C1.0 MARKETING MEASURES

C1.1 Raising Awareness, Marketing & Promotion

C1.1.1 The education of residents on the Mobility Management Plan initiatives and the importance of contribution are very important. The services available to the residents must be communicated in a consistent and continuous manner to sustain behavioural change.

C1.1.2 Promotion would start with the marketing of the residential development. The sustainable location of the development and the high-quality infrastructure provision for walking and cycling will be a prominent feature. The high-quality links provided by Dublin Bus and Luas to the various Employment Areas, City Centre and other links are also an attractive feature for encouraging sustainable travel for future residents.

C1.1.3 Communications will include promotional initiatives and activities aimed at informing the residents of all relevant external bodies of the existing and proposed transport networks. Such initiatives will include, but not limited to:

- Internal communications channels
- Advertising – local press and media
- Publicity – promotion of benefits

C1.2 Sustainable Travel Pack

C1.2.1 Promotion of sustainable travel will continue when residents take up occupation of their new accommodation. A 'Welcome Pack' can be provided which will include maps and timetable information for walking, cycling and public transport journeys. It will also include information on a range of incentives to encourage take up of public transport and cycling etc.

C1.2.2 The 'Welcome Pack' will be produced and approved prior to first occupation and staff will be trained in the contents of the information contained. The 'Welcome Pack' will include:

- A covering letter explaining the purpose of the 'Welcome Pack' and contact details of the Mobility Manager,
- An overview of the Mobility Management Plan,
- Maps for walking, cycling and public transport,

- Timetables for public transport (i.e. Dublin Bus, Luas),
- Local taxi information,
- Car sharing scheme information,
- Information on reducing the demand for travel,
- Sustainable travel voucher to encourage walking, cycling and public transport, and
- Pedometer pack with information on the health benefits of walking.

C1.2.3 Increasing awareness of alternative modes to car use and the benefits is a central component of mobility management. In particular, residents should be made aware of the benefits of active travel modes including health and financial benefits. Key actions might include:

- Establishing a clear brand concept for green / smarter travel to and from the site. This should be incorporated in all communication with the residents regarding commuting to and from the site;
- Provide a central information point for residents in relation to travel options, this should be a physical point within the development but should also be made available on the internet. The latter could also include information on bus and rail routes and timetables;
- New residents to the development should be informed about travel options;
- Ensure the residential development is included as a key destination on journey planning apps.

C1.3 Personalised Travel Plan

C1.3.1 An advisory leaflet will be provided in the 'Welcome Pack' to explain to new residents the sustainable transport options available in the MMP and that if they wish they may contact the Mobility Manager directly to discuss specific travel needs. The Mobility Manager will then use the information discussed to prepare a 'Personal Travel Plan' for that resident free of charge. The Personal Travel Plan will be based on individual lifestyles and in light of the available transport options for stated everyday journeys.

C1.3.2 This process will allow residents to consider how they currently travel and promote alternative methods for their journeys to work, school and when accessing other local amenities. Personalised journey planning will also enable

residents who might not otherwise use public transport realise there are local services available that can suit their needs.

C1.3.3 The Mobility Manager is responsible for promoting the availability of this measure and residents will be encouraged to contact the Mobility Manager if they have any specific sustainable travel related queries.

C1.4 Online Website

C1.4.1 A dedicated online website for the residential development may be created and will focus on providing appropriate, up-to-date information on sustainable travel options for accessing the development site.

C1.4.2 This website will act as a 'one-stop-shop' for the dissemination of site-wide sustainable travel information to residents, as well as acting as a source of information for visitors. Information on the website will include details of local public transport routes, local amenities and facilities, walking and cycle maps and a link to online car sharing opportunities. The website will also provide links to other websites such as Dublin Bus and Luas so as to encourage residents to plan their journeys using sustainable transport.

C1.5 Smart Device Travel App

C1.5.1 A Travel App could be developed for the residents at the development as well as visitors travelling to the site. This smart device app will enable all users to gain instant access to travel information. This may include:

- Timetables, location of stops, route information, fares, and real-time information for both buses and the Luas.
- Interactive map showing users current location and highlighting local points of interest (e.g. closest bus stop)
- Pedometer for walkers

APPENDIX 16.1

UTILITY RECORDS

ESB Networks

LE: 20200217-018_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: 17-Feb-2020

** SCALE: 1:2000

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

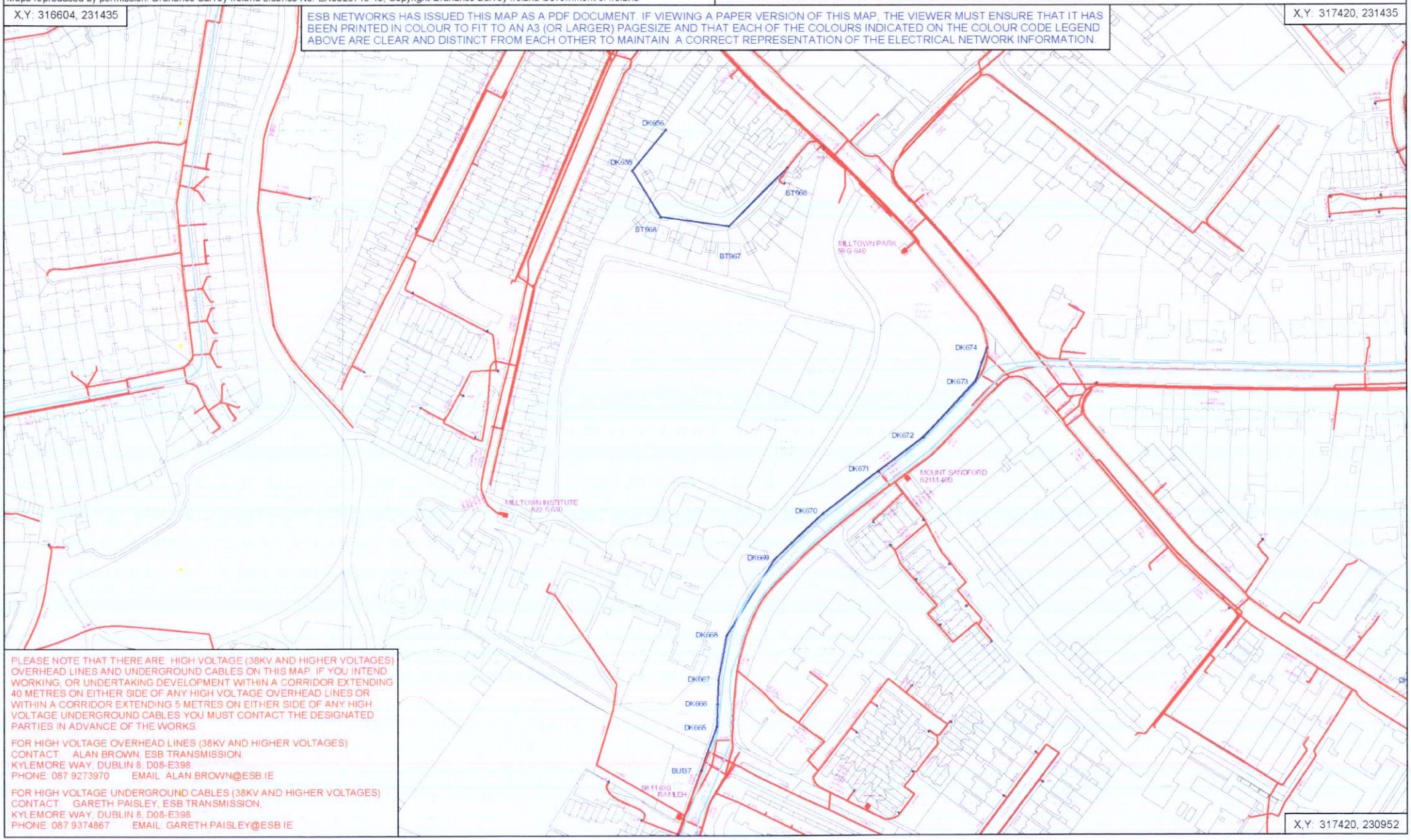
WARNING

THIS MAP INDICATES THE APPROXIMAT ION OF ESB TRANSMISSION (400KV, 220KV, 110KV, 38KV) AND DISTRIBUTION (20KV, 10KV, IV) UNDERGROUND CABLES AND OVERHEA S IN THE GENERAL AREA OF THE PROPOSED WORKS. ESB NETWORKS TAKES NO RESPON Y 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: 316604, 231435

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: 317420, 231435



X,Y: 317420, 230952

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 IN ADVANCE OF THE WORKS.

FOR HIGH VOLTAGE OVERHEAD LINES (38KV AND HIGHER VOLTAGES)
CONTACT: ALAN BROWN, ESB TRANSMISSION,
KYLEMORE WAY, DUBLIN 8, D08-E398.
PHONE: 087 9273970 EMAIL: ALAN.BROWN@ESB.IE

FOR HIGH VOLTAGE UNDERGROUND CABLES (38KV AND HIGHER VOLTAGES)
CONTACT: GARETH PAISLEY, ESB TRANSMISSION,
KYLEMORE WAY, DUBLIN 8, D08-E398.
PHONE: 087 9374867 EMAIL: GARETH.PAISLEY@ESB.IE

Important Safety Notice: Damage to gas pipelines can result in serious injury or death. Gas network information is provided as a general guide. The exact location and depth of medium or low pressure distribution gas pipes must be verified on site by carrying out necessary investigations, including, for example, hand digging trial holes along the route of the pipe. Service pipes are not generally shown but their presence should always be anticipated.

High pressure transmission pipelines are shown in red. If a transmission pipeline is identified within 10m of any intended excavations then work must not proceed before GNI has been consulted. The true location and depth of a transmission pipeline must be verified on site by a representative of GNI. Contact can be made through 1850 427 747.

All work in the vicinity of the gas network must be completed in accordance with the current edition of the Health and Safety Authority publication, "Code of Practice For Avoiding Danger From Underground Services" which is available from the Health and Safety Authority (1890 289 389) or can be downloaded at www.hsa.ie

Legal Notice: Gas Networks Ireland (GNI) and its affiliates, accept no responsibility for the accuracy of any information contained in this document including data concerning location and technical designation of the gas distribution and transmission network (the"Information"). The Information should not be relied on for accurate distance or depth of cover measurements.

Any representations and warranties, express or implied, are excluded to the fullest extent permitted by law. No liability shall be accepted for any loss or damage including, without limitation,direct, indirect or consequential loss, arising out of or in connection with the use or re-use of the Information.

