the lines and the development in advance of any excavation. The contact name and number for the Transmission representative within this area is Mr Peter Kirk, Avenue Road, Dundalk, 087-2225491.

Provision for 6 No 125mm red MV ducts will be considered at the entrance to the site. The main entrance to the development is proposed as being from the R172 Blackrock Road to the East of the site.

ESB services will be extended from the site entrance and will terminate in each ESB sub-station within the development. It is envisaged that 2 No. ESB Sub-stations will be required to serve the development. The final locations of these Sub-stations and its duct work installation will be subject to design approval by ESB new connections department and planning with consideration taken to centrally located substation positions to limit ESB cable runs.

Services to each individual dwelling will be from a local min-pillar, with 1No. mini-pillar typically expected to serve 10 No. dwellings. Final quantity and location of these mini-pillars will be subject to new connections department and planning approval.

ESB services will terminate within the metering cabinet positioned on the external wall of each detached dwelling, semi-detached dwelling, Terraced and an agreed house services meter location for the duplexes and apartments.

2.2 GAS (GAS NETWORKS IRELAND)

There is an existing Gas Network Ireland distribution medium pressure pipework (Indicated with a blue line) along in the vicinity of the development. Image 2.2A below indicates a 63 PE-80 4 bar medium pressure distribution pipe installed at Bothar Maol road. A 63 PE-80 4 bar medium pressure distribution pipe also appears to be serving a domestic dwelling at the East of the site given the impression that Gas Networks Ireland are also located on the R172 Blackrock Road, however this is not clear due to the positioning of the Notice on the map.

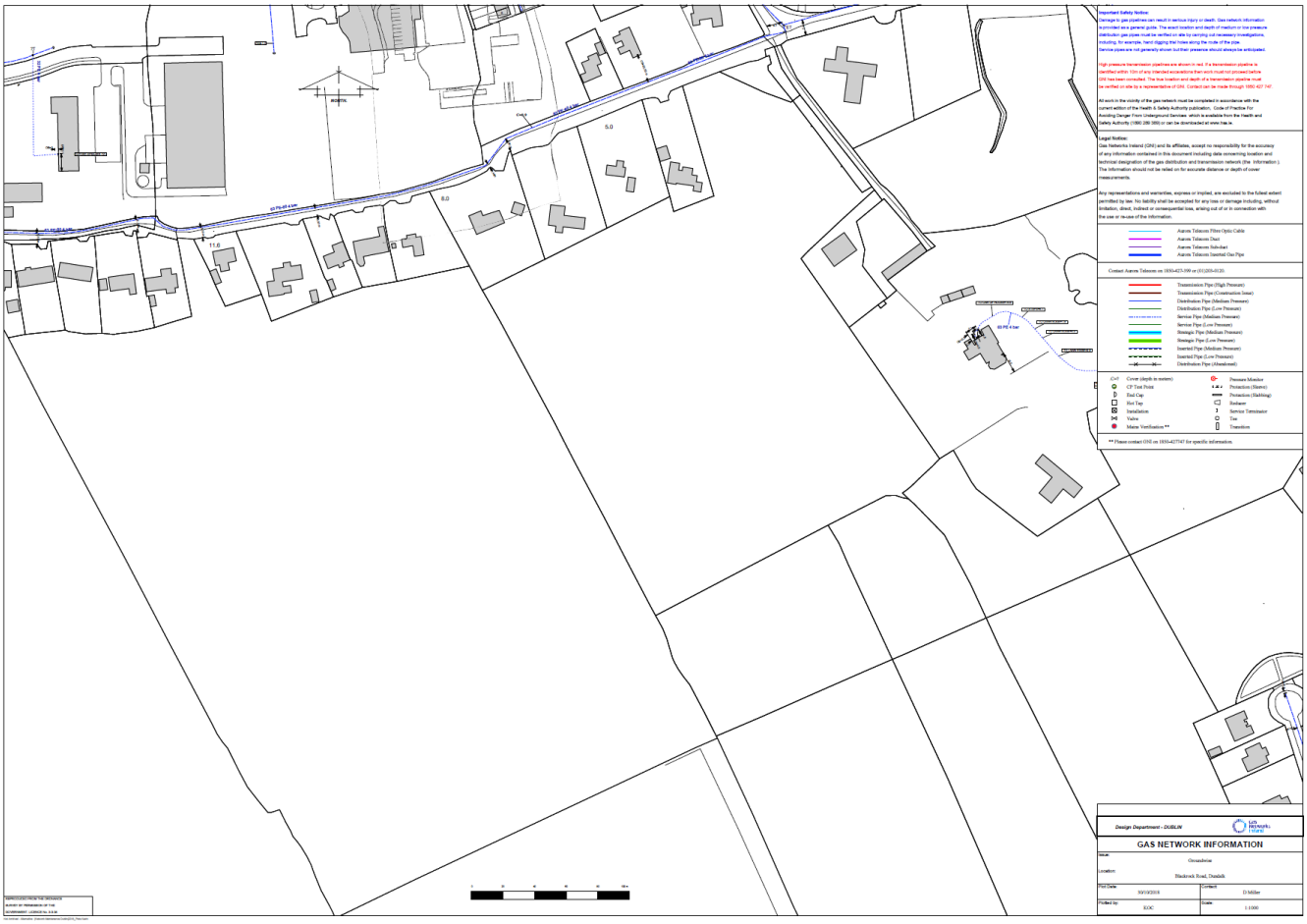


Image 2.2A – Gas Networks Ireland Map indicating approximate locations of utility providers equipment

The proposal would be for a connection to be installed from the existing gas main to the development entrance, located on the R172 Blackrock Road to the East of the site and then capped at this point, subject to approval by the utility provider.

2.3 OPEN EIR

As per image 2.3A below, the proposed development site appears to have an EIR network installation within the vicinity. This is currently indicated at the East of the site given the impression that EIR networks are located on the R172 Blackrock Road, however the complete route is not clear on the map.

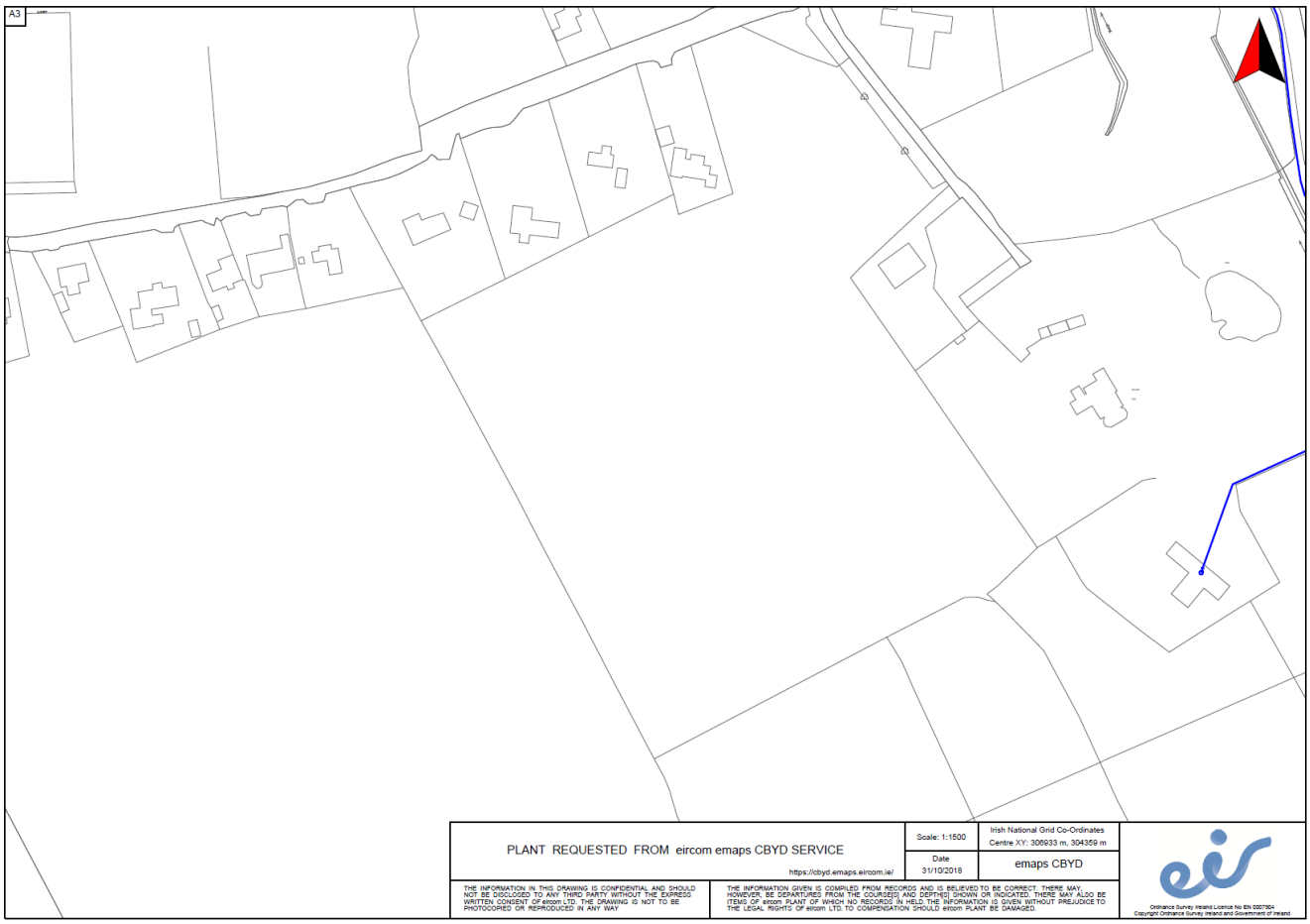


Image 2.3A – EIR Networks Map indicating approximate locations of utility providers equipment

The proposal would be to install 4No. 100mm dia. communication ducts, these ducts would be located at the site entrance and will be distributed throughout the development.

It is envisaged that EIR services will comprise of JB4 chambers and ducting with final locations and routes subject to utility design. All chambers will be suitably traffic rated for the area in which they are being installed.

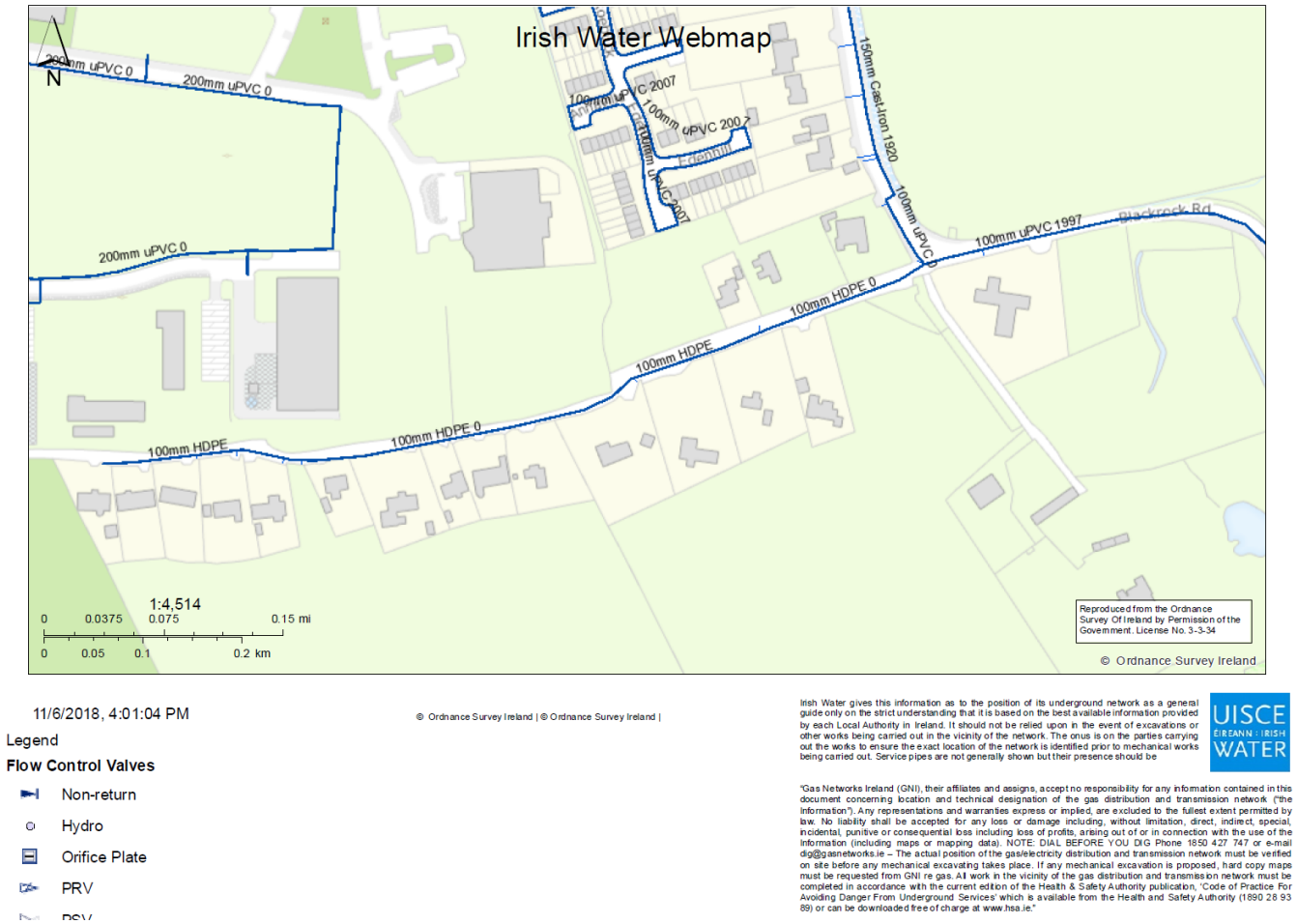
As per other residential developments which we have been involved, an EIR network duct installation would be installed from the nearest chamber to each dwelling, with an expected maximum 12No dwellings served from any one chamber.