- Aurora Telecom Duct
- Aurora Telecom Sub Duct
- Aurora Telecom Inserted Gas Pipe

Aurora TELECOM

Aurora Telecom Queries - 01-8926166 (Office Hours)
Aurora_Network_Queries@gasnetworks.ie
Aurora Telecom Emergency Only 1850 427399 / 01 2030120

- Transmission Pipe (High Pressure)
- Transmission Pipe (Construction Issue)
- Distribution Pipe (Medium Pressure)
- Distribution Pipe (Low Pressure)
- Service Pipe (Medium Pressure)
- Service Pipe (Low Pressure)
- Strategic Pipe (Medium Pressure)
- Strategic Pipe (Low Pressure)
- Inserted
- Abandoned Pipe

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

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

DIAL BEFORE YOU DIG 1850 42 77 47
In Emergency call 1850 20 50 50 Gas Networks Ireland

Gas Networks Ireland

GAS NETWORK INFORMATION

Description: Sandford Road

Location: 716957,731293

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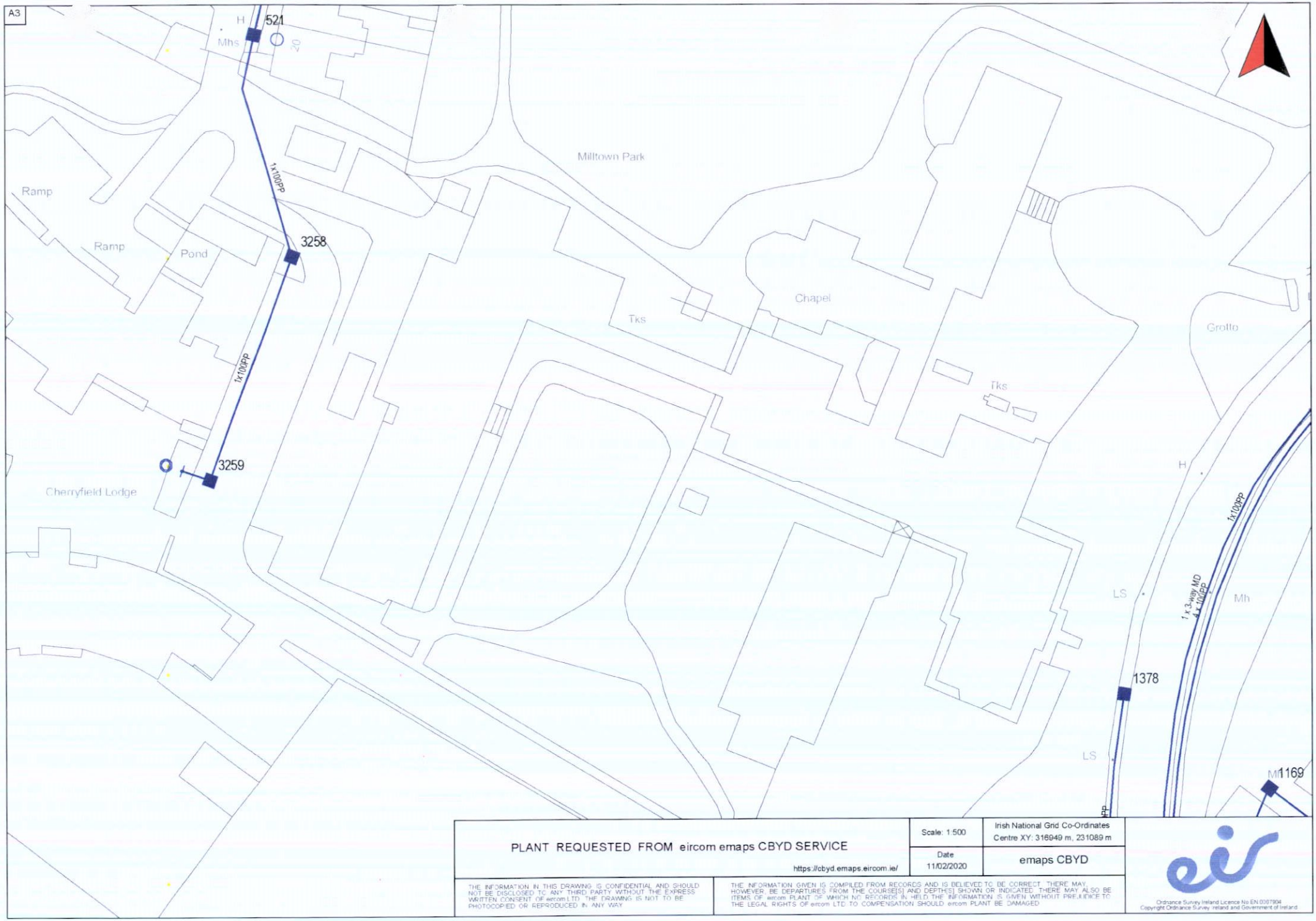
Plotted By: 1022	Ref ID: *1022_12022020101034*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Grotto
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1x3-Way MD
4x100PP
LS
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1378
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Irish National Grid Co-Ordinates
Centre XY: 316949 m, 231089 m
Date
11/02/2020
emaps CBYD
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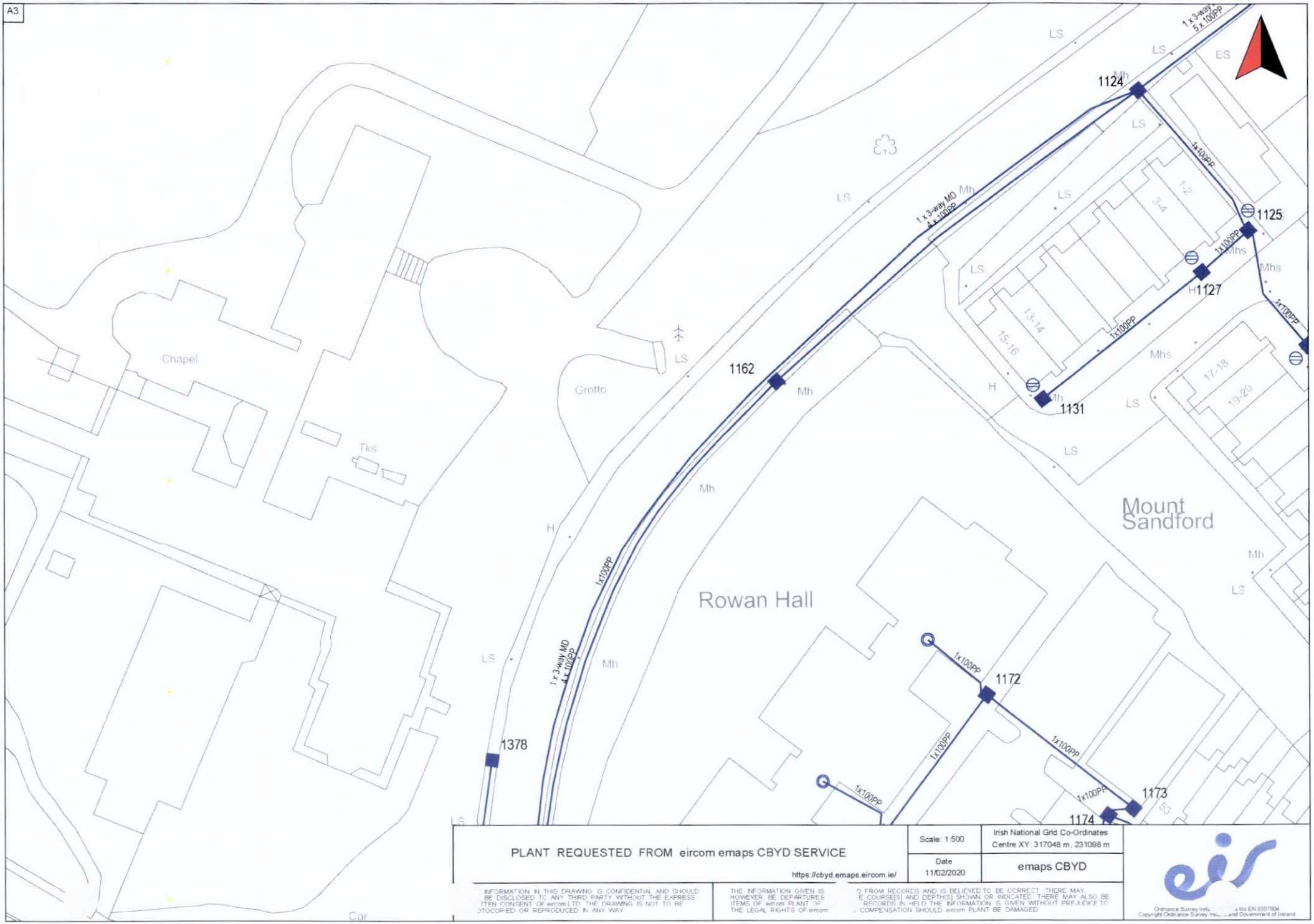
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Grotto
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15-16
17-18
19-20
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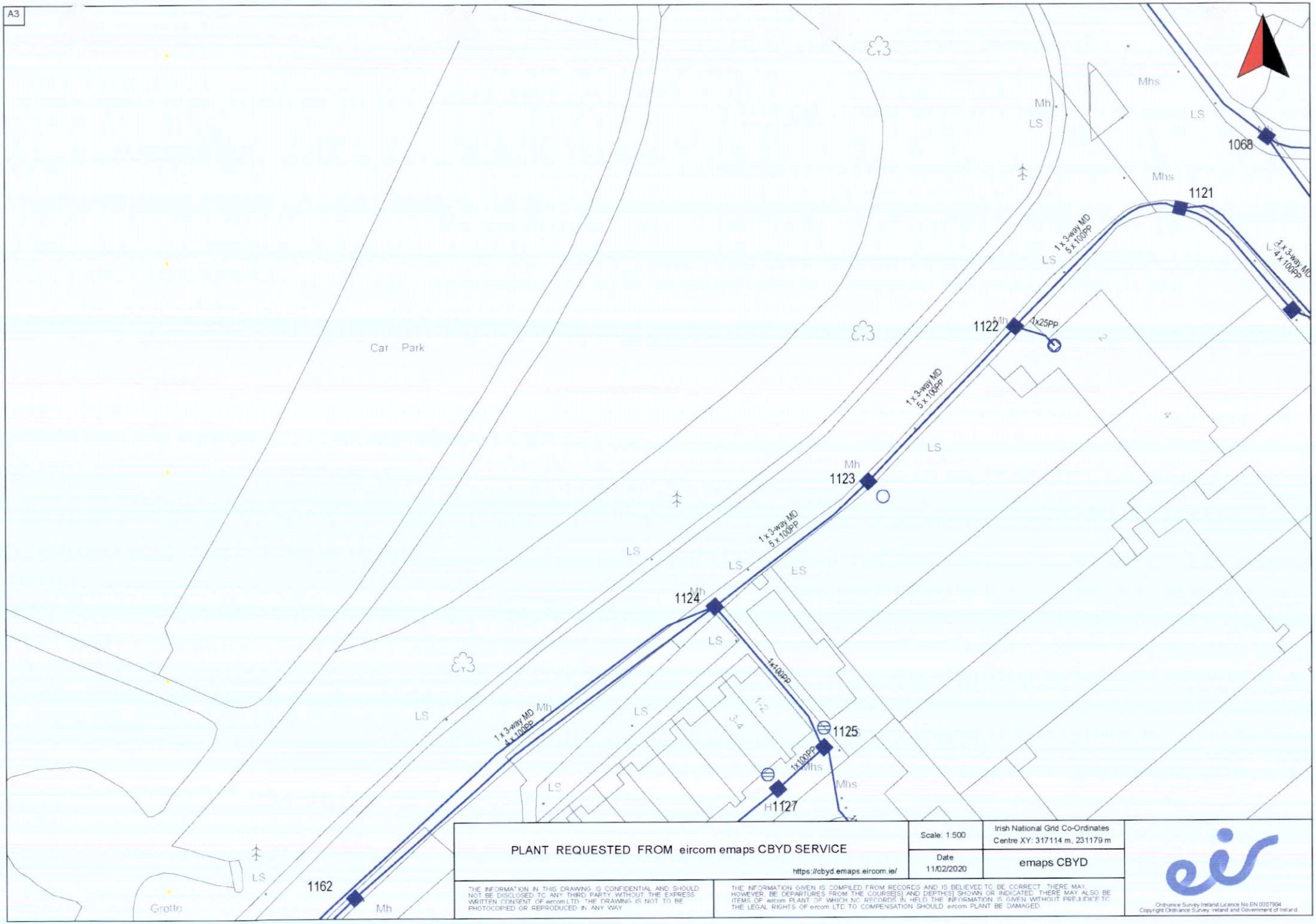
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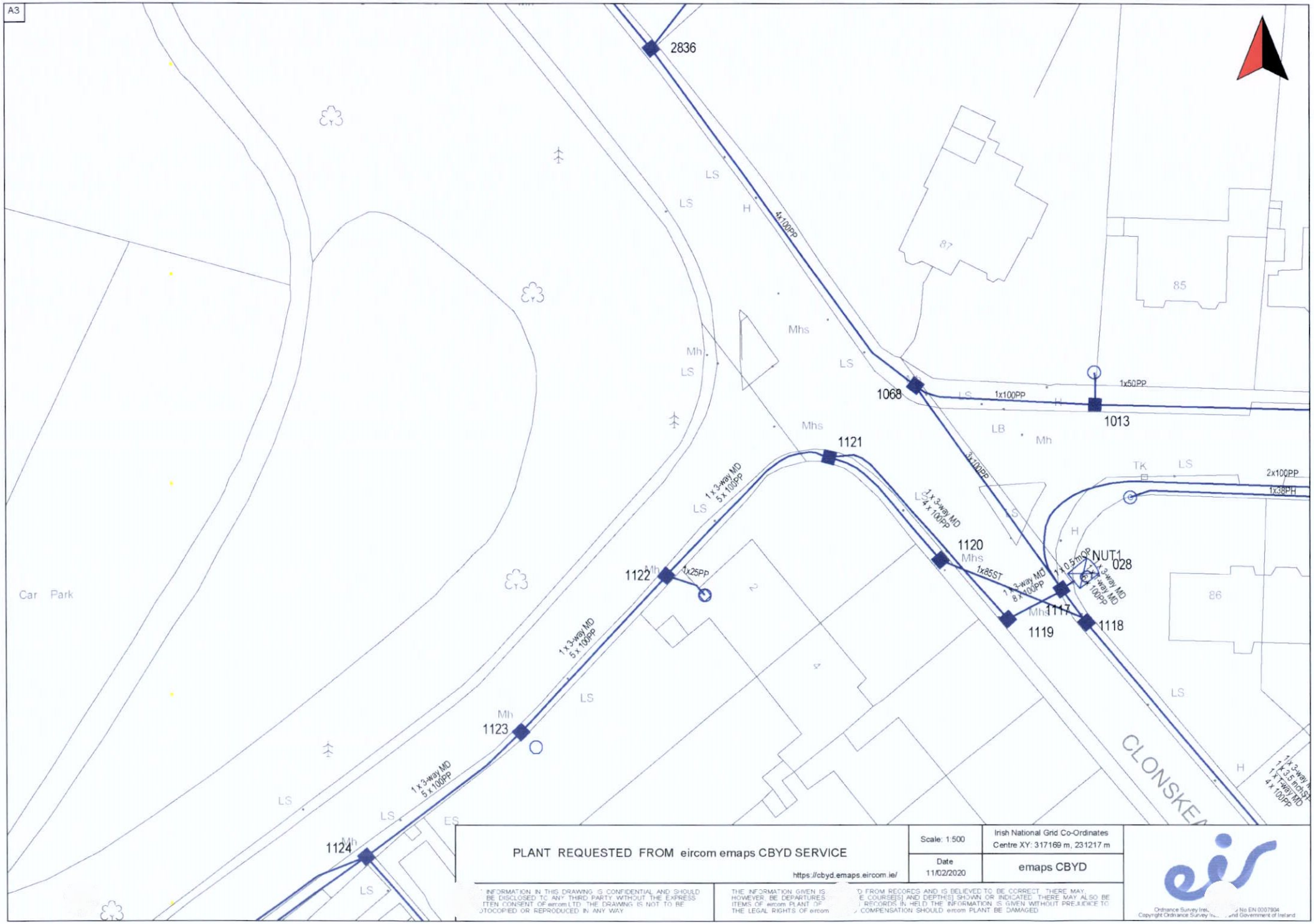
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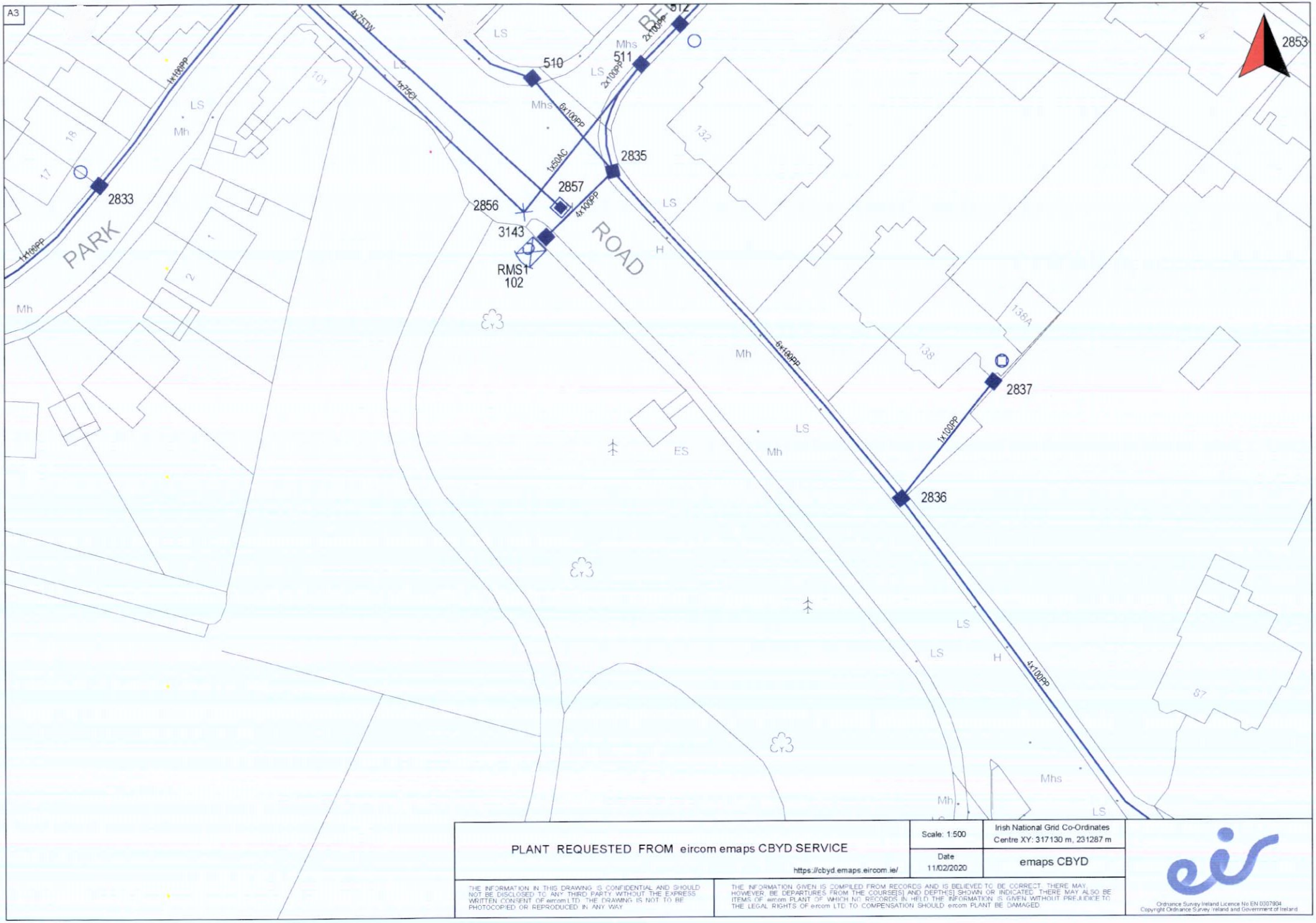