EIR services will then terminate within an EIR ETU box which is normally positioned on the external wall of the dwelling.

In relation to the apartment blocks, EIR's network installation will terminate within an EIR cabinet(s) located within a secure area on the ground floor. EIR services will then be extended and terminated within the EIR distribution unit and distributed to each apartment. Final design and conditions are to be agreed with EIR utility provider.

2.4 WATER (IRISH WATER)

There is an existing Irish Water underground network (Indicated with a blue line) along in the vicinity of the development. Image 2.4A below appears to indicate the Irish water network traveling along the R172 Blackrock Road via 150mm Cast Iron and a 100mm UPVC network and then banching to neighbouring dwellings and developments via a 100mm High Density Polyethylene (HDPE) installation along the Bothar Maol road at the North end of the development site.



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Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland. It should not be relied upon in the event of excavations or other works being carried out in the vicinity of the network. The onus is on the parties carrying out the works to ensure the exact location of the network is identified prior to mechanical works being carried out. Service pipes are not generally shown but their presence should be

UISCE ÉIREANN : IRISH WATER

Legend

Flow Control Valves

- Non-return
- Hydro
- Orifice Plate
- PRV

"Gas Networks Ireland (GNI), their affiliates and assigns, accept no responsibility for any information contained in this document concerning location and technical designation of the gas distribution and transmission network ("the Information"). 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, special, incidental, punitive or consequential loss including loss of profits, arising out of or in connection with the use of the Information (including maps or mapping data). NOTE: DIAL BEFORE YOU DIG Phone 1850 427 747 or e-mail dig@gasnetworks.ie – The actual position of the gas/electricity distribution and transmission network must be verified on site before any mechanical excavating takes place. If any mechanical excavation is proposed, hard copy maps must be requested from GNI re gas. All work in the vicinity of the gas distribution and transmission network must be completed in accordance with the current edition of the Health & Safety Authority publication, 'Code of Practice For Avoiding Danger From Underground Services' which is available from the Health and Safety Authority (1890 28 93 89) or can be downloaded free of charge at www.hsa.ie."

Image 2.4A – Irish Water Networks Map indicating approximate locations of utility providers equipment

The proposal would be to extent the existing Irish water network currently installed on the R172 Blackrock Road to the development entrance located at the East of the site and then cap at this point, subject to approval by the utility provider.

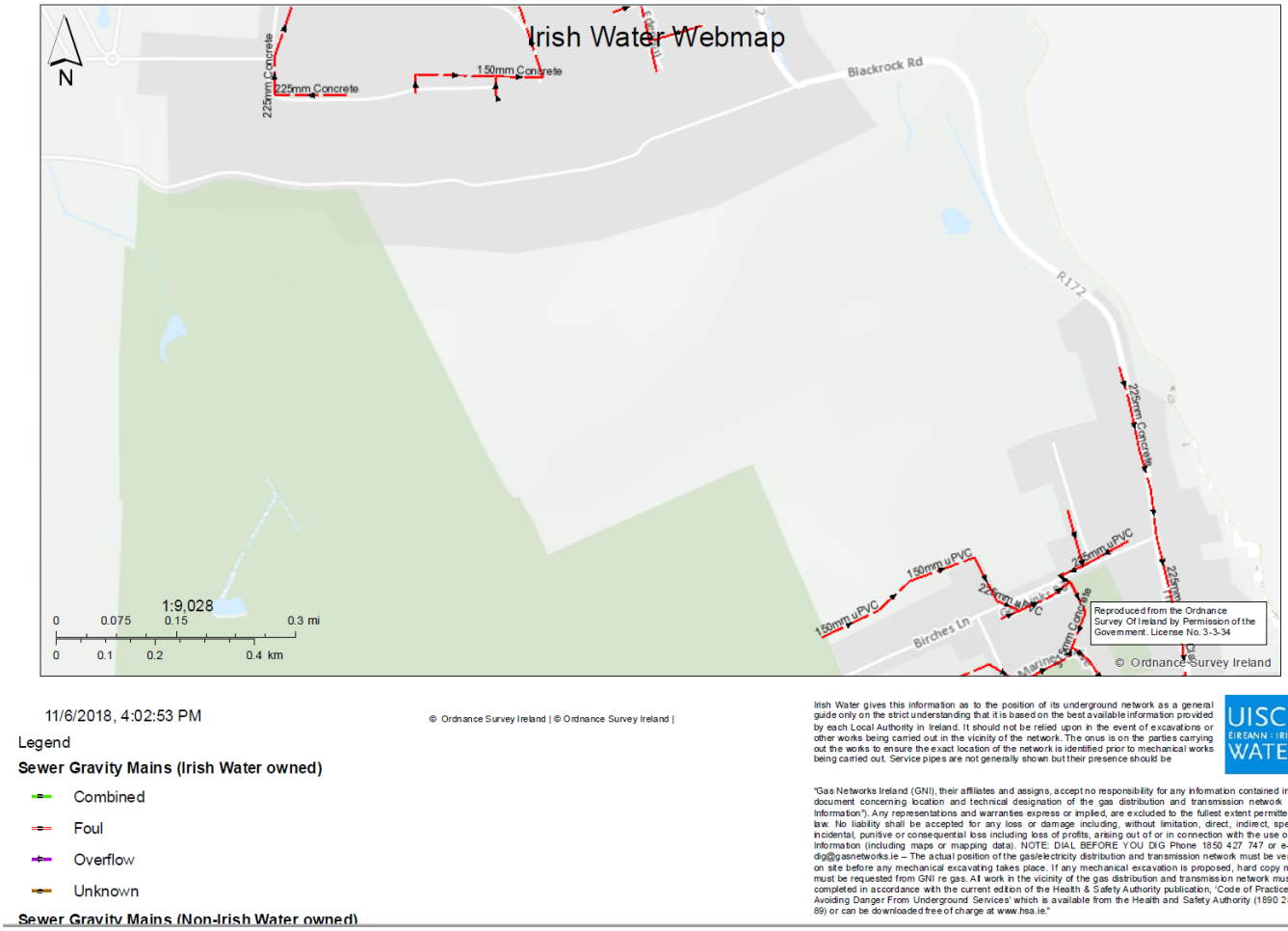

Image 2.4B – Irish Water Sewer Networks Map indicating approximate locations of utility providers equipment

As Image 2.4B above indicates, Irish Water currently as a Foul network installation within the vicinity of the development. The R172 Blackrock Road appears to have a 225mm Concrete sewer network installation which then branches to neighbouring dwellings and developments currently via 375mm Concrete network installation and a 225mm and 150mm UPVC network.

The proposal would be to extent the existing Irish water sewer network currently installed on the R172 Blackrock Road to the development entrance located at the East of the site and then cap at this point, subject to approval by the utility provider.

2.5 FOUL WATER DRAINAGE AND WASTE WATER PUMPING STATION

The proposed development will have a new foul drainage network constructed throughout, which will include 150mm and 225mm diameter gravity pipelines with manholes.

The proposed design comprises an onsite pumping station with an adjoining emergency storage tank which is capable of 12 hours of dry weather flow or 447 TS/dwelling. The waste water from the pumping station will be pumped to the public mains located at the junction of the N52 and the entrance to the Crowne Plaza Hotel and DKIT. For further design clarification, refer to Finn Design Partnership engineering and services report.

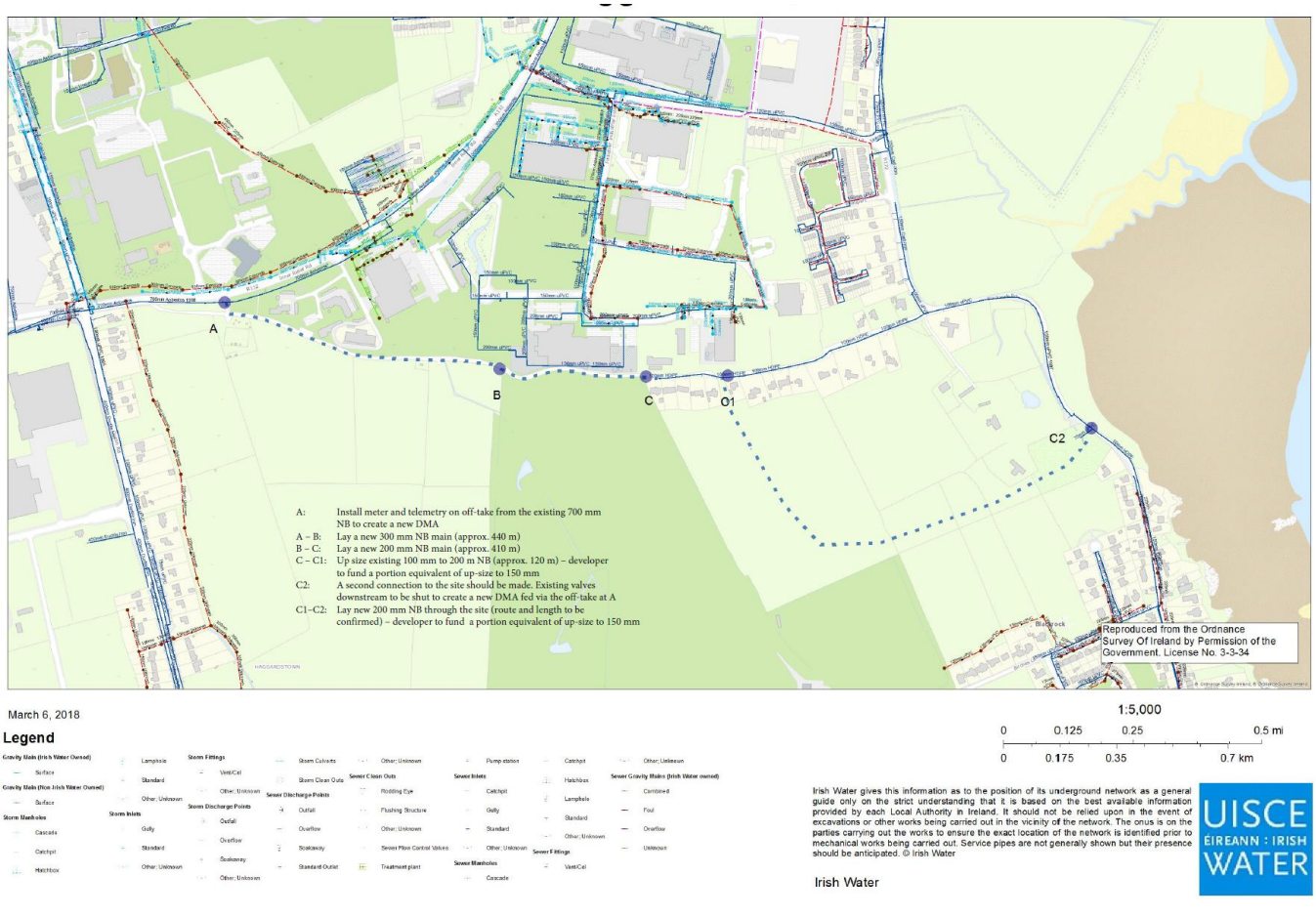

Image 2.5A – Irish Water Sewer Networks Map indicating proposed routes

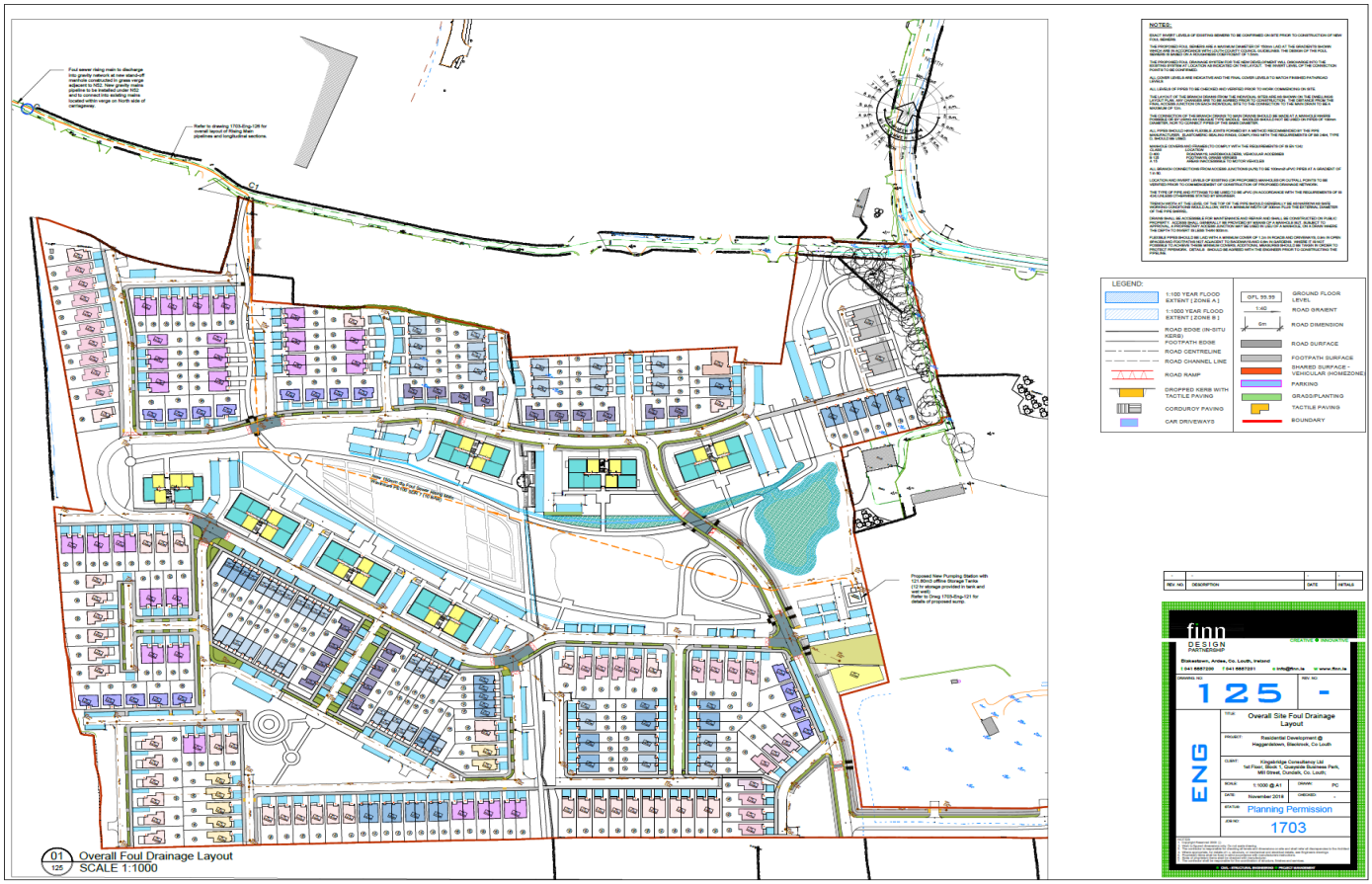

Image 2.5B – Finn Design Partnership Overall Site Foul Drainage Layout

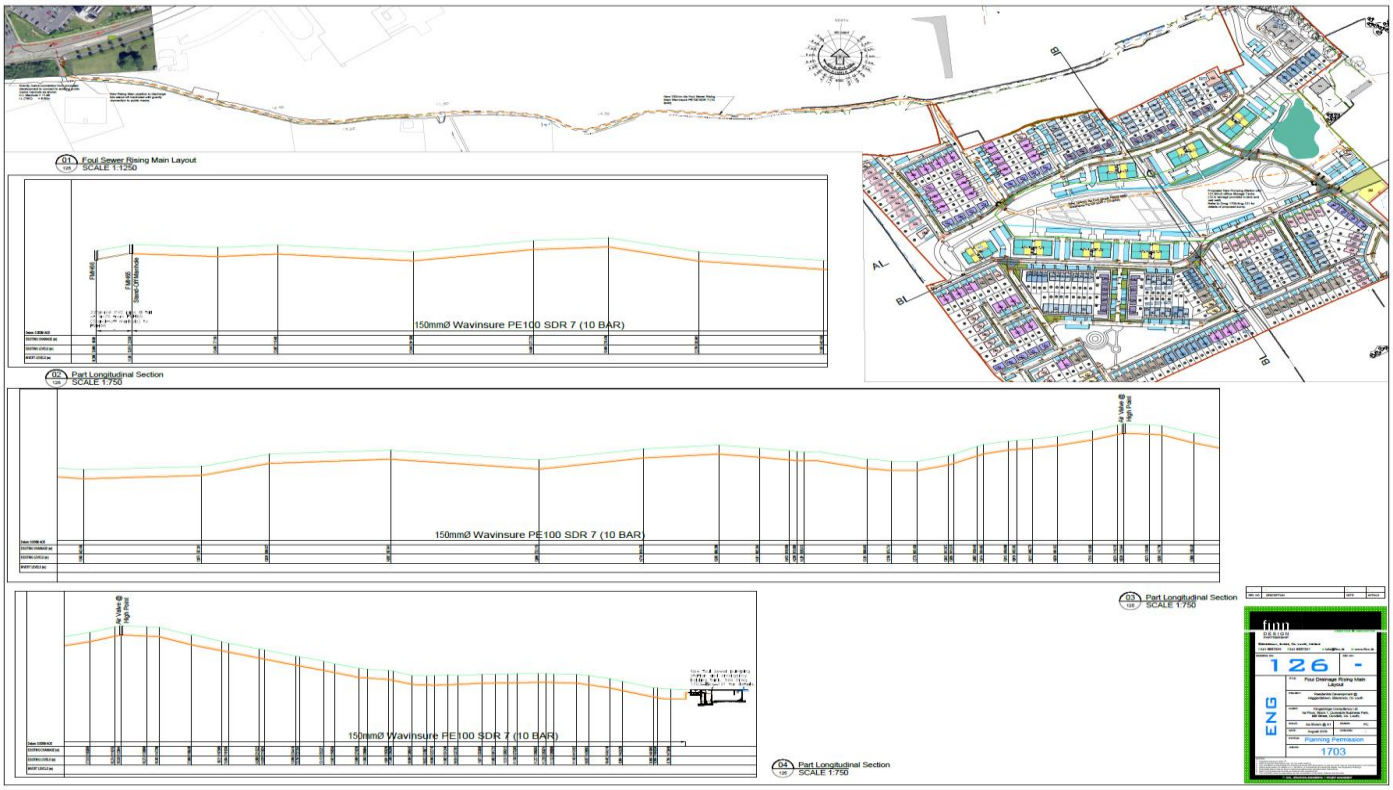

Image 2.5C – Finn Design Partnership Foul Drainage rising main layout

2.6 POTABLE WATER SUPPLY

The potable water supply for the development will be taken from the existing public mains located at the junction of the N52 and the entrance to the Crowne Plaza Hotel and DKIT. Consultations by Finn Design Partnership with Irish Water have confirmed that a new DMA will be installed where a new pipeline will be installed from the connection point and will be extended along Bothar Maol before entering and passing through the site and connecting to the existing public watermains on the R172 at the North end of Blackrock Village near the proposed entrance to the site. For further design clarification, refer to Finn Design Partnership engineering and services report.