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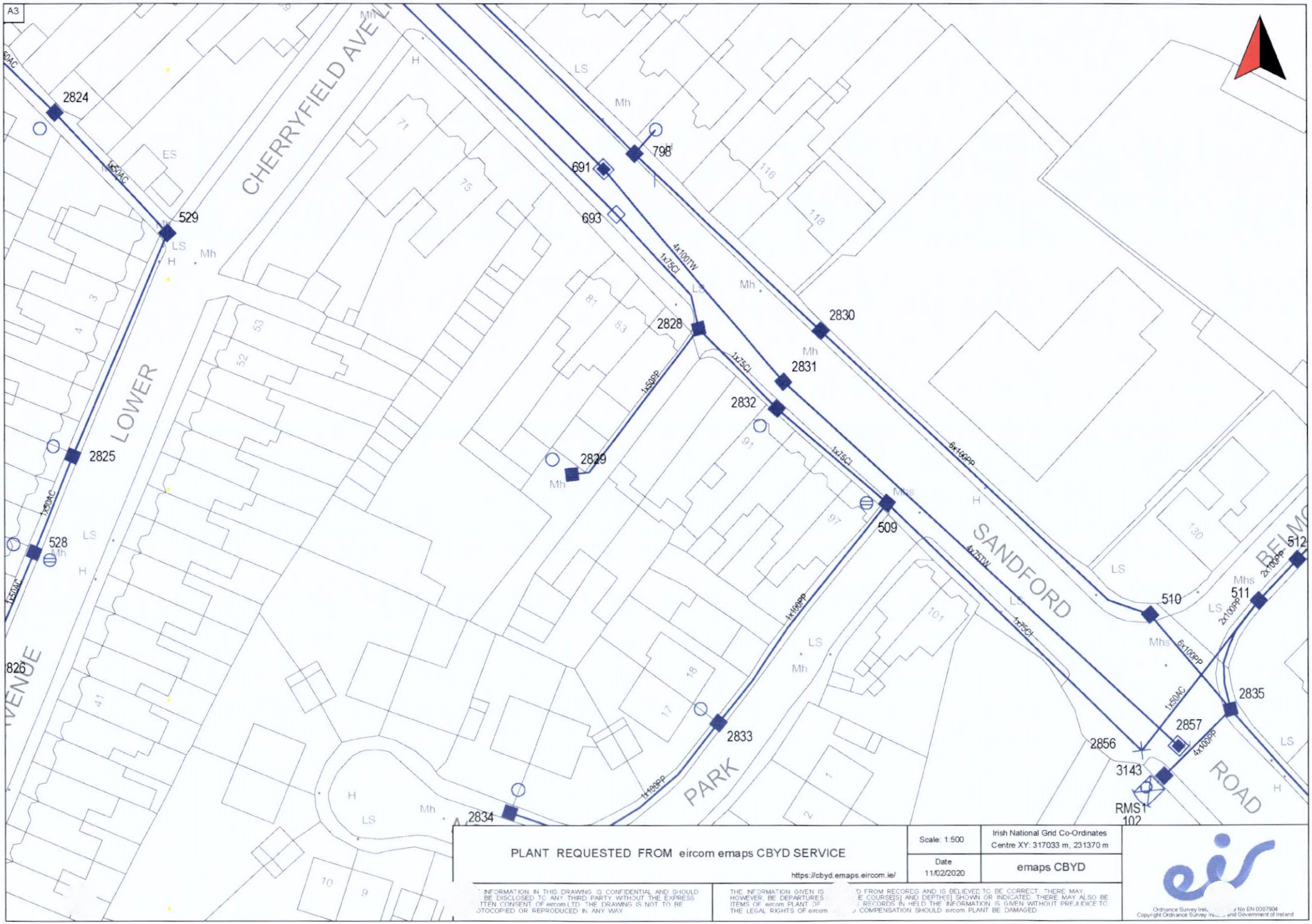
Date 11/02/2020	emaps CBYD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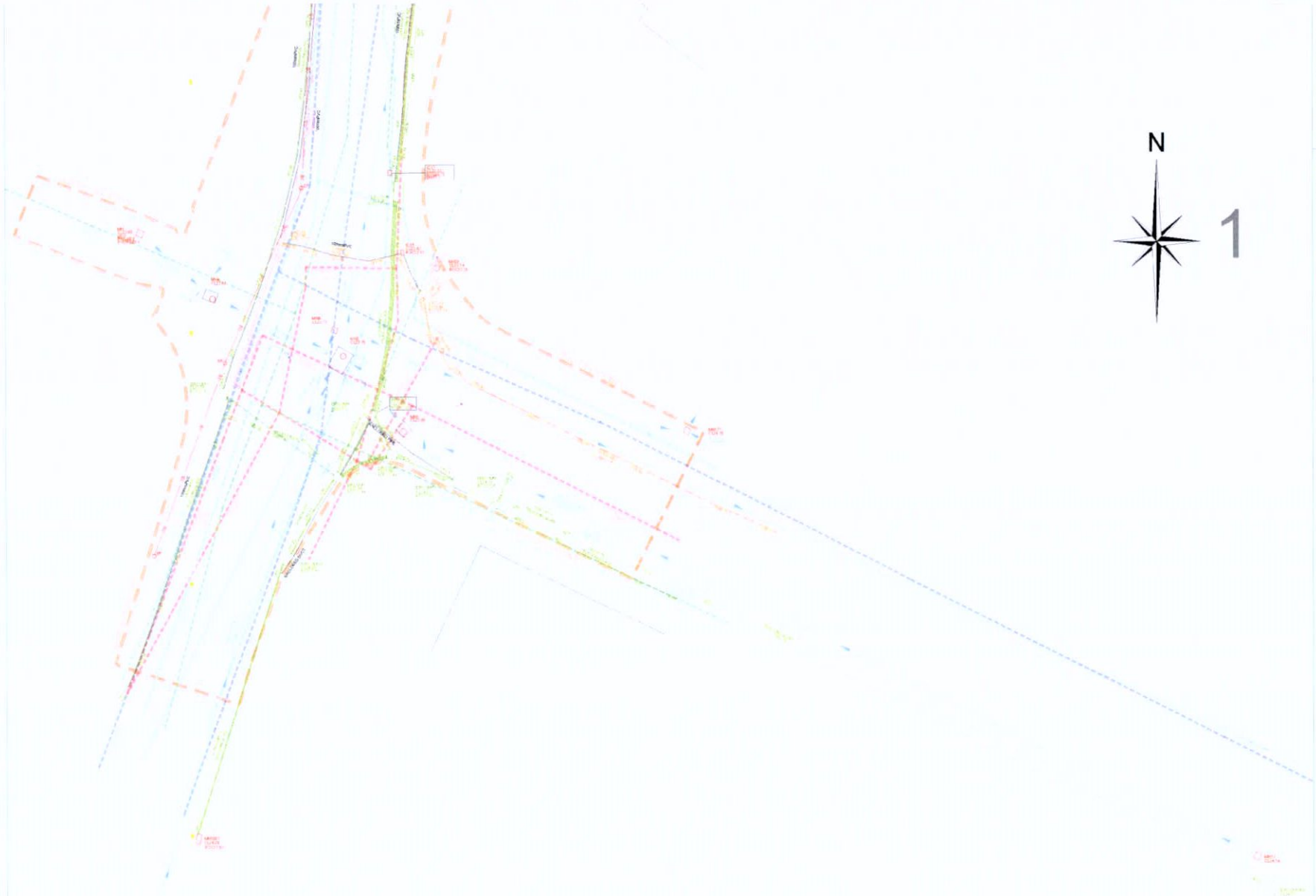
APPENDIX 16.2