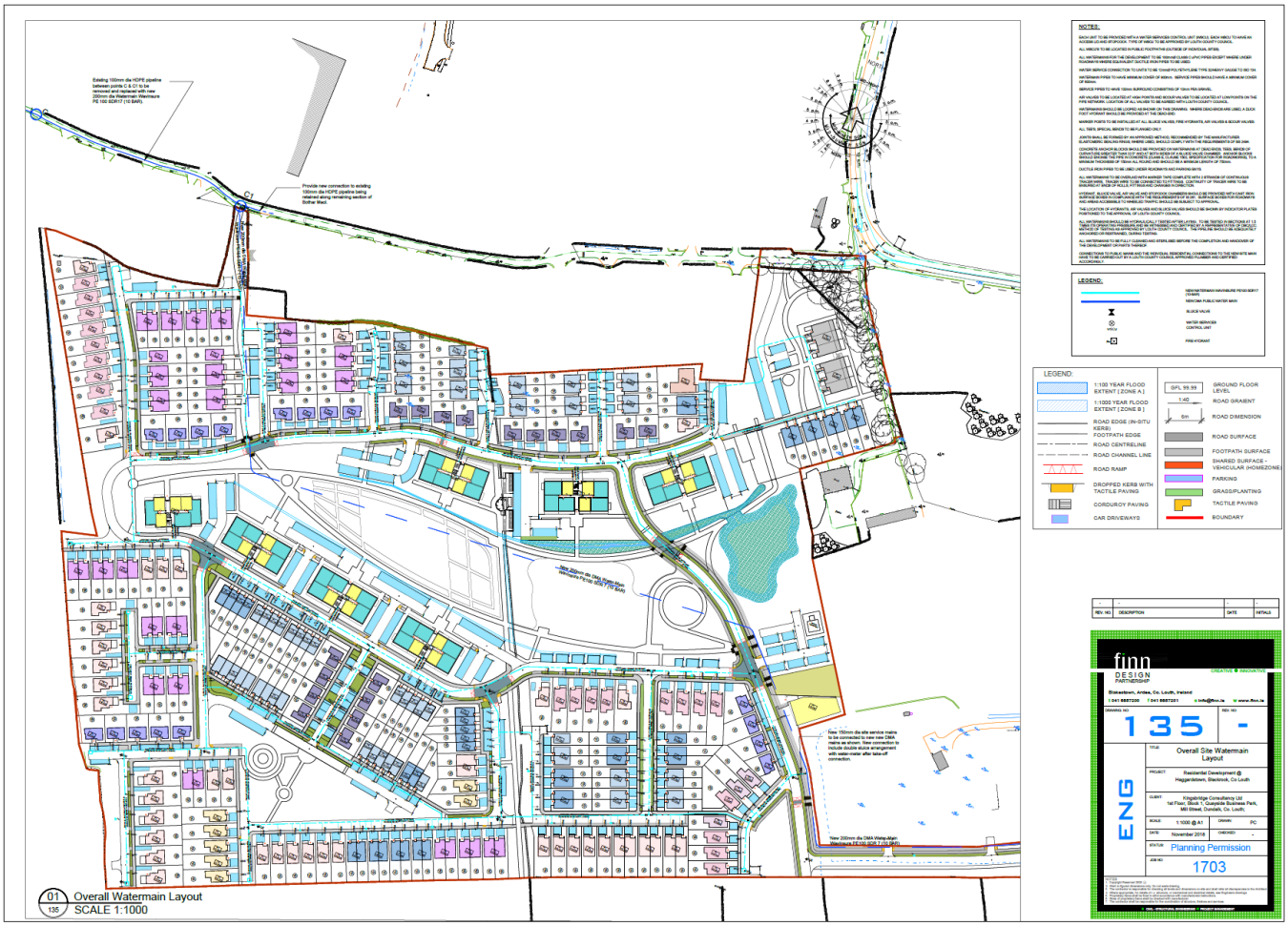

Image 2.6A – Finn Design Partnership Overall Site Watermain Layout

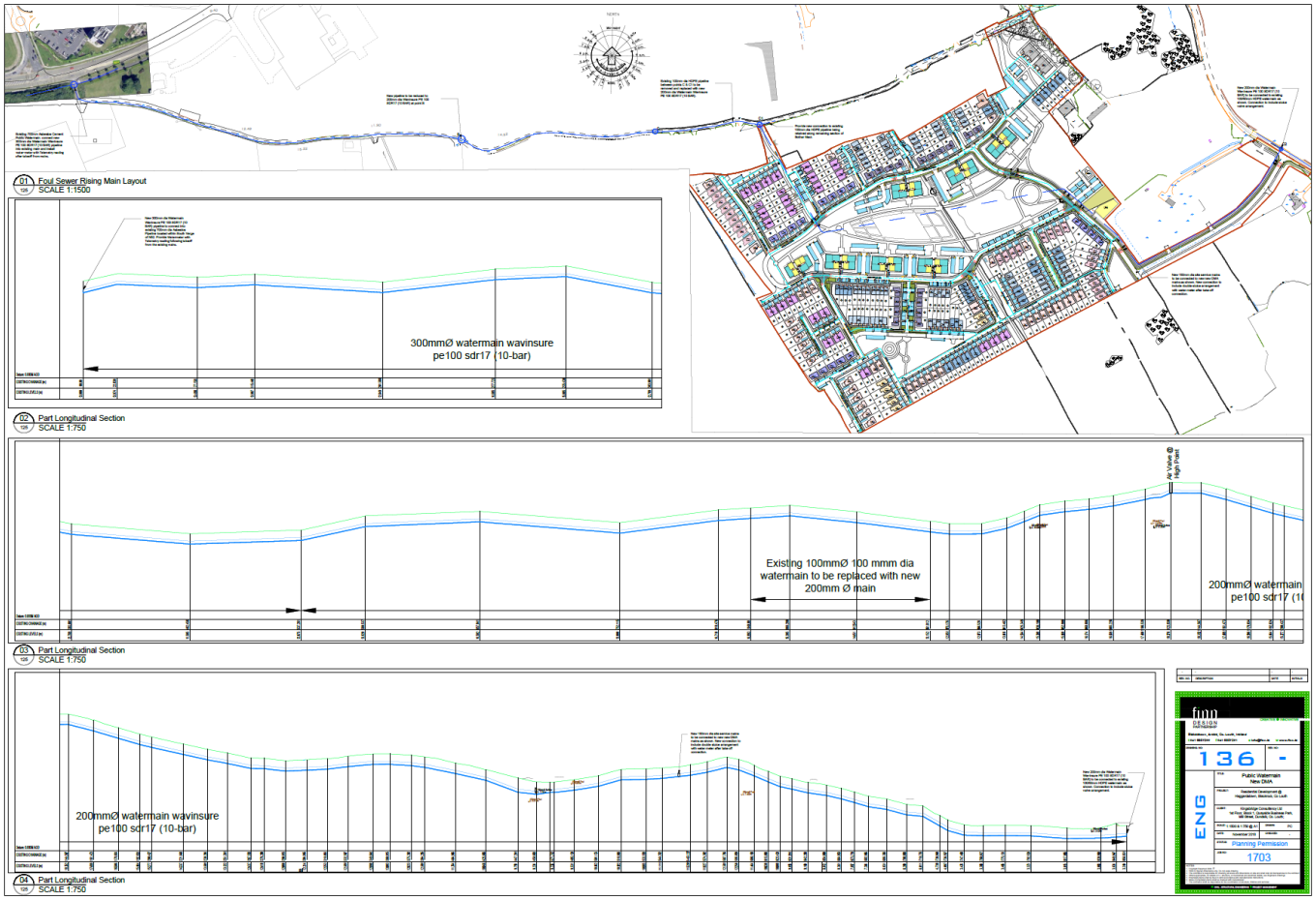

Image 2.6B – Finn Design Partnership Public Watermain Layout

2.7 STREETLIGHTING

The proposed Streetlighting has been detailed in a separate report and is summarised below.

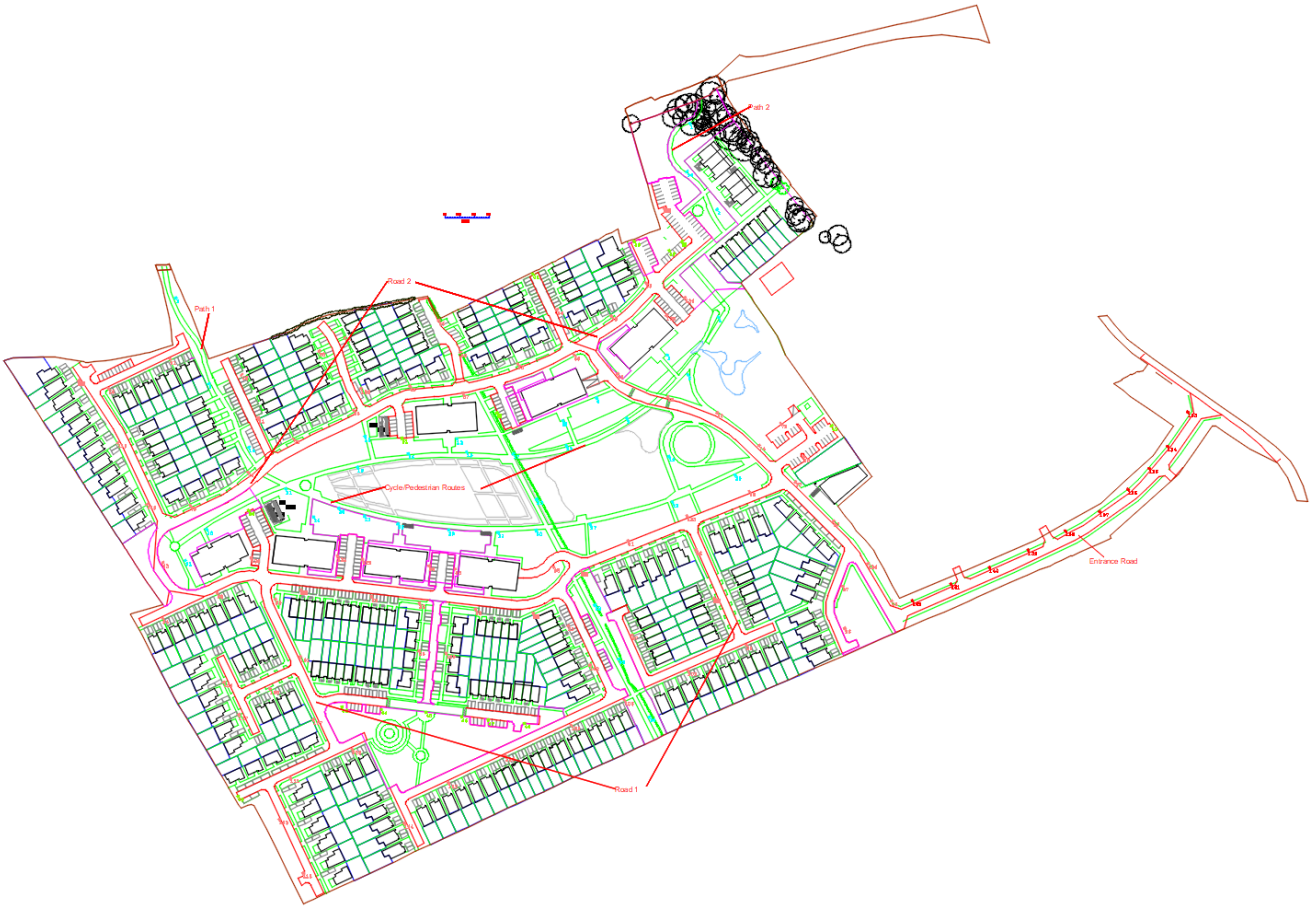

Image 2.7A – Proposed street lighting design with isoline remove for clarity

The proposed streetlighting installation for the new Residential Development at Haggardstown, Blackrock, Dundalk, Co. Louth achieves the following;

- Luminaire selection limits upward light spill and helps control minimal light spillage and glare onto site boundaries in accordance with the 'Biodiversity Chapter of the EIAR'.

- All lamps selected have a DALI driver and are dimmable. If a curfew is implemented, this will limit the amount of upward sky glow at night during a pacific time also helping to reduce running and maintenance costs

- Complies with the recommended illumination levels in accordance with relevant current regulations and standards. The light levels are as follows:

    I. Entrance Road: 9.7 lux average, with a minimum of 1.7 lux. This complies with class P2 of IS

EN 13201/BS5489 with a S/P ratio of 1.4 **(8.4 lux average, 1.7 lux minimum)**

II. Road 1: 4.5 lux average, with a minimum of 0.8 lux. This complies with class P4 of IS EN 13201/BS5489 with a S/P ratio of 1.4 **(3.8 lux average, 0.8 lux minimum)**

III. Road 2: 4.6 lux average, with a minimum of 0.8 lux. This complies with class P4 of IS EN 13201/BS5489 with a S/P ratio of 1.4 **(3.8 lux average, 0.8 lux minimum)**

IV. Cycle / Pedestrian Routes: 3.4 lux average, with a minimum of 0.4 lux. This complies with class P5 of IS EN 13201/BS5489 with a S/P ratio of 1.4 **(2.1 lux average, 0.4 lux minimum)**

V. Path 1: 2.8 lux average, with a minimum of 0.6 lux. This complies with class P5 of IS EN 13201/BS5489 with a S/P ratio of 1.4 **(2.1 lux average, 0.4 lux minimum)**

VI. Path 2: 3.2 lux average, with a minimum of 0.5 lux. This complies with class P5 of IS EN 13201/BS5489 with a S/P ratio of 1.4 **(2.1 lux average, 0.4 lux minimum)**

- Complies with Uniformity requirements throughout the development to ensure good visibility at night

The final installation will be coordinated with drop kerbs, providing access to dwellings and landscaping to ensure that lighting is not obstructed, nor does it cause a hazard to pedestrians, cyclists or road users.

2.8 SUSTAINABILITY

This section outlines the proposed energy efficiency and sustainability objectives under consideration for the development.

The options set out are all potentially viable and it is envisaged that there is sufficient flexibility in the planning assessment to allow for one of more of these options to be implemented.

The sustainable options being investigated assist in achieving reduced overall energy consumption and usage within all properties.

3 DWELLING ENERGY ASSESSMENT PROCEDURE (DEAP)

Dwelling energy Assessment Procedure (DEAP) methodology will be utilised to calculate the energy performance and associated carbon dioxide emissions for the provision of space heating, ventilation, water heating and lighting in all Dwelling types to show compliance with Part L of the Irish Building Regulations.

The DEAP models will enable and provide information on;

- expected energy consumption and associated CO2 emissions for a dwelling under standardised operating conditions
- the publication of a BER certificate indicating the rating scale based on a dwellings energy consumption per unit area

This will enable prospective Purchasers/Tenants to objectively compare the energy performance of different dwellings on a like for like basis.

4 ELECTRICAL SERVICES INSTALLATION

4.1 RENEWABLE ENERGY

Renewable energy is generated from natural resources such as the sun, wind and water. This therefore provides an alternative option to buying all or part of our energy from suppliers, by installing renewable technology also known as micro generation and low carbon technology to generate our own. The following benefits of installing a renewable technology are highlighted below

- It will help to reduce your energy bills and, in some cases, could lead to you generating income by selling any surplus energy back to your energy provider,
- Reduces your dependence on non-renewable energy,
- Makes use of secure and local resources,
- Helps to reduce your production of carbon dioxide and other greenhouse gases,
- Can help new constructions meet carbon legislation compliance,

4.1.1 MICRO-WIND TURBINES

Wind turbines are used to hardness the power of the wind, which is then converted to generate electricity. The wind turbines use large blades to catch the wind, when the wind blows the blades are forced to rotate which drives a turbine which then generates electricity. There are two types of domestic size wind turbines:

- Building mounted – These are normally smaller in size than mast mounted systems and can be installed on the roof of the home where there is a suitable wind resource. These turbines are sized between 1KW – 2KW. The main disadvantages of this renewable technology on a domestic property within a residential development is its visual look and the cost of maintenance. Maintenance checks are necessary every few years and will generally cost between 150 euro and 250 euro per year depending on the turbine size.
- Pole mounted – These are free standing wind turbines and are erected in a suitable exposed position within your property and will often come in sizes between 5KW to 6KW.

4.1.2 SOLAR PANEL ELECTRICITY SYSTEMS (PV)

Solar panel electricity systems, also known as photovoltaics (PV), are a renewable technology used to capture the suns energy using photovoltaic cells. The positive fact of these cells is that they don't need direct sunlight to operate and can still generate some electricity on a cloudy day (However the stronger the

sun shine, the more electricity is produced). The photovoltaic cells convert the sunlight into electricity, which then allows the tenant/home owner to use the generated electricity to run the household appliances and lighting. An advantage that PV panels have over domestic Micro-wind turbines discussed previously within this report is that with improving technology, the PV systems are made up of panels that can either fit on top of an existing roof or can be more discrete and can be installed as a solar tile. Solar tiles are designed to be used in place of ordinary roof tiles. However, a system made up of solar tiles will typically cost approximately twice as much as an equivalent panel system.

Another advantage of solar PV system is that they need little maintenance and typically just require the tenant/home owner to keep the panels relatively clean and make sure trees don't begin to overshadow them.

4.2 E-CAR CHARGING POINTS

Consideration has been given to the provision of E-CAR home charging points in accordance with government electric vehicle home charge schemes providing a reduction in diesel and petrol powered vehicles policy and targets.

It is anticipated that persons in dwellings owning electric vehicles will install their own charging point as and when required.

It is recommended that several E-CAR charging points are considered for installation in the vicinity of the apartment blocks with power supplies being provide from the local Landlord Services LV network and that the charging points will be maintained by a Management Company.

5 MECHANICAL SERVICES INSTALLATION

5.1 CONDENSING BOILERS

Condensing boilers have been considered, as these boilers can be fuelled by either gas or oil. They have a high operating efficiency which results in lower fuel consumption reducing energy bills and lowering greenhouse gas emissions reducing your carbon footprint. Condensing boiler manufactures claim that up to 98 thermal efficiency can be achieved, compared to 70% - 80% with conventional designs.

5.2 VENTILATION AND HEAT RECOVERY

5.2.1 NATURAL VENTILATION

Natural ventilation has been considered to minimise energy usage. This method is used to avoid installing mechanical equipment to supply air to and removing air from an indoor space within a domestic dwelling.

Natural ventilation provides less noise impact for occupants and adjacent dwellings, passive approach results in no energy usage, little maintenance and fresh air providing a healthy indoor environment.

5.2.2 MECHANICAL VENTILATION HEAT RECOVERY (MVHR)

Mechanical ventilation heat recovery systems (MVHR) has being considered as they extract warm, damp air from the property and extract fresh air from the environment. The warm, extracted air is passed through a heat exchanger to recover any available heat prior to been extracted outside. The outside air does a similar process and travels through the heat exchanger where it is prewarmed before being pumped into the domestic dwelling. The MVHR system consists of concealed ducts either located within the properties attic or floor voids and store, which provide a low energy solution for ventilation to the dwellings whilst ensuring that fresh air is continuously provided. It is noted that like most systems, MVHR installations do require regular servicing, as all equipment such as filters and fans must be kept clean to ensure effective operation.

5.2.3 EXHAUST AIR HEAT PUMPS

Exhaust air heat pumps are being considered to provide mechanical ventilation, space heating and domestic hot water. Exhaust air heat pumps provide controlled domestic ventilation and heat recovery as they extract heat from a dwelling via the ventilation system by drawing the air from Kitchens, Utility Rooms, Bathrooms and en-suites through ducts to the heat pump, which then absorbed and transfers it to the air supply, space heating and or domestic hot water. The system also captures heat generated by an individual within the dwelling, as well as heat generate during cooking, lighting and solar.

Any excess air with the heat removed is discharged to free air outside the dwelling.

5.3 AIR TO WATER HEAT PUMPS

Air to water heat pumps are being considered to provide space heating and domestic hot water. An air source heat pump is a system which transfers heat energy absorbed from the outside air in order to heat inside a dwelling. This is done via radiators, underfloor heating and domestic hot water. These systems do not require fuel storage, are easy to install and have a long lifespan (20 Years) as well as reducing your energy bills and carbon footprint. However, has noted with other renewable systems the installation will require maintenance cleaning every few months and serviced by an engineer once a year to ensure effective operation and a long-life span.

5.4 COMBINED HEAT AND POWER (CHP)

A Combined heat and power system (CHP) are being considered to generate electricity and thermal energy. This technology harnesses wasted energy and utilises a larger percentage of energy stored in the fuel to produce heating, hot water and electricity for the home. The system can offer both financial and environmental benefits reducing the homes energy costs and CO2 emissions and can help with new constructions meet carbon legislation compliance.

5.5 ELEMENTAL U-VALUES AND AIR INFILTRATION

Lower U-values and improved air tightness will minimise heat losses through the building fabric, reducing energy consumption thereby reducing emissions.

U-values being evaluated will need to comply as a minimum, in accordance with those required by the Technical Guidance Documents Part L 'Conservation of Fuel and Energy in Dwellings'. This government document applies to dwellings, both new and existing and provides guidance on the materials, methods of construction, standards and technical specifications.

Thermal bridging at junctions between construction elements and at other locations will be minimised in accordance with paragraphs 1.3.3, 1.5.3, 2.1.3 and appendices D of the Technical Guidance Documents Part L 'Conservation of Fuel and Energy in Dwellings'.

6.0 SUMMARY

Based on recent utility survey enquires, records indicate that there is sufficient utility infrastructure within the vicinity of the development proposed at Haggardstown, Blackrock, Dundalk, Co. Louth.

The proposed residential development site does have existing ESB poles installed throughout the site area including crossing the entrance of the site at R172 Blackrock Road. The Medium Voltage (MV - 10K/20KV) and Low Voltage (LV – 400V/230V) overhead lines will either need to be switchout or a diversion implemented, subject to approval by the utility provider.

The proposed streetlighting installation summarised in this report and detailed in a separate report offers Luminaire selection which limits upward light spillage and glare onto site boundaries in accordance with the 'Biodiversity Chapter of the EIAR', has the ability to be dimmable and Complies with the recommended illumination levels and Uniformity requirements in accordance with relevant current regulations and standards.

The energy efficiency options summarised within this report have all being evaluated at present and will be assessed and confirmed at detailed design stage. Each system potential offering either/both financial and environmental benefits reducing the homes energy costs and CO2 emissions in addition to supporting new constructions with meeting carbon legislation compliance.

SNC·LAVALIN

ATKINS
Member of the SNC-Lavalin Group

Strategic Housing Development, Blackrock, Dundalk, Co. Louth.

Outline Construction and Demolition Waste Management Plan

Kingsbridge Consultancy Ltd.

17 April 2019

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WS Atkins Ireland Limited assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 27 pages including the cover.

Document history

Revision	Purpose description	Origin-ated	Checked	Reviewed	Author-ised	Date
Rev 1	Draft for Comment	AMc	AMc	DL	MF	04/12/2018
Rev 2	Revised Draft	AMc	AMc	DL	MF	07/12/2018
Rev 3	Final	AMc	AMc	DL	MF	10/12/2018
Rev 4	Final	AMc	AMc	DL	MF	17/04/2019

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1. Introduction

This Outline Construction and Demolition (C&D) Waste Management Plan (WMP) has been prepared by WS Atkins Ireland Ltd. (Atkins) on behalf of Kingsbridge Consultancy Ltd. (the applicant) as part of the supporting documents required for a planning application for a proposed residential development at Blackrock, Dundalk, Co. Louth. The proposed development, on a 17.9Ha greenfield site, comprises the construction of 483no. residential units, an access road, creche, 824no. car parking spaces (including 2no. undercroft parking facilities with a combined total of 96no. spaces), 512no. cycle parking spaces, open space / landscaped areas, and all associated ancillary works. The proposed development will be accessed from Blackrock Road. The existing site is bounded to the north by residential housing and Finnabair Industrial Park, to the west by Dundalk Golf Course, to the east by urban residential developments and agricultural land, and to the south by agricultural land.

The principle objective of this Outline WMP is to provide a framework at the planning stage of the project to facilitate the development of a project specific Detailed C&D WMP by the Contractor. Atkins understands that this development will be constructed as 11no. phases. Therefore, the following waste management considerations will apply for the entire life-cycle of this construction project (hereafter referred to as 'the project').

1.1. Aim of the Plan

The purpose of this plan is to provide sufficient information to ensure that the management of construction waste is undertaken in accordance with all relevant legislation and best practice standards (as set out in Section 4 of this document). This plan aims specifically to ensure the guiding principles of responsible waste management (prevent, reuse, recycle, recover) are implemented throughout the project, thereby limiting the volume of waste disposed of to landfill.

1.2. Methodology

This document has been prepared in accordance with the relevant industry standard guidance document; '*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects*' (Department of Environment, Heritage and Local Government (DoEHLG), 2006);

In addition, the following relevant best practice guidance documents have also been consulted:

- 'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous' (EPA, 2015);
- 'A review of Design and Construction Waste Management Practices on Selected Case Studies – Lessons Learned' (EPA, 2015);
- 'Design out Waste: Preparation of Waste Reduction Factsheets for Design Teams' (EPA, 2015); and,
- 'Development of an Audit Methodology to Generate Construction Waste Projection Indicators for the Irish Construction Industry' (EPA, 2009).

1.3. Need for the Plan

Within Section 3.1 of the guidelines (DoEHLG, 2006) relevant thresholds for developments are identified above which there is a requirement for the preparation of a project specific Detailed C&D WMP. This Outline WMP has been prepared as the proposed development falls under the following criterion:

'*New residential development of 10 houses or more'.*

This document applies only to the construction stage of the proposed development. A standalone WMP should be prepared separately for the operational stage, in advance of the site being fully commissioned.

1.4. Format of the Plan

This is a live document, which will be updated throughout the project lifecycle. This document will provide a framework for waste management and will clearly identify the processes that will be implemented onsite, whilst also seeking to ensure compliance with relevant waste legislation, government policy objectives and project

specific waste objectives. The Plan will provide a mechanism for monitoring and auditing waste management performance and compliance for the duration of the project. This document provides a detailed overview of key waste management considerations for the project at this preliminary stage, while also allowing for further refinement as the project progresses through to the design and construction stages.

It will be the responsibility of the appointed Contractor to develop this document further and to prepare a project specific Detailed C&D WMP, as more information becomes available and there is more certainty in terms of the proposed project layout, construction methods, programme and waste streams.

1.5. List of Acronyms

The following list of abbreviations have been used within this document;

- AOD – Above Ordnance Datum
- C&D - Construction and Demolition
- DoEHLG - Department of Environment, Heritage and Local Government
- LCC – Louth County Council
- EPA - Environmental Protection Agency
- EWC - European Waste Catalogue
- NWCPO - National Waste Collection Permit Office
- PSCS - Project Supervisor Construction Stage
- PSDP - Project Supervisor for the Design Process
- SDS - Safety Data Sheet
- LoW - List of Waste
- WAC - Waste Acceptance Criteria
- WMP - Waste Management Plan

1.6. Site Location & Surrounding Land Use

The proposed development site is located at an existing 17.9Ha greenfield site in Blackrock, Dundalk, Co. Louth. For the purposes of this report the site boundary is outlined in red in Figure 1.1 below. The site is bordered to the north by residential developments, Bothar Maol, and Finnabair Industrial Park, to the west by Dundalk Golf Course, to the east by rural residential housing / agricultural land and to the south by agricultural land.

1.7. Roles & Responsibilities

For the purposes of clarity, the roles and responsibilities of the project team for the proposed development should be determined at the very outset of the construction stage of this project. Key roles are typically performed by the Client, Engineer, and Contractor. Specific details will be determined during the Detailed Design and Contract stage.

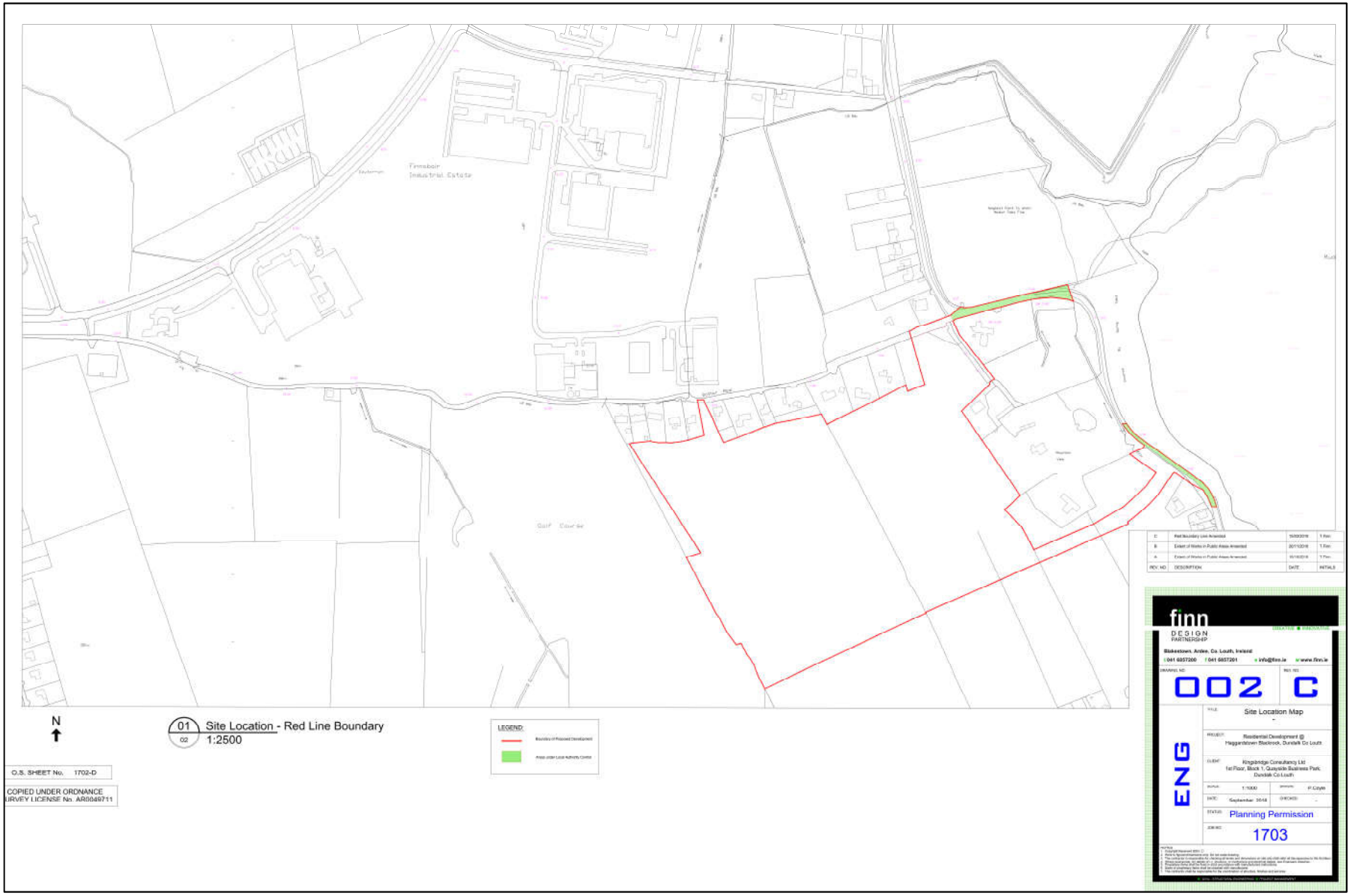

Figure 1.1 - Site Location

2. Project Details

2.1. Location, Nature and Scale of the Development

The proposed residential development will facilitate the growing population of the general Dundalk area. The area of Blackrock benefits from connectivity to the M1 motorway, which allows for reasonable commuting distances to Dublin and Belfast Cities and their surrounding areas. The proposed development lands are designated as 'Residential 2' and 'Recreation, Amenity and Open Space' zoning by Louth County Council (LCC) within the Dundalk and Environs Development Plan 2009-2015. The zoning objective vision for these lands is stated by LCC as follows:

- *'To provide for new residential communities and supporting community facilities subject to the availability of services';* and,
- *'To provide for the provision of public parks, open spaces, amenity and recreational facilities.*

Refer to Figure 2.1 for the proposed development layout. Further details of the proposed development are presented in the planning documents and drawings submitted as part of this planning application. No demolition works will be required on this project.