APEX SURVEYS



N

1

PAS 128: 2014 (Quality of Survey Level Outputs):

DESK TOP UTILITY RECORDS SEARCH

QUD — Drafted from utility records

SITE RECONNAISSANCE

QLC — Location: Demonstrated by visual reference to street furniture or evidence of previous streetworks, or reinstatement scars

DETECTION

QLB4 — A segment of utility suspected to exist that has not been detected by a geophysical technique

QLB3 — Horizontal location only of the utility detected by one of the geophysical techniques used

QLB2 — Horizontal and vertical location of the utility detected by one of the geophysical techniques used

QLB1 — Horizontal and vertical location of the utility detected by multiple geophysical techniques

VERIFICATION

QLA — Horizontal and vertical location of the top and/or bottom of the utility

Apex Surveys Ltd. Disclaimer - Utility Survey

The Survey aims to map existing utilities and sub-surface structures and provide information with respect to pipe size, material type and drainage connects its However utility surveying is limited by the following guidelines and it may not be possible to accurately survey, define and locate all services and sub-surface features

Please note that not all buried pipes, cables and ducts can be detected and mapped in consideration of their depth, location, material type, geology and proximity to other utilities Even an appropriate and professionally executed survey may not be able to achieve 100% detection rate

Although all reasonable steps have been taken to locate all features, there is no guarantee that all utilities and underground structures will be located and shown on the drawing.

The following is a non-exhaustive list of the limitations of utility surveys

Depth of Utility — The depth and size of a utility affect the signal strength and the degree with which a utility can be located

Due to attenuation of the radio signal with depth, resolution is reduced, hence making identification of utilities more difficult with increasing depth

Size of Utility — The smaller the diameter of a utility the more difficult it is to locate This difficulty increases with depth

Ground Conditions — The depth penetration and quality of the data depends on the ground conditions of the site GPR Surveying works best within high resistivity material Clay or saturated can impair GPR Surveying Poor data may be a result of areas with high conductivity

Utility Congestion — Where different utilities converge together into a service corridor or cross paths it becomes difficult to locate a specific utility and to map its route The reflected signal will display a single response to multiple utilities Therefore multiple utilities may appear to be a single utility Where similar services run on close proximity, separation may be impossible

Signal Jumping — Signal from surrounding services may 'jump' to a highly conductive line masking its true identity

Shadowing — Of deeper utilities by shallower objects Shallow utilities will mask the existence of deeper utilities where they are in close proximity Also, high reflective materials close to the surface or below may hide deeper anomalies

Surface Interference — The GPR system relies on a relatively flat and even surface on which to perform radar passes If ground disturbances such as vehicles, organic material (long grass, scrub) or undulating ground surface are present then the acquired data will be of lower resolution and in some cases not viable

Loss of Signal — It is not always possible to trace the entire length of each underground service

Connections between manholes — Connections between manhole chambers are assumed to be straight

Non-metallic objects — Non-metallic objects are amongst the most difficult to trace therefore successful tracing of non-metallic pipes/ cables may be limited

Fibre Optic Cables — Fibre optic cables may not be possible to locate except where clad with a duct or the wire or similar conductor system

Defective / flooded manholes or pipework — It may not be possible to establish connections between flooded or defective manholes or pipework

Acute bends in pipework — It may not be possible to trace a pipe/ cable an acute bend

Accuracy estimates

Locational accuracy is determined by referring to the manufacturers guidelines for the detector used

In ideal conditions the spatial accuracy for the underground utilities may be +/- 1% for Radiodetection and +/- 10% of depth for the GPR to +/- 5% level However variations within the subsurface, depth below the ground, close proximity of other services and local magnetic, atmospheric or ground conditions, bends, lateral service connections and any of the other limitations listed in this disclaimer may alter the estimated accuracy

Plan accuracies of +/- 150mm may be achieved but this figure will depend on the depth of service below ground level However variations within the subsurface, depth below the ground, close proximity of other services and local magnetic, atmospheric or ground conditions, bends, lateral service connections and any of the other limitations listed in this disclaimer may alter the estimated accuracy

DP represents distance from the surface level to the top of the service/ target

Where technically possible, depth indications will be given These along with plan positions should be used for guidance only and whenever critical accuracy is required these should be confirmed by the client by undertaking trial excavations or similar

Record Drawing Information

Services which have been untraceable are shown from records where possible or available These lines are annotated as "Taken From Records" or "From Records" Existing record information showing underground services is often incomplete and with unknown accuracies therefore it should be regarded as indicative only

Where Apex Surveys issue a utility drawing, this should be read in conjunction with all available public or private utility records

Apex Surveys endeavor to add relevant Public Utility record information onto the final drawing However, we would recommend that direct contact is made with the asset owner or statutory undertaker

We shall not be held responsible for the accuracy or otherwise of the location of a service, as issued by the utility provider and therefore shown as "Taken to Records" on the drawing

The following have been excluded from the survey:

Location of individual service feeds to properties or buildings as access would be required into each property to apply direct connections to inlet points and this would significantly increase the scope of works, survey cost and also cause possible disruption to occupants

Live ended or disconnected cables or terminated short lengths of pipe

Internal building services

Small diameter cables less than 20mm diameter or pipes less than 40mm diameter

Above ground services unless specifically requested

Lifting manholes which require longer than 10 minutes effort using standard heavy duty apparatus