Figure 2.1 - Proposed Development Layout

2.2. Details of the Non-Hazardous Wastes to be produced

Waste materials generated during the construction stage will primarily comprise topsoil, subsoil and excavated bedrock (via. excavation during the installation of structural foundations, internal roads, drainage networks and underground utilities), surplus general building waste materials, and waste generated by construction workers.

In accordance with good practice, excavated soils will be reused onsite where feasible, including for boundary treatment and landscaping purposes. Given that the site is a greenfield site (both currently and historically) and taking account of site-specific information (including '*Proposed Residential Development Blackrock Dundalk County Louth Ground Investigation Factual and Interpretative Report'* prepared by Geotechnical Environmental Service Limited, 2018), it is assumed that all of the soils excavated during the construction stage will be native material. Therefore (subject to appropriate testing), such materials should largely be suitable for onsite reuse. Any surplus material will be disposed of offsite.

According to the EPA '*Correct classification is the foundation for ensuring that the collection, transportation, storage and treatment of waste is carried out in a manner that provides protection for the environment and human health and in compliance with legal requirements'*. Hence soils requiring offsite disposal must be characterised as per the requirements of the relevant Waste Acceptance Criteria (WAC) under the European Communities Council Decision ((EC) 92003/33/EC) 'COUNCIL DECISION of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC'. Soils requiring offsite disposal will also require waste classification in strict accordance with the requirements of the EPA as set out in the following document 'Waste Classification List of Waste & Determining if Waste is Hazardous or Non-hazardous' (EPA, 2015). All waste soils removed from site must be transported by appropriately permitted hauliers and must be disposed of to an appropriately authorised disposal / recovery facility (via. valid Certificate of Registration, Waste Facility Permit, or Waste Facility Licence).

Surplus construction materials including concrete blocks, cladding, metals, tiles, glass, plastics, packaging, and timber will be generated during the Construction Phase. Materials will be segregated and recycled were possible; all other materials will be disposed of offsite. Additional waste generated by onsite personnel during the construction works will include the following; canteen waste, waste arising from temporary onsite self-contained welfare facilities, and a minor volume of waste electrical and electronic equipment.

2.3. Potential Hazardous Wastes to be produced

2.3.1. Fuels, Oils and Chemicals

Hazardous materials (fuels, oils and chemicals) will be used at the site during the Construction Phase. As per industry standards any fuel and oils temporarily stored onsite will be stored in double skinned / appropriately bunded storage tanks, in a secure dedicated fuel storage location onsite. All other chemicals including paints, varnishes, glues, adhesives, degreasing agents and cleaning agents will be securely stored in a dedicated temporary bunded chemical store onsite. All machinery including any generators / pumps used onsite should be checked at the start of each work shift for evidence of any fuel or oil leaks (and removed offsite for any repairs as may be required).

Fuel, oil and chemical spill kits should be available at the designated storage areas, along with the relevant Safety Data Sheet (SDS). SDS documents contain information on the potential hazards (health, fire, reactivity and environmental) and how to work safely with the relevant chemical. All site operatives should receive training in appropriate refuelling methods and machinery checks, and chemical handling methods to be implemented onsite. Taking account of these control measures, along with the fact that the volumes of paints, varnishes, glues, adhesives etc. will be minor, it is not expected that any waste fuel, oil or chemicals will be generated during the Construction Phase.

2.3.2. Contaminated Soils

Based on available information no potential sources of onsite ground contamination associated with current or historic land-use have been identified. Therefore, the risk of encountering ground contamination beneath the site is considered to be highly unlikely at this preliminary juncture.

Nonetheless excavation works during the Construction Phase should be monitored and in the highly unlikely event that contaminated materials are encountered these will need to be segregated from all uncontaminated soils, temporarily stored (any stockpiles should be lined and covered by heavy duty 1000 gauge plastic) sampled and analysed for relevant parameters (Waste Acceptance Criteria suite e.g. Rilta Disposal Suite). Any contaminated soils must be characterised as per the requirements of the relevant Waste Acceptance Criteria (WAC) under the relevant European Communities Council Decision (EC) (92003/33/EC), and classified in accordance with the requirements of the EPA as set out in the following documents 'Waste Classification List of Waste & Determining if Waste is Hazardous or Non-hazardous' (EPA, 2015). Any contaminated soils must be transported by appropriately permitted hauliers and disposed of to an appropriate EPA licensed Waste Facility in accordance with all relevant waste management legislation.

2.3.3. Non-native Invasive Species

The site was surveyed by Brian Keeley for the presence of invasive species in July 2018. The findings of this report (a copy of which is presented in the planning documents and drawings submitted as part of this planning application) clearly state the following:

> '*There were no invasive species within the landtake nor in the adjoining fields. This is not an issue for this site and there is no requirement to initiate any control measures. Precautionary measures in the introduction of any soil and plants should be implemented but no special requirements apply.*'

Therefore, the presence of invasive alien species warrants no further consideration at this juncture. However, in the highly unlikely event that any non-native invasive species including Japanese Knotweed (*Fallopia japonica*) are identified prior to or during construction activity, appropriate measures (designed, scoped and managed by a relevant specialist) will be required in order to remediate any identified Japanese Knotweed stems and any soils impacted by the plant roots.

In regard to non-native invasive species the following points should be noted;

- Regulations 49 and 50 of Part 6 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011) outlines the legal context for the prohibition of the introduction and dispersal of certain plant and animal species. Specifically, Section 49, paragraph 2 states that any person without the required licence "who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow" any plant species listed in Part 1 of the Third Schedule within the State shall be guilty of an offence.
- Under Section 50 paragraph 1, a person without the required licence "shall be guilty of an offence if he or she has in his or her possession for sale, or for the purposes of breeding, reproduction or propagation, or offers or exposes for sale, transportation, distribution, introduction or release" of any plant species listed in Part 1 of the Third Schedule or anything from which "a plant referred to in Part 1 of the Third Schedule can be reproduced or propagated or "a vector material listed in Part 3 of the Third Schedule".

2.4. Summary of Potential Waste Streams (LoW / EWC Codes)

A summary of the main hazardous and non-hazardous waste streams, which could arise during the Construction Phase is presented below, along with the relevant List of Waste (LoW) code. The LoW code (also referred to as European Waste Catalogue (EWC) code) serves as a common method of characterising various waste streams. Assignment of waste codes will determine how and where the generated waste can be disposed of. LoW codes must be selected for each waste type – a full description of each code is available on the EPA website[1].

It should be noted that the summary list presented in Table 2.1 is a non-exhaustive list and it will be the Contractor's responsibility to ensure all waste streams generated onsite during the Construction Phase for this project are appropriately characterised, managed and disposed of in accordance with all relevant waste management legislation.

Table 2.1 - Summary list of LoW Codes, which may be relevant to the site (See also Note 1)

Waste Material	LoW Code
Concrete, bricks, tiles and ceramics	

[1] https://www.epa.ie/pubs/reports/waste/stats/wasteclassification/EPA_Waste_Classification_2015_Web.pdf

concrete	17 01 01
bricks	17 01 02
tiles and ceramics	17 01 03
mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	17 01 07
Wood, glass and plastic	
wood	17 02 01
glass	17 02 02
plastic	17 02 03
Bituminous mixtures, coal tar and tarred products	
bituminous mixtures	17 03 02
metals (including their alloys)	
mixed metals	17 04 07
Soil (including excavated soil from contaminated sites), stones and dredging spoil	
soil and stones containing hazardous substances	17 05 03*
soil and stones other than those mentioned in 17 05 03	17 05 04
Gypsum-based construction material	
Gypsum-based construction material	17 08 02
Other construction and demolition wastes	
mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	17 09 04
Miscellaneous Waste	
Paper and cardboard	20 01 01
biodegradable waste (Green waste)	20 02 01
batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries	20 01 33*
batteries and accumulators other than those mentioned in 20 01 33	20 01 34
Waste fuel oil and diesel	13 07 01*
Waste petrol	13 07 02*
Waste other fuels (including mixtures)	13 07 03*
Chemicals – Solvents	20 01 13*
Chemicals – Pesticides	20 01 19*
Chemicals - paint, inks, adhesives and resins containing hazardous substances	20 01 27*
Chemicals - paint, inks, adhesives and resins other than those mentioned in 20 01 27	20 01 28

Chemicals - detergents containing hazardous substances	20 01 29*
Chemicals - detergents other than those mentioned in 20 01 29	20 01 30
insulation materials other than those mentioned in 17 06 01 and 17 06 03	17 06 04
Waste Material	LoW Code
Concrete, bricks, tiles and ceramics	
concrete	17 01 01
bricks	17 01 02
tiles and ceramics	17 01 03
mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	17 01 07
Wood, glass and plastic	
wood	17 02 01
glass	17 02 02
plastic	17 02 03
Bituminous mixtures, coal tar and tarred products	
bituminous mixtures	17 03 02
metals (including their alloys)	
mixed metals	17 04 07
Soil (including excavated soil from contaminated sites), stones and dredging spoil	
soil and stones containing hazardous substances	17 05 03*
soil and stones other than those mentioned in 17 05 03	17 05 04
Gypsum-based construction material	
Gypsum-based construction material	17 08 02
Other construction and demolition wastes	
mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	17 09 04
Miscellaneous Waste	
Paper and cardboard	20 01 01
biodegradable waste (Green waste)	20 02 01
batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries	20 01 33*
batteries and accumulators other than those mentioned in 20 01 33	20 01 34
Waste fuel oil and diesel	13 07 01*
Waste petrol	13 07 02*

Waste other fuels (including mixtures)	13 07 03*
Chemicals – Solvents	20 01 13*
Chemicals – Pesticides	20 01 19*
Chemicals - paint, inks, adhesives and resins containing hazardous substances	20 01 27*
Chemicals - paint, inks, adhesives and resins other than those mentioned in 20 01 27	20 01 28
Chemicals - detergents containing hazardous substances	20 01 29*
Chemicals - detergents other than those mentioned in 20 01 29	20 01 30
insulation materials other than those mentioned in 17 06 01 and 17 06 03	17 06 04

Note 1: The use of an asterisk on a LoW code denotes that the material is characterised as hazardous.

3. Waste Management – Policies, Legislation And Guidance

3.1. National Level

The implementation of the Waste Management Act in 1996 provided a legal basis for waste management, practice and infrastructure in Ireland. Following the implementation of this Act government policy moved from primarily relying on landfill disposal towards a more sustainable system of waste treatment through the promotion of recycling and recovery. The policy document entitled 'Changing our ways' (DoEHLG, 1998) set specific targets for recycling and consolidated the now familiar waste hierarchy of prevention, minimisation, reuse/recycling, energy recovery and disposal. This approach was supported by subsequent legislation.

In 2002, the policy statement 'Preventing and Recycling Waste: Delivering Change' (DoEHLG, 2002) specifically focused on waste prevention and recycling. This document emphasised the importance of adopting a hierarchical approach, with prevention highlighted as the most desirable option. Various national waste prevention programmes and best practice guidance documents were subsequently delivered by the government.

The relevant guidance document in respect of the preparation of waste management plans for the construction sector was subsequently published by the DoEHLG in 2006. This document, entitled 'Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects' clearly sets out recommendations for the development of C&D WMPs. The purpose of these guidelines was to promote an integrated approach to the management of C&D waste, which all parties from planners, designers, contractors and regulators can adopt throughout the project lifecycle, to ultimately minimise the generation of C&D waste and to establish specific thresholds for the requirement of a C&D WMP.