All works carried out by Apex Surveys conform to the guidelines set out in The Survey Association (TSA) and PAS 128 Standard for utility mapping

APEX SURVEYS

www.apexsurveys.ie
info@apexsurveys.ie
00353 1 691 0159

STREET FURNITURE

BOLLARDS
BUS STOP
CROSS MARKINGS
GATE
ELECTRICITY POLE
TELEPHONE POLE
EARTHING ROD
LAMP POST
MARKER POST
SIGN POST
TRAFFIC LIGHT
TELEPHONE BOX
POST
POST BOX
ROADSIGN
BORE HOLE
TRIAL PIT

BOTTOM OF CHAMBER — BOC
CAST IRON — CI
CONCRETE — CONC
DIAMETER — DIA

SERVICES

AIR VALVE
ARMSTRONG JUNCTION
CABLE TV PC
COVER LEVEL
EIRCOM COVER
EIRCOM JUNCTION BOX
ELECTRICAL CABLE PIT
ESAT COVER
ESB COVER
ESB JUNCTION BOX
FIRE HYDRANT
GAS VALVE
INVERT
INSPECTION COVER
MANHOLE
SEPTIC TANK
SLUICE VALVE

DOWNPIPE — DP
EARTHENWARE — EW
NO FURTHER TRACE — NFT
OFFSITE — OS

STOPCOCK
SERVICE BOX (UNKNOWN)
TRAFFIC COVER
VENT — VENT
WATER METER — WM

LEVELS

RED LEVEL
FLOOR LEVEL — +FLOOR
INVERT LEVEL
ROAD LEVEL
SOFFIT LEVEL
SPOT LEVEL
TOP OF WALL LEVEL
WATER LEVEL
SURVEY CONTROL STATION

START OF RUN — SOR
UNABLE TO — UTO
UNABLE — UTT

UNDERGROUND LEGEND

WATER MAIN
GAS MAIN
STORM DRAIN
FOUL SEWER
COMBINED SEWER
ELECTRIC CABLE
ELECTRIC (LIGHTING)
EIRCOM
FIBRE OPTIC CABLE
BROADBAND
CABLE TV
TRAFFIC AND SIGNAL CABLE
CCTV
IRRIGATION PIPE
EMPTY DUCT — EMPTY
OFF ANOMALY
UNKNOWN CABLE
OHGND ELECTRICITY
OHGND TELECOM

SHEET LAYOUT

PLAN PRODUCED BY

APEX SURVEYS

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CLIENT

D.B.F.L.

GRID SYSTEM	Irish Transverse Mercator
DATUM	Malin Head (OSGM15)
NOTES	Drawing Contains Scale Factor

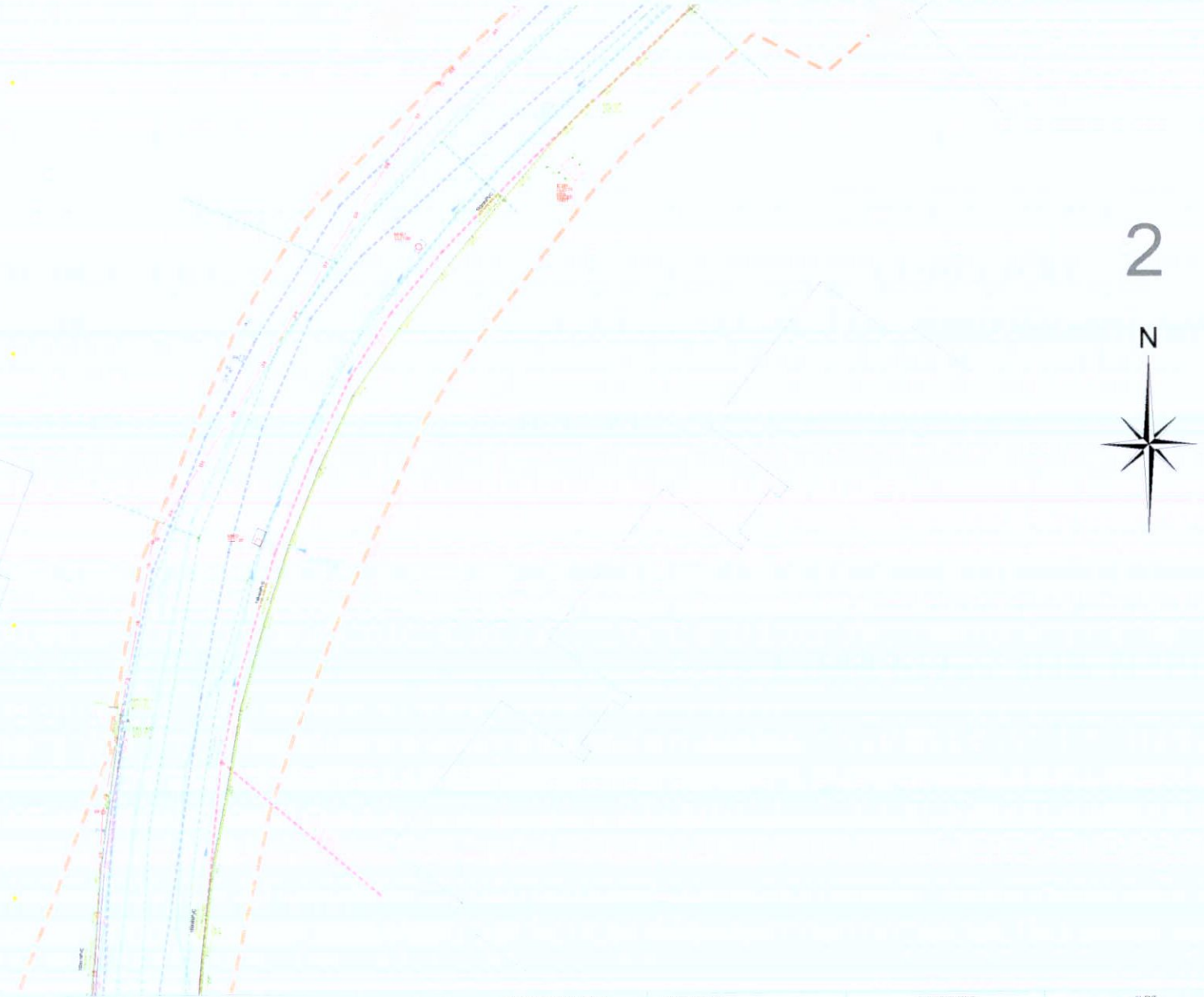
REVISIONS

No	Date	Description
001	24/03/20	Original Drawing
002	05/11/20	Additional Information Added

PROJECT

Sandford Park, Miltown

SCALE	1/200 A1	DATE	04/03/2020
DRG No	4234	DESCRIPTION	2D Utilities
		SURVEYED BY	Apex Surveys
SHEET	1 of 10	[illegible] BY	Alan Brady



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PAS 128: 2014 (Quality r

Level Outputs):

DESKTOP UTILITY RECORDS SEARCH

QL-D — Drafted from utility recs.

SITE RECONNAISSANCE

QL-C — Location Demonstrated by visual reference to street furniture or evidence of previous streetworks, or reinstatement scars

DETECTION

QL-B4 — A segment of utility suspected to exist but has not been detected by a geophysical technique

QL-B3 — Horizontal location only of the utility detected by one of the geophysical techniques used

QL-B2 — Horizontal and vertical location of the utility detected by one of the geophysical techniques used

QL-B1 — Horizontal and vertical location of the utility detected by multiple geophysical techniques

VERIFICATION

QL-A — Horizontal and vertical location of the top and/or bottom of the utility

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Ground Conditions: The depth penetration and quality of the data depends on the ground conditions of the site. GPR Surveying works best within high resistivity material. Clay overburden can impair GPR Surveying. Poor data may be a result of areas with high conductivity.

Utility Congestion: Where different utilities converge together into a service corridor or cross paths it becomes difficult to isolate a specific utility and to map its route. The reflected signal will display a single response to multiple utilities. Therefore multiple utilities may appear to be a single utility. Where similar services run on close proximity, separation may be impossible.

Signal Jumping: Signal from surrounding services may 'jump' to a highly conductive line masking its true identity.

Shadowing: Lost deeper utilities by 'shallower objects'. Shallow utilities will mask the existence of deeper utilities where they are in close proximity. Also, high reflective materials close to the surface, i.e. rebar may hide deeper anomalies.

Surface Obstructions: The GPR system relies on a relatively flat and even surface on which to perform radar passes. If ground obstructions such as vehicles, organic material (long grass, scrub) or undulating ground surface are present then the acquired data will be of lower resolution and in some cases not viable.

Loss of signal: It is not always possible to trace the entire length of each underground service.

Connections between manholes: Connections between manhole chambers are assumed to be straight.

Non-metallic objects: Nonmetallic objects are amongst the most difficult to trace therefore successful tracing of non-metallic buried utilities may be limited.

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MARKER POST
SIGN POST
TRAFFIC LIGHT
TELEPHONE BOX
POST
POST BOX
ROADSIGN
BORE HOLE
TRIAL PIT

SERVICES

AIR VALVE
ARMSTRONG JUNCTION
CABLE TV IC
COVER LEVEL
EIRCOM COVER
EIRCOM JUNCTION BOX
ELECTRICAL CABLE PIT
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FIRE HYDRANT
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STOP COCK
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BOTTOM OF CHAMBER
CAST IRON
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DIAMETER

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NOT FURTHER TRACE
OFF SITE

START OF RUN
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SHEET LAYOUT

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GRID SYSTEM: Irish Transverse Mercator
DATUM: Malin Head (OSGM15)
NOTES: Drawing Contains Scale Factor

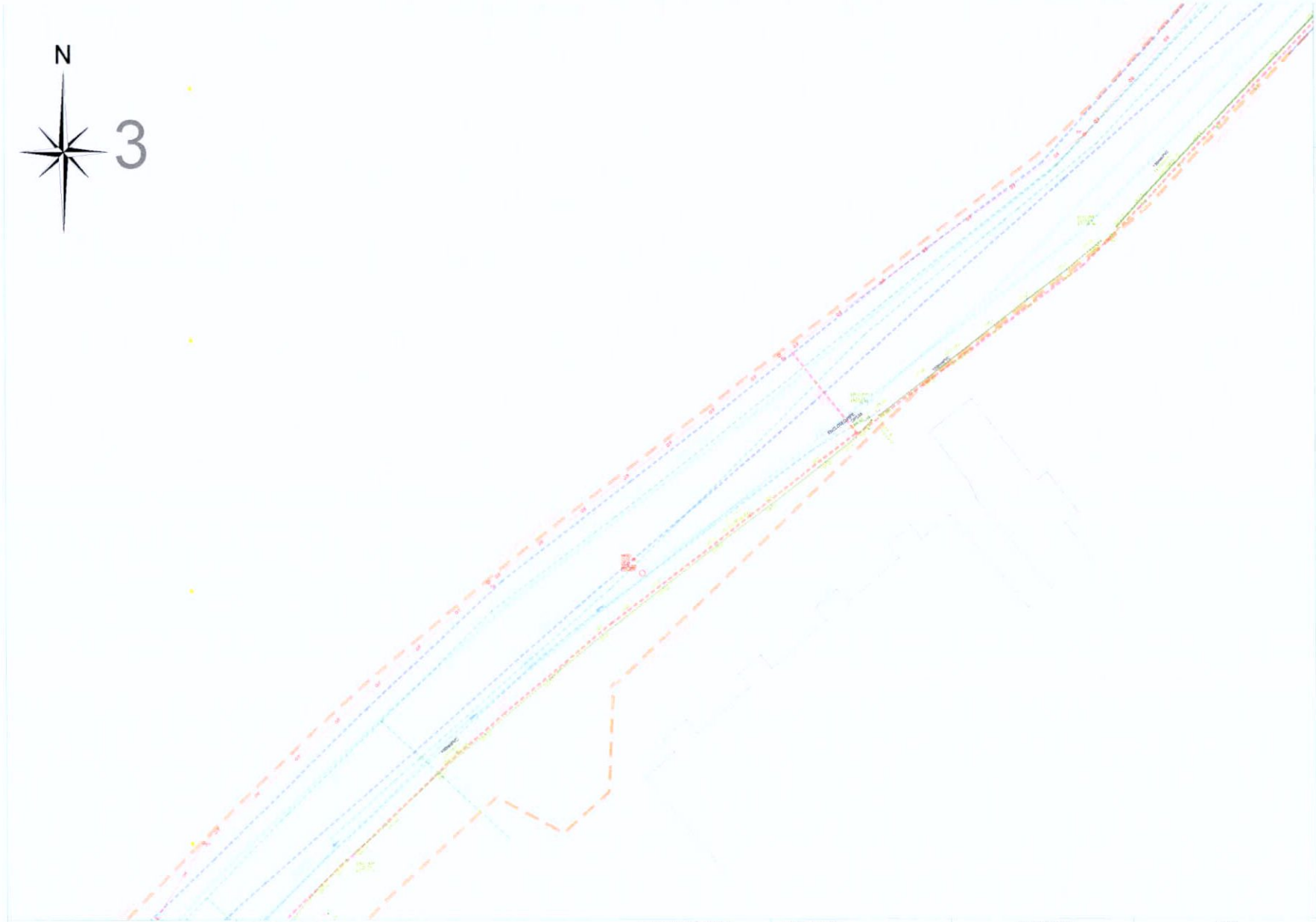
REVISIONS

No	Date	Description
301	04/03/20	Original Drawing
302	26/11/20	Additional Information Added

PROJECT

Sandford Park, Miltown

SCALE	1/200 A1
DRG No	4234
SHEET	2 of 10
DATE	04/03/2020
DESCRIPTION	2D Utilities
SURVEYED BY	Mario Gaspar
PROCESSED BY	Apex Surveys
CHECKED BY	Alan Brady



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EARTHING ROD
LAMP POST
MARKER POST
IRON POST
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POST
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BORE HOLE
TRIAL PIT

BOTTOM OF CHAMBER BOC
CAST-IRON CI
CONCRETE CONC
DIAMETER DIA

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AIR VALVE
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CABLE TV PC
COVER LEVEL
EIRCOM COVER
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WATER LEVEL
SURVEY CONTROL STATION

START OF RUN SOR
UNABLE UNA
UNADOPTED UNAD

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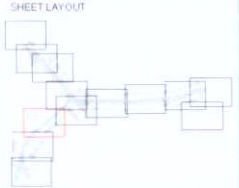
SHEET LAYOUT



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D.B.F.L.

ORD. SYSTEM	Irish Transverse Mercator
DATUM	Mean Head (OSMHT)
NOTES	Drawing Contains Scale Factor

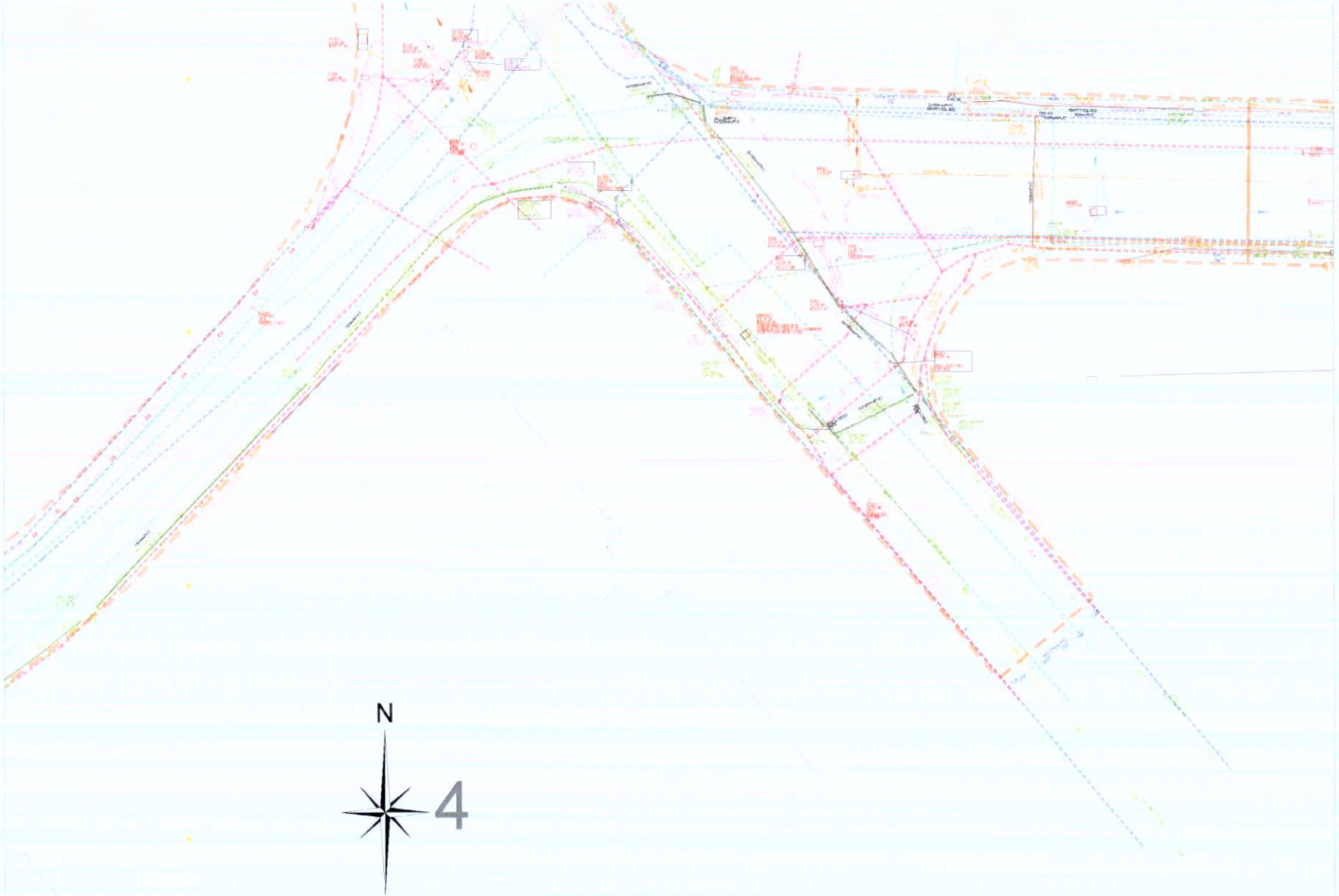
REVISIONS

No	Date	Description
301	14/03/20	Original Drawing
302	26/11/20	Additional Information Added

PROJECT

Sandford Park, Miltown

SCALE	1/200 A1
DRG No	4234
SHEET	3 of 10
DATE	04/03/2020
DESCRIPTION	2D Utilities
SURVEYED BY	Mario Gaspar
DESIGNED BY	Apex Surveys
QA BY	Alan Brady



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POST
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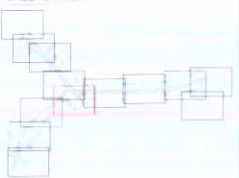

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D.B.F.L.

GRID SYSTEM Irish Transverse Mercator
DATUM Malin Head (OSGM15)
NOTES Drawing Contains Scale Factor

REVISIONS

No.	Date	Description
301	04/03/20	Original Drawing
302	05/11/20	Additional Information Added

PROJECT

Sandford Park, Miltown

SCALE	1/200 A1	DATE	04/03/2020
DRG No.	4234	DESCRIPTION	2D Utilities
		SURVEYED BY	Marc Darcy
SHEET	4 of 10	PROCESSED BY	Apex Surveys
		CHECKED BY	Alan Brady

PAS 128: 2014 (Quality of Survey Level Outputs):

DESKTOP UTILITY RECORDS SEARCH

QL-D: Drafted from utility records

SITE RECONNAISSANCE

QL-C: Location Delineated by visual reference to street furniture or evidence of previous streetworks, ie - reinstatement scars

DETECTION

QL-B4: A segment of utility suspected to exist but has not been detected by a geophysical technique

QL-B3: Horizontal location only of the utility detected by one of the geophysical techniques used

QL-B2: Horizontal and vertical location of the utility detected by one of the geophysical techniques used

QL-B1: Horizontal and vertical location of the utility detected by multiple geophysical techniques

VERIFICATION

QL-A: Horizontal and vertical location of the top and/or bottom of the utility

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The Survey aims to map existing utilities and sub-surface structures and provide information with respect to pipe size, material type and drainage connectivity. However utility surveying is limited by the following guidelines and it may not be possible to accurately survey, define and locate all services and sub-surface features.

Please note that not all buried pipes, cables and ducts can be detected and mapped in consideration of their depth, location, material type, geology and proximity to other utilities. Even an appropriate and professionally executed survey may not be able to achieve 100% detection rate.

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Ground Conditions: The depth penetration and quality of the data depends on the ground conditions of the site. GPR Surveying works best within high resistivity material. Clay or embankm can impact GPR Surveying. Poor data may be a result of areas with high conductivity.

Utility Congestion: Where different utilities converge together into a service corridor or cross paths it becomes difficult to isolate a specific utility and to map its route. The reflected signal will display a single response to multiple utilities. Therefore multiple utilities may appear to be a single utility. Where similar services run on close proximity, separation may be impossible.

Signal Jumping: Signal from surrounding services may 'jump' to a highly conductive line masking its true identity.

Shadowing: Of deeper utilities by shallower objects. Shallow utilities will mask the existence of deeper utilities where they are in close proximity. Also, high reflective materials close to the surface - ie rebar may hide deeper anomalies.

Surface Obstructions: The GPR system relies on a relatively flat and even surface on which to perform radar passes. If ground obstructions such as vehicles, organic material (long grass, scrub) or undulating ground surface are present then the acquired data will be of lower resolution and in some cases not viable.

Loss of signal: It is not always possible to trace the entire length of each underground service.

Connections between manholes: Connections between manhole chambers are assumed to be straight.