In 2011 the revised EU Waste Framework Directive was transposed into Irish law by the European Commission (Waste Framework Directive) Regulations 2011 (SI 126 of 2011) (EC, 2008). The Waste Framework Directive focussed on sustainable and efficient materials management strategy and provides a legal basis for the waste hierarchy. Therefore, the waste hierarchy presented in Figure 3-1 should be applied as a priority in Ireland.

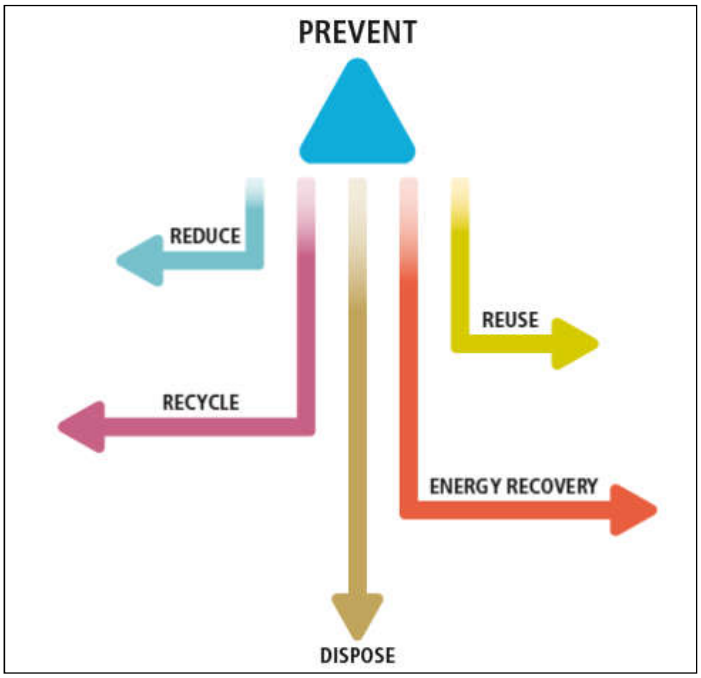

Figure 3.1 - Accepted Best Practice Waste Hierarchy (EPA, 2018)

In 2012 the Government published a new policy document entitled 'A Resource Opportunity Waste Management Policy in Ireland' (DoECLG, 2012). This document sets out the steps to be implemented on a national scale in order to make further progress on resource efficiency and seeking the elimination of landfilling

of municipal waste in Ireland. This approach is further supported by subsequent guidance including the EPA publication 'Green Procurement: Guidance for the Public Sector' (EPA, 2014), which clearly states the following Core Green Public Procurement (GPP) Criteria for the Construction sector:

- Construction environmental management plan;
- Staff training;
- Management of fuel and hazardous substances;
- Use of secondary aggregate and recycled materials;
- Water Management; and,
- Waste Management.

This EPA publication clearly sets out the responsibility of the Contractor with regard to waste management and disposal, as follows:

> *'The Contractor must apply appropriate measures in order to reduce and recover waste that is produced during the construction activity. The Contractor shall prepare and submit a waste management plan with its tender which shall form part of the Construction Management Plan to be agreed with the Contracting Authority in advance of the commencement of works. The waste management plan must be prepared in accordance with the Department of Environment, Community and Local Government Best practice guidelines on the preparation of waste management plans for construction and demolition projects (2006).'*
>
> *'Contractors are responsible for disposing of all waste generated under the contract in accordance with the Waste Management Act 1996 as amended. The Contractor must have full use of, or access to, waste disposal facilities with appropriate licenses and permits. The Contractor must provide copies of valid EPA Waste licences and Local Authority Waste Permits (including those relating to their subcontractors or brokers, where applicable) for collection and waste treatment/disposal/export facilities.'*

3.2. Regional Level

The relevant Regional Waste Management Plan for Louth County Council is the Eastern-Midlands Region Waste Management Plan 2015-2021. The Eastern-Midlands Region encompasses the following local authorities: Dublin City, Dún Laoghaire-Rathdown, Fingal, South Dublin, Kildare, Louth, Laois, Longford, Meath, Offaly, Westmeath and Wicklow. The regional plan, which was launched in May 2015, provides the framework for waste management up to 2021 and sets out a range of policies and actions in order to meet mandatory and performance targets. The key objectives of this plan are as follows:

- **Prevent waste**: a reduction of one per cent per annum in the amount of household waste generated over the period of the plan;
- **Increase recycling**: increase the recycling rate of municipal waste to 50 per cent by 2020; and,
- **Further reduce landfill**: eliminate all unprocessed residual municipal waste going to landfill from 2016.

The overarching objectives of the Eastern-Midlands Region Waste Management Plan 2015-2021 have been incorporated into the latest development plan pertinent to this site i.e. Louth Development Plan 2015-2021 (LCC). According to LCC (2015) all Regional Waste Management Plans have the following objectives:

- Prevent or minimise the production and harmful nature of waste;
- Encourage and support the recovery of waste;
- Ensure that such waste as cannot be prevented or recovered is safely disposed of; and,
- Address the need to give effect to the polluter pays principle, in relation to waste disposal.

The Louth Development Plan 2015-2021 specifically states the following with regards to construction and demolition waste management:

> *'…. developers and builders should minimise construction waste generated in development projects. During the construction process measures should be implemented to minimise soil removal (as art of the scheme design process), properly manage construction waste and encourage off-site prefabrication where feasible.'*

3.3. Waste Legislation

It will be the Contractor's responsibility to ensure that they are familiar with and comply with the requirements of all relevant waste legislation for the duration of the project. The following non-exhaustive list of legislative requirements typically apply to the construction stage of major developments:

- Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste, as amended, 2018 (S.I. 2018/851);
- European Communities (Waste Directive) Regulations 2011 (SI 126 of 2011) as amended 2016 (S.I 315 of 2016);
- Waste Management Act of 1996, 2001 and 2003;
- Litter Pollution Act of 1997, and as amended in 2017;
- Litter Pollution Regulations 1999, S.I. No. 359 of 1999);
- European Communities (Waste Electrical and Electronic Equipment) Regulations 2011 (S.I. 355 of 2011), as amended 2011 (S.I. No. 397 of 2011), 2013, (S.I. No. 32 of 2013);
- European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014);
- Waste Management (Facility Permit and Registration) Regulations 2007, S.I. No. 821 of 2007, as amended, 2008 (S.I. No. 86 of 2008), 2015 (S.I. No. 198 of 2015);
- Waste Management (Collection Permit) Regulations 2007, S.I. No. 820 of 2007), as amended, 2015 (S.I. No. 197 of 2015), 2016 (S.I. No. 24 of 2016);
- Waste Management (Licensing) Regulations 2004 (S.I. No. 395 of 2004) as amended 2010 (S.I. No. 350 of 2010);
- Waste Management (Miscellaneous Provisions) Regulations, 1998, S.I. No. 164 of 1998;
- Waste Management (Miscellaneous Provisions Act 2015;
- Waste Management (Landfill Levy) Regulations 2008, S.I. No. 199 of 2008, as amended 2009, (S.I. No. 550 of 2009), 2010 (S.I. No. 31 of 2010), 2012 (S.I. No. 221 of 2012), 2013 (S.I. No. 194 of 2013), 2015 (S.I. No. 189 of 2015);
- Waste Management (Hazardous Waste) Regulations, 1998, as amended, 2000 (S.I. No. 73 of 2000);
- Waste Management Shipment of Waste Regulations 2007, S.I. No. 419 of 2007;
- Waste Management (Movement of Hazardous Waste) Regulations, 1998 (S.I. No. 147 of 1998);
- European Communities (Shipments of Hazardous Waste Exclusively within Ireland) Regulations 2011, S.I. No 324 of 2011;
- European Communities (Transfrontier Shipment of Waste) Regulations 1994 (S.I. No. 121 of 1994);
- Waste Management (Transfrontier Shipment of Waste) Regulations 1998, as amended, 2014 (S.I. No. 861 of 2014);
- Waste Management (Tyres and Waste Tyres) Regulations 2007 (S.I. No. 664 of 2007), as amended 2017, (S.I. No. 400 of 2017), 2018 (S.I. No. 96/2018);
- European Union Batteries and Accumulators Regulations 2014, S.I. No. 283 of 2014, as amended, 2014 (S.I. No. 349 of 2014), 2015 (S.I. No. 347 of 2015);
- Waste Management (Registration of Brokers and Dealers) Regulations 2008, SI No. 113 of 2008;
- Waste Management (Prohibition of Material Disposal by burning) Regulations 2009, S.I No. 286 of 2009, as amended 2013 (S.I. No. 504 of 2013), 2017 (S.I. No. 599 of 2017);
- European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011, as amended 2016 (S.I. No. 315 of 2016);
- European Waste Catalogue (EWC) and Hazardous Waste List 2002;
- Waste Management (Food Waste) Regulations 2009, S.I. No 508 of 2009, as amended, 2015 (S.I. No. 430 of 2015);
- European Union (Properties of Waste which Render it Hazardous) Regulations 2015, S.I. No. 233 of 2015, as amended 2018 (S.I. No. 383 of 2018);
- Air Pollution Act, 1987 (Emission Limit Values for use of Asbestos) Regulations, 1990, S.I. No. 28 of 1990, as amended 1996 (S.I. No. 264/1996);
- EC (Control of Emissions of Gaseous & Particulate Pollutants from Non-Road Mobile Machinery) Regulations 2007, S.I. No.147 of 2007, as amended, 2011 (S.I. No. 263 of 2011), 2012 (S.I. No. 407 of 2012), 2013 (S.I No. 417 of 2013), 2016 (S.I. No. 2016/1628);

- The EU Regulation 2037/2000 (CFC's, HCFC's, Halons) - Ozone Depleting Substances. Control of Substances that Deplete the Ozone Layer Regulations 2006, S.I. No 281 of 2006, as amended, 2011 (S.I. No. 465 of 2011);
- EU F Gas Regulations 2014, S.I. No. 517 of 2014;
- Waste Management (Packaging) Regulations 2007 (S.I. No. 798 of 2007), as amended 2014 (S.I. 282 of 2014), 2015 (S.I No 542 of 2015);
- Planning and Development Acts 2000 to 2015, as amended (2018);
- Protection of Environment Act 1992 as amended (2003 and 2017).

3.4. Relevant Guidance

The purpose of the DoEHLG (2006) guidelines (*'Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects'*) was to establish a common framework and standard methodology for the preparation of WMPs within the Construction sector. This document provides a clear definition of C&D waste:

> *'Construction and demolition waste is defined as waste which arises from construction, renovation and demolition activities, together with all waste categories mentioned in chapter 17 of the European Waste Catalogue (EWC). Also included within the definition are surplus and damaged products and materials arising in the course of construction work or used temporarily during the course of onsite activities'.*

The following specific objectives are set out within the guidelines:

- To promote a clear, integrated strategy for the management of C&D waste which is followed throughout the project lifecycle;
- To set out a process which the Client, planner, designer, Contractor, sub-contractors and suppliers can engage in proactively in order to reduce C&D waste and to improve waste management procedures;
- To provide a standardised platform for designers, developers, practitioners and competent authorities in order to assess the robustness and adequacy of C&D WMPs; and,
- To provide guidance as to when a C&D WMP is required through the establishment of clear thresholds.

4. Waste Management

4.1. Soil Generation

It is estimated that a total soil volume of c.46,929 will be generated during the construction of the proposed development, as the application site will require some levelling and excavation for utilities, building foundations, services and roads. Fill material will predominately comprise imported aggregate as required for construction. A preliminary breakdown of proposed cut and fill volumes is presented in Table 4.1.

Table 4.1 - Preliminary Estimated Cut and Fill Volumes

Construction Element	Cut (m^3)	Fill (m^3)
Roads	14,729	3,521
Drainage/Services (Excavations)	16,895	14,365
Infiltration Basin/Pond	3,551	200
Dwellings	4,635	9,459
Under-croft Car Parking	7,119.3	1,076
Total	**46,929**	**28,621**

4.2. Construction Waste Generation

A typical breakdown of C&D wastes generated during construction of this development type in Ireland is presented in Figure 4.1 below (EPA, 2009).

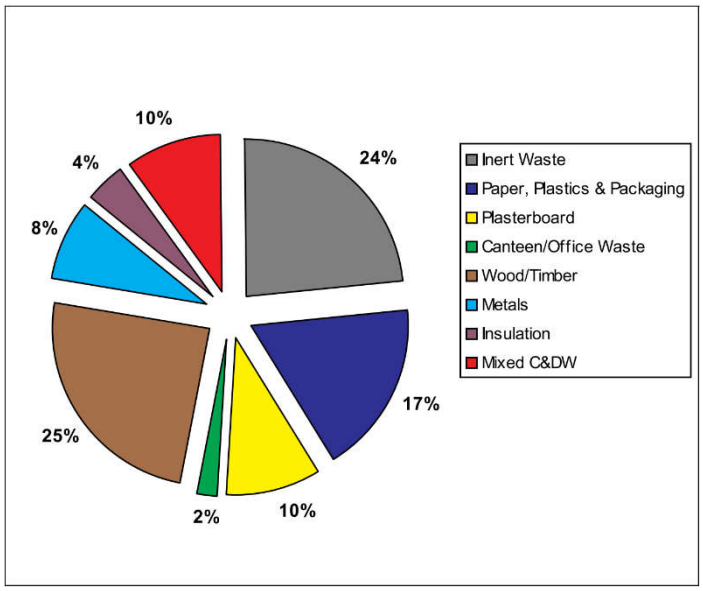

Figure 4.1 - New residential construction composition by volume (m^3) (C&D Waste) (EPA, 2009).

Taking account of an average generated waste factor of 0.107m^3 per m^2 (of completed floor space) for 'new residential construction' (EPA, 2009)[2], and based on the building floor space areas for the proposed development provided by O'Mahony Pike (OMP) Architects, preliminary waste volumes have been calculated, and are estimated to be 5,686m^3 or 4,958 tonnes.

The total estimated C&D waste volume of 5,686m^3 (4,958 tonnes) has been further broken down into various waste streams tonnages, as presented in Table 4.2.

This calculation is based on representative data gathered during a case study of waste composition arising from a new residential construction (EPA, 2009) (refer to Figure 4.1). Volumes have been converted to tonnes using factors obtained from relevant UK waste guidance[3].

It is noted that these volumes are based on literature values for representative Irish construction sites and are an approximate guideline only. In addition, no specific allowance has been made for C&D waste arising from

[2] Waste factor based on EPA audited data from 19no. new residential construction sites (2004 to 2005). EPA STRIVE Report Series 26 (2009) available at: http://www.epa.ie/researchandeducation/research/researchpublications/strivereports/STRIVE_26_Kelly_ConstructionWaste_syn_web.pdf

[3] http://www.sustainabilityexchange.ac.uk/conversion_factors_for_calculation_of_weight_to_vo??end

the construction of access roads, utilities and services. Final volumes can only be confirmed via. site audited waste disposal / recovery records.

Table 4.2 - Predicted Construction Waste Generation for each development type – Breakdown for each Waste Stream

		Estimated Waste Stream - Breakdown (tonnes)							
Property	Estimated Volume of C&D Waste (m3)	Mixed C&D Waste (tonnes)	Wood / Timber (tonnes)	Plasterboard (tonnes)	Metals (tonnes)	Paper, Plastics & Packaging (tonnes)	Canteen / Office Waste (tonnes)	Inert Waste (tonnes)	Insulation (tonnes)
TA	463	56	81	46	44	47	7	111	11
TB	359	43	63	36	34	37	5	86	9
TC	162	19	28	16	16	17	2	39	4
TC1	115	14	20	11	11	12	2	28	3
TD	47	6	8	5	4	5	1	11	1
TE	341	41	60	34	33	35	5	82	8
TF	103	12	18	10	10	10	2	25	2
TG	646	78	113	65	62	66	10	155	16
D.B.	17	2	3	2	2	2	0	4	0
TH	113	14	20	11	11	12	2	27	3
TH1	106	13	19	11	10	11	2	25	3
TI	404	48	71	40	39	41	6	97	10
TJ	600	72	105	60	58	61	9	144	14
1 Bed Apt.	379	46	66	38	36	39	6	91	9
2 Bed Apt.	1309	157	229	131	126	134	20	314	31
DP - 2 Bed	53	6	9	5	5	5	1	13	1
DP - 3 Bed	76	9	13	8	7	8	1	18	2
Creche	72	9	13	7	7	7	1	17	2
Undercroft Carpark	321	38	56	32	31	33	5	77	8
Tonnes	-	682	995	569	546	580	85	1365	136

4.3. Construction Waste Management & Disposal Costs

In terms of waste management and disposal costs, at this preliminary juncture it would not be feasible to estimate the total cost of waste management and disposal associated with the proposed development. Estimated costs will be determined by the Contractor and presented within the project specific Detailed C&D WMP.

4.4. Proposed Management Strategy for each Waste Stream

One of the key principles set out in the guidelines (DoEHLG, 2006) is the prevention of waste and this concept should be at the core of each project from the planning and preliminary design stages through to the construction and operational phases. Specifically, the guidance states:

> *'During the inception and preliminary planning stages of the project, special attention should be given to the development of a C&D waste management approach, which should establish goals for the diversion of waste from landfill and focus upon waste prevention, reuse and recycling opportunities'*

Therefore, every effort should be made to prevent and limit the amount of waste generated at the very outset of the project. At the preparatory phase of the Construction Phase the following measures will aid the prevention of waste in the first instance:

- Schedule and plan delivery of materials on an '*as needed'* basis to limit any surplus materials;
- Schedule and plan delivery of materials in sufficient dimensions so as to optimise the use of these materials onsite;
- Careful handling of materials will limit the potential for any damage; and,
- Where feasible, ensure that sub-contractors are responsible for the provision of the materials they require onsite; this will help reduce any surplus waste.

Each waste stream will be managed onsite as follows:

4.4.1. Native Non-Contaminated Soils

The estimated volume of soil generated during the construction phase (est.: 46,929) will be minimised by reducing / eliminating the need for excavation and importing of capping layers. Lime stabilisation may also be used to reduce the amount of soils generated onsite. The balance of soil materials excavated from the site will be reused where possible for landscaping purposes, and infill where appropriate, ensuring that any residual soil waste is kept to a minimum. Any surplus soil will be characterised and removed offsite in accordance with all relevant waste management legislation.

4.4.2. Mixed C&D Waste

Following segregation onsite, any residual mixed C&D waste (est.: 682 tonnes) will be collected in containers specifically for mixed C&D waste; these will be removed offsite for subsequent offsite separation and disposal at a waste disposal / recovery facility.

4.4.3. Wood / Timber

Timber waste (est.: 995 tonnes) will be segregated in order to prevent contamination by other wastes and will be stored so as to limit the potential for this material to rot. Wooden pallets will be returned to relevant suppliers where possible. Timber offcuts will be reused onsite where feasible. A covered receptible for waste wood will be placed in the waste storage area, prior to removal from site for recycling. All such timber will be free from chemical treatment.

4.4.4. Metals

Metal waste (est.: 546 tonnes) will be generated during the project, particularly arising from the use of rebar. All waste metal will be segregated offsite at the waste disposal / recovery facility for reuse and recycling. Given the significant scrap value associated with metal waste, this waste will be stored in a dedicated container within

a secure part of the site, and regular collections from site to the waste recycling facility will limit the potential for unauthorised entry and theft.

4.4.5. Paper, plastics and Packaging

Packaging wastes (est.: 580 tonnes) will be removed (paper / cardboard / plastic / general waste) offsite for subsequent offsite separation and disposal at a waste disposal / recovery facility. Waste packaging will be stored in dedicated containers in the waste storage area for collection and subsequent segregation and recycling.

4.4.6. Canteen / Office Waste

Onsite staff canteens will generate food and packaging waste (est.: 85 tonnes). Dedicated containers will be provided at each canteen to permit easy segregation of these wastes; brown bins will be provided for compostable food waste, green bins will be provided for dry recyclables (packaging, hard plastic, paper, cardboard, tetrapak etc.) and black bins will be provided for any residual waste.

4.4.7. Other wastes

In addition to the above waste streams, other waste materials (est.: 2,070 tonnes) will be generated during the construction phase. These residual wastes will typically comprise non- recycling waste such as soiled paper / cardboard / plastics / cloth, canteen food waste, fibreglass, polystyrene insulations and plasterboard. These materials will be stored separately to all other waste streams in order to prevent any cross contamination.

All C&D waste materials will be segregated onsite into the various waste streams, via. dedicated skips and storage areas. Waste will be removed from site by a suitably permitted waste haulage contractor. The Contractor should clearly identify all proposed waste haulage contractors within the project specific Detailed C&D WMP. Each waste haulage contractor must hold a current valid waste collection permit issued by the National Waste Collection Permit Office (NWCPO). All waste materials generated during the Construction Phase must be removed offsite to an appropriately permitted or licenced waste disposal / recovery facility.

4.5. Tracking and Documentation Procedures for Off-Site Waste

All waste transport and disposal / recovery must be carried out in accordance with relevant waste management legislation (outlined in Section 4) and any subsequent future legislation which may apply. A nominated Waste Manager for the project will be responsible for ensuring correct tracking and documentation procedures are undertaken for all waste removed from site during the project. Each consignment of waste removed from site will be tracked and recorded. A site record detailing the date, truck registration, waste type, estimated volume and destination will be filed onsite for each consignment, along with the corresponding truck docket and weighbridge record at the offsite disposal / recovery destination. A copy of the relevant waste collection permits and waste permit / waste licence for the relevant disposal / recovery facilities will be available onsite for the duration of the project.

5. Training Awareness And Competence

5.1. Waste Manager - Training and Responsibilities

The Contractor will nominate a Waste Manager for the duration of the Construction Phase. The Waste Manager will be responsible for the efficient operation of onsite waste management procedures. They will also be responsible for ensuring that all waste removed offsite is appropriately characterised (under the correct LoW / EWC code), transported and disposed of in accordance with all relevant waste management legislation. It will be the Waste Managers responsibility to maintain all waste management and disposal / recovery records onsite throughout the project. These site records should be made available for viewing by the Client, Employer's Representative and statutory consultees (LCC, EPA) as required.

The Waste Manager should be appropriately trained in the correct documentary procedure, waste auditing and best practice methods in onsite waste minimisation and waste management. It will be the Waste Managers responsibility to implement the project specific Detailed C&D WMP during the Construction Phase. Onsite toolbox talks with site operatives to highlight any specific waste management concerns will also be carried out should the need arise.

5.2. Site Operatives - Training and Responsibilities

All site personnel should receive waste management information as part of their initial site briefing from the Waste Manager. The initial briefing should include a discussion of the key points set out in the project specific Detailed C&D WMP, along with the specific procedures to be implemented onsite in order to segregate and appropriately store the generated waste and key control measures such as refuelling procedures and oil, fuel and chemical storage requirements. This will ensure that all onsite personnel are familiar with the site-specific waste management strategy. The project specific Detailed C&D WMP should be available onsite for the full duration of the Construction Phase.

6. Record Keeping

The Contractor, through the appointed Waste Manager, will be responsible for ensuring that the full details of all materials deliveries, materials movements and C&D waste generated are recorded during the Construction Phase. Each C&D waste consignment removed from site will be tracked and documented in order to ensure full traceability of the material from site to the final destination. A single record will be completed for each individual consignment.

The Contractor will also receive printed receipts / weighbridge records from the waste disposal / recovery facilities for each individual consignment. These records will enable the Contractor to accurately quantify the total volume of waste removed for offsite disposal / recovery for each individual waste stream. These records will be maintained onsite and will be made available for auditing of the project specific Detailed C&D WMP.

7. Outline Waste Audit Procedures

According to DoEHLG (2006), a Waste Audit represents a systematic study of the waste management practices applied in the Project and is required in order to highlight firstly, the potential issues that can arise during the waste management process and, secondly, the benefits of waste prevention and minimisation. Therefore, Waste Audits should be carried out routinely onsite by the Waste Manager. The specific Audit Plan will be set out by the Contractor within the project specific Detailed C&D WMP. However, at this preliminary stage the following measures will be undertaken as a minimum:

- When materials arrive on site, they will be properly recorded including the assignment of such materials to specific uses within the works;
- A review will be undertaken of onsite waste management practices in order to identify any improvements which may be required;
- Onsite waste management processes from materials delivery through to waste disposal / recovery (including the quantity, type and composition of all waste) will be reviewed in order to identify any opportunities for waste reduction;
- Corrective actions will be highlighted and implemented following each audit. Such actions include applying 'lessons learned' regarding efficient waste management on this project to other projects in the future to enable further waste reduction; and
- The key steps and findings from each waste audit should be presented in a summary report.

Separately a routine waste report (i.e. Waste Validation Report), which clearly presents the types and total quantities of waste removed from site for subsequent disposal / recovery, transport details and the final destination of each waste stream will be prepared by the Contractor. This report will include all required tracking documentation, including any site records, truck dockets and weighbridge receipts (final destination). The guidelines (DoEHLG, 2006) state that '*these summary reports should be prepared within three months of the end of each calendar year. Where the period of construction is greater than one year, reports should be submitted as required by the local authority*'.

8. Consultation with Relevant Bodies

Appropriate consultation will be undertaken with relevant bodies by various members of the project team as required throughout the project. Relevant consultees include, but are not limited to, the following:

- LCC (as the relevant local authority for waste matters);
- The EPA (as the relevant regulatory body for environmental matters);
- NWCPO;
- Permitted hauliers; and,
- Suitably permitted / licenced waste disposal / recovery facilities.

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