Non-metallic objects: Nonmetallic objects are amongst the most difficult to trace therefore successful tracing of non-metallic pipes/ utilities may be limited.

Fiber Optic Cables: Fiber optic cables may not be possible to locate except where laid with a built in trace wire or similar conductor system.

Defective / flooded manholes or pipework: It may not be possible to establish connections between flooded or defective manholes or pipework.

Acute bends in pipework: It may not be possible to trace a pipe past an acute bend.

Accuracy estimates:

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Plan accuracies of + or - 150mm may be achieved but this figure will depend on the depth of service below ground level. However variations within the subsurface, depth below the ground, close proximity of other services and local magnetic, atmospheric or ground conditions, bends, lateral service connections and any of the other limitations listed in this disclaimer may alter this estimated accuracy.

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Internal building services.

Small diameter cables less than 20mm diameter or pipes less than 40mm diameter.

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TELEPHONE POLE
EARTHING ROD
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MAST/SIGN POST
SIGN POST
TRAFFIC LIGHT
TELEPHONE BOX
POST
POST BOX
ROADSIGN
BORE HOLE
TRIAL PIT

BOTTOM OF CHAMBER BOC
CAST IRON CI
CONCRETE CONC
DIAMETER DIA

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AIR VALVE
ARMSTRONG JUNCTION
CABLE TV IC
COVER LEVEL
EIRCOM COVER
EIRCOM JUNCTION BOX
ELECTRICAL CABLE PIT
ESAT COVER
ESB COVER
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FIRE HYDRANT
GAS VALVE
GULLY
INSPECTION COVER
MANHOLE
SEPTIC TANK
SLUICE VALVE

DOWNPIPE DP
EARTHENWARE EW
NO FURTHER TRACE NFT
OFFSITE O/S

STOPCOCK
SERVICE BOX (UNKNOWN)
TRAFFIC LOOP/EN
VENT
WATER METER

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FLOOR LEVEL
INVERT LEVEL
ROAD LEVEL
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SPOT LEVEL
TOP OF WALL LEVEL
WATER LEVEL
SURVEY CONTROL STATION

START OF P... SOR
UNABLE ...TO
UNABL... ...TY

UNDERGROUND LEGEND

WATER MAIN
GAS MAIN
STORM DRAIN
FOUL SEWER
COMBINED SEWER
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ELECTRIC LIGHTING
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FIBRE OPTIC CABLE
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TRAFFIC AND SIGNAL CABLE
CCTV
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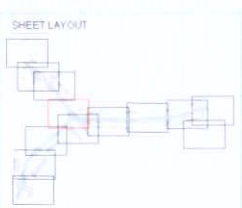
EMPTY DUCT
OPR ANOMALY
UNKNOWN CABLE
OHHEAD ELECTRICITY
OHHEAD TELECOM

SHEET LAYOUT



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CLIENT

D.B.F.L.

GRID SYSTEM	Irish Transverse Mercator
DATUM	Mean Height (OSGM15)
NOTES	Drawing Contains Scale Factor

REVISIONS

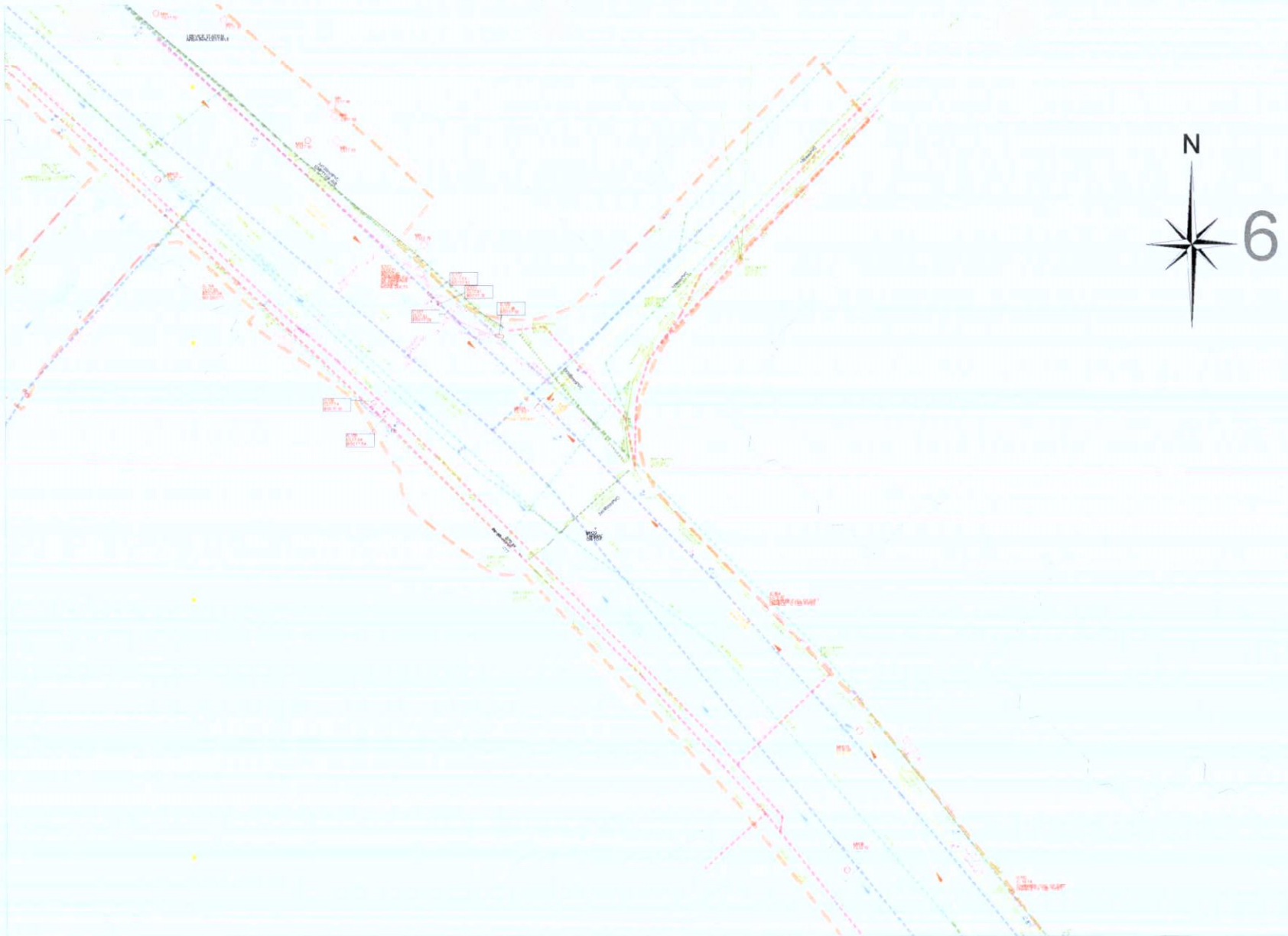
No.	Date	Description
201	04/03/20	Original Drawing
202	05/11/20	Additional Information Added

PROJECT

Sandford Park, Miltown

SCALE	1/200 A1
DATE	04/03/2020
DRG No	4234
SHEET	5 of 10

DESCRIPTION	2D Utilities
SURVEYED BY	Mario Gaspar
[illegible]ISSUED BY	Apex Surveys
BY	Alan Brady



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PAS 128: 2014 (Quality r Level Outputs):

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QL-D Drafted from utility reco..

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OHBAD ELECTRICITY
OHBAD TELECOM

SHEET LAYOUT

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CLIENT

D.B.F.L.

GRID SYSTEM	Irish Transverse Mercator
DATUM	Malin Head (OSGM15)
NOTES	Drawing Contains Scale Factor

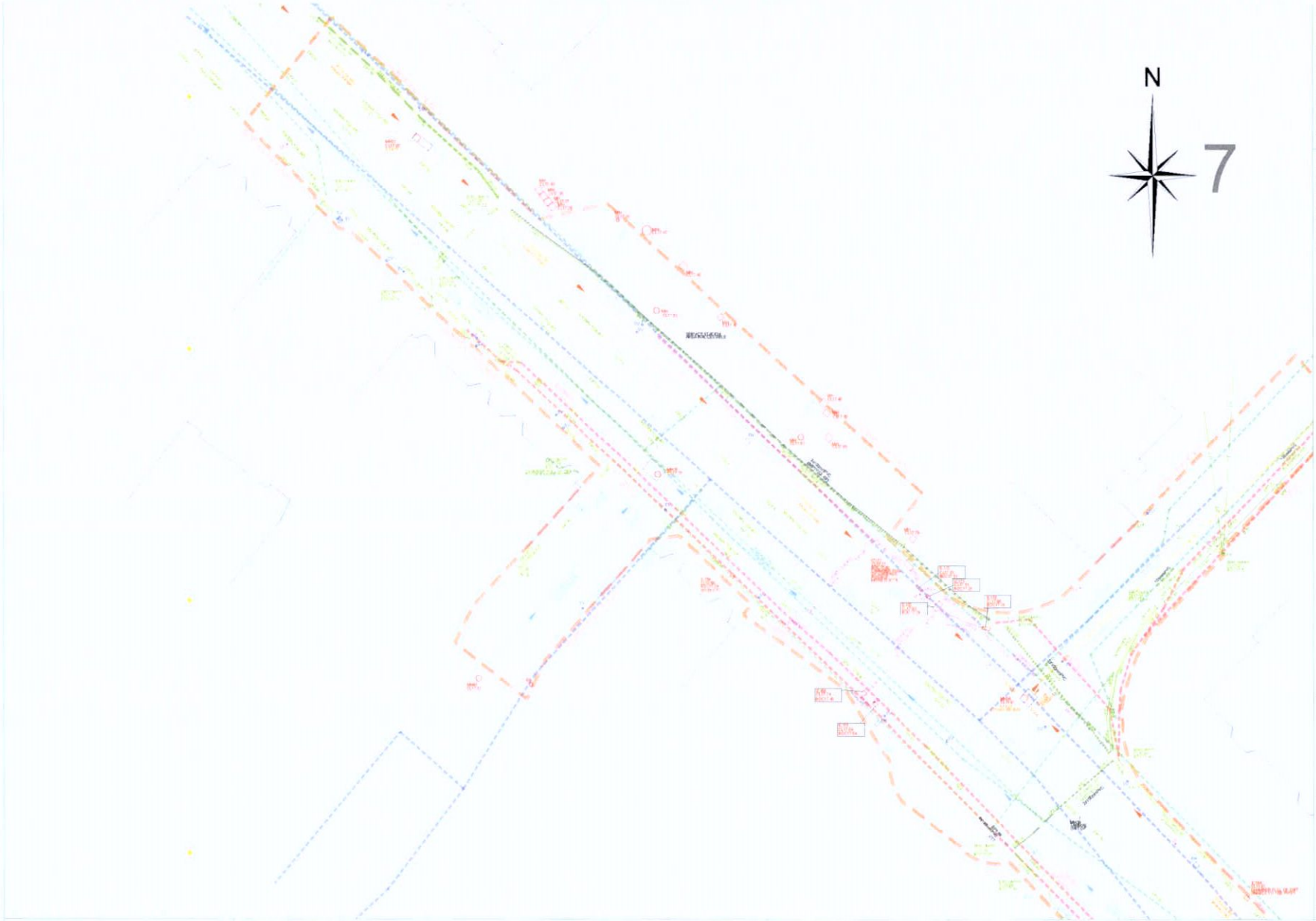
REVISIONS

No	Date	Description
301	04/03/20	Original Drawing
302	05/10/20	Additional Information Added

PROJECT

Sandford Park, Miltown

SCALE	1/200 A1	DATE	04/03/2020
DRG No	4234	DESCRIPTION	2D Utilities
		SURVEYED BY	Mario Gaspar
		PROCESSED BY	Apex Surveys
SHEET	6 of 10	CHECKED BY	Alan Brady



PAS 128: 2014 (Quality of Survey Level Outputs):

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SHEET LAYOUT

PLAN PRODUCED BY:
APEX SURVEYS

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CLIENT
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PROJECT
Sandford Park, Miltown

ORD SYSTEM Irish Transverse Mercator
DATUM Malin Head (OSGM15)
NOTES Drawing Contains Scale Factor

REVISIONS

No.	Date	Description
001	04/03/20	Original Drawing
002	06/11/20	Additional Information Added

SCALE 1/200 A1
DATE 04/03/2020
DRG No 4234
SHEET 7 of 10
DESCRIPTION 2D Utilities
SURVEYED BY Mario Gaspar
DRAWN BY Apex Surveys
BY Alan Brady

PAS 128: 2014 (Quality r

Level Outputs):

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Shadowing: Of deeper utilities by shallower objects. Shadow utilities will mask the existence of deeper utilities where they are in close proximity. Also, high reflective materials close to the surface e.g. rebar may hide deeper anomalies.

Surface Obstructions: The GPR system relies on a relatively flat and even surface on which to perform radar passes. If ground obstructions such as vehicles, organic material (long grass, scrub) or undulating ground surface are present then the acquired data will be of lower resolution and in some cases not viable.

Loss of signal: It is not always possible to trace the entire length of each underground service.

Connections between manholes: Connections between manhole chambers are assumed to be straight.

Non-metallic objects: Nonmetallic objects are amongst the most difficult to trace therefore successful tracing of non-metallic piped utilities may be limited.

Fiber Optic Cables: Fiber optic cables may not be possible to locate except where clad with a built in tracer wire or similar conductor system.

Defective / flooded manholes or pipework: It may not be possible to establish connections between flooded or defective manholes or pipework.

Acute bends in pipework: It may not be possible to trace a pipe past an acute bend.

Accuracy estimates:

Locational accuracy is determined by referring to the manufacturers guidelines for the detector used.

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Internal building services.

Small diameter cables less than 20mm diameter or pipes less than 40mm diameter.

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8

APEX SURVEYS

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STREET FURNITURE

BOLLARDS
BUS STOP
CRASH BARRIER
DATE
ELECTRICITY POLE — EP
TELEPHONE POLE
EARTHING ROD
LAMP POST
MARKER POST
SIGN POST
TRAFFIC LIGHT
TELEPHONE BOX
POST
POST BOX
ROADSIGN
BORE HOLE
TRIAL PIT

BOTTOM OF CHAMBER — BOC
CAST IRON — CI
CONCRETE — CONC
DIAMETER — DIA

SERVICES

AIR VALVE — AV
ARMSTRONG JUNCTION — AJ
CABLE TV IC — CTV
COVER LEVEL — CL
EIRCOM COVER — EIR
EIRCOM JUNCTION BOX — EJB
ELECTRICAL CABLE PIT — ECP
ESAT COVER — ESAT
ESB COVER — ESB
ESB JUNCTION BOX — ESB EJB
FIRE HYDRANT — FH
GAS VALVE — GV
GULLY — G
INSPECTION COVER — IC
MANHOLE — MH
SEPTIC TANK — ST
SLUICE VALVE — SV

DOWNPIPE — DP
EARTHENWARE — EW
NO FURTHER TRACE — NFT
OFFSITE — OS

STOPCOCK — SC
SERVICE BOX / UNKNOWN — SB
TRAFFIC COVER — TC
VENT — VENT
WATER METER — WM

LEVELS

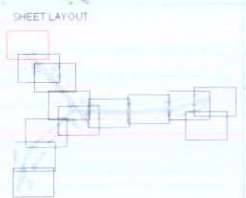
BED LEVEL — BL
FLOOR LEVEL — FL 101.50
INVERT LEVEL — IL
ROAD LEVEL — RL
SOFFIT LEVEL — SOF
SPOT LEVEL — 100.00
TOP OF WALL LEVEL — TOW
WATER LEVEL — WL
SURVEY CONTROL STATION

START OF RUN — SOR
UNABLE TO OPEN — UTO
UNABLE TO TRACE — UTT

UNDERGROUND LEGEND

WATER MAIN — WATER
GAS MAIN — GAS
STORM DRAIN — STORM
FOUL SEWER — FOUL
COMBINED SEWER — COMB
ELECTRIC CABLE — ELEC
ELECTRIC (OHMEG) — ELEC
E-MCOM — E-MCOM
FIBRE OPTIC CABLE — FIBRE
BROADBAND — BB
CABLE TV — CTV
TRAFFIC AND SIGNAL CABLE — TRAFFIC
CCTV — CCTV
IRRIGATION PIPE — IRRIG
EMPTY DUCT — EMPTY
OFR ANONMALY — OFR
UNKNOWN CABLE — UNK
OHMEAD ELECTRICITY — OHE
OHMEAD TELECOM — OHT

SHEET LAYOUT



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CLIENT

D.B.F.L.

GRID SYSTEM	Irish Transverse Mercator
DATUM	Malin Head (OSGM15)
NOTES	Drawing Contains Scale Factor

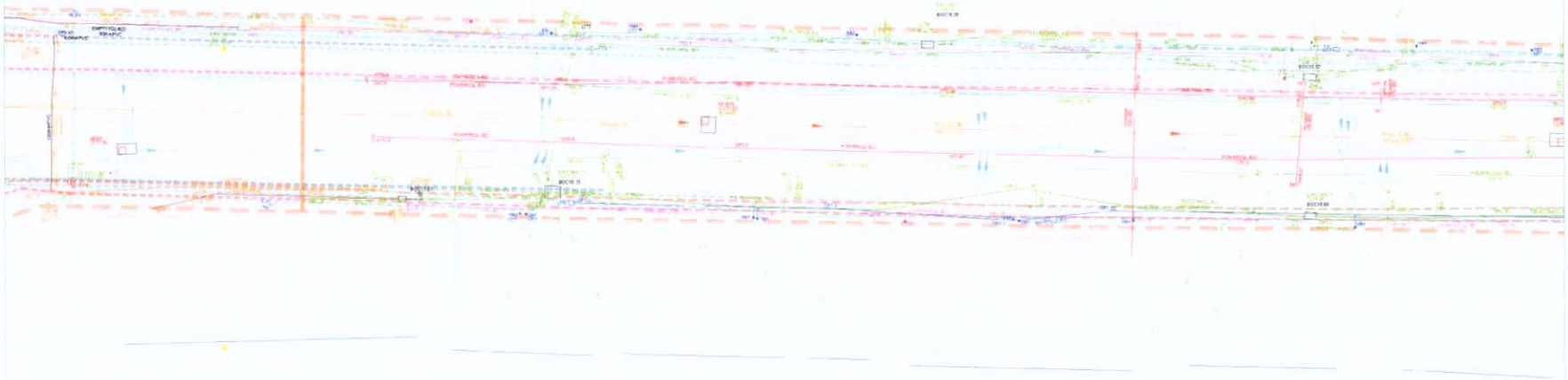
REVISIONS

No	Date	Description
301	24/03/20	Original Drawing
302	26/11/20	Additional Information Added

PROJECT

Sandford Park, Miltown

SCALE	1/200 A1	DATE	04/03/2020
DRG No	4234	DESCRIPTION	2D Utilities
		SURVEYED BY	Mairtin Gannon
SHEET	8 of 10	PROCESSED BY	Apex Surveys
		CHECKED BY	Alan Brady



PAS 128: 2014 (Quality of Survey Level Outputs):

DESKTOP UTILITY RECORDS SEARCH
QL-D: Drafted from utility records

SITE RECONNAISSANCE
QL-C: Location Demonstrated by visual reference to street furniture or evidence of previous streetworks ie - reinstatement scars

DETECTION
QL-B4: A segment of utility suspected to exist but has not been detected by a geophysical technique
QL-B3: Horizontal location only of the utility detected by one of the geophysical techniques used
QL-B2: Horizontal and vertical location of the utility detected by one of the geophysical techniques used
QL-B1: Horizontal and vertical location of the utility detected by multiple geophysical techniques

VERIFICATION
QL-A: Horizontal and vertical location of the top and/or bottom of the utility

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Please note that not all buried pipes, cables and ducts can be detected and mapped in consideration of their depth, location, material type, geology and proximity to other utilities. Even an appropriate and professionally executed survey may not be able to achieve 100% detection rate.

Although all reasonable steps have been taken to locate all features, there is no guarantee that all utilities and underground structures will be located and shown on the drawing.

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Depth of Utility: The depth and size of a utility affect the signal response and the degree with which a utility can be located.

Due to attenuation of the radar signal with depth, resolution is restricted, hence making identification of utilities more difficult with increasing depth.

Size of Utility: The smaller the diameter of a utility the more difficult it is to locate. This difficulty increases with depth.

Ground Conditions: The depth penetration and quality of the data depends on the ground conditions of the site. GPR Surveying works best within high resistivity material. Clay or saturation can impair GPR Surveying. Poor data may be a result of areas with high conductivity.

Utility Congestion: Where different utilities converge together into a service corridor or cross paths it becomes difficult to isolate a specific utility and to map its route. The reflected signal will display a single response to multiple utilities. Therefore multiple utilities may appear to be a single utility. Where similar services run on close proximity, separation may be impossible.

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TELEPHONE POLE
EARTHING ROD
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POST BOX
ROADSIGN
BORE HOLE
TRIAL PIT

BOTTOM OF CHAMBER BOC
CAST-IRON CI
CONCRETE CONC
DIAMETER DIA

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ESB COVER
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START OF P SOS
UNABLE JTO
UNABL UTT

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TRAFFIC AND SIGNAL CABLE
CCTV
IRRIGATION PIPE
EMPTY DUCT
GPR ANOMALY
UNKNOWN CABLE
OHNEAD ELECTRICITY
OHNEAD TELECOM

SHEET LAYOUT

PLAN PRODUCED BY

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CLIENT

D.B.F.L.

PROJECT

Sandford Park, Miltown

GPO SYSTEM: Irish Transverse Mercator
DATUM: Mean Head (OSNMTF)
NOTES: Drawing Contains Scale Factor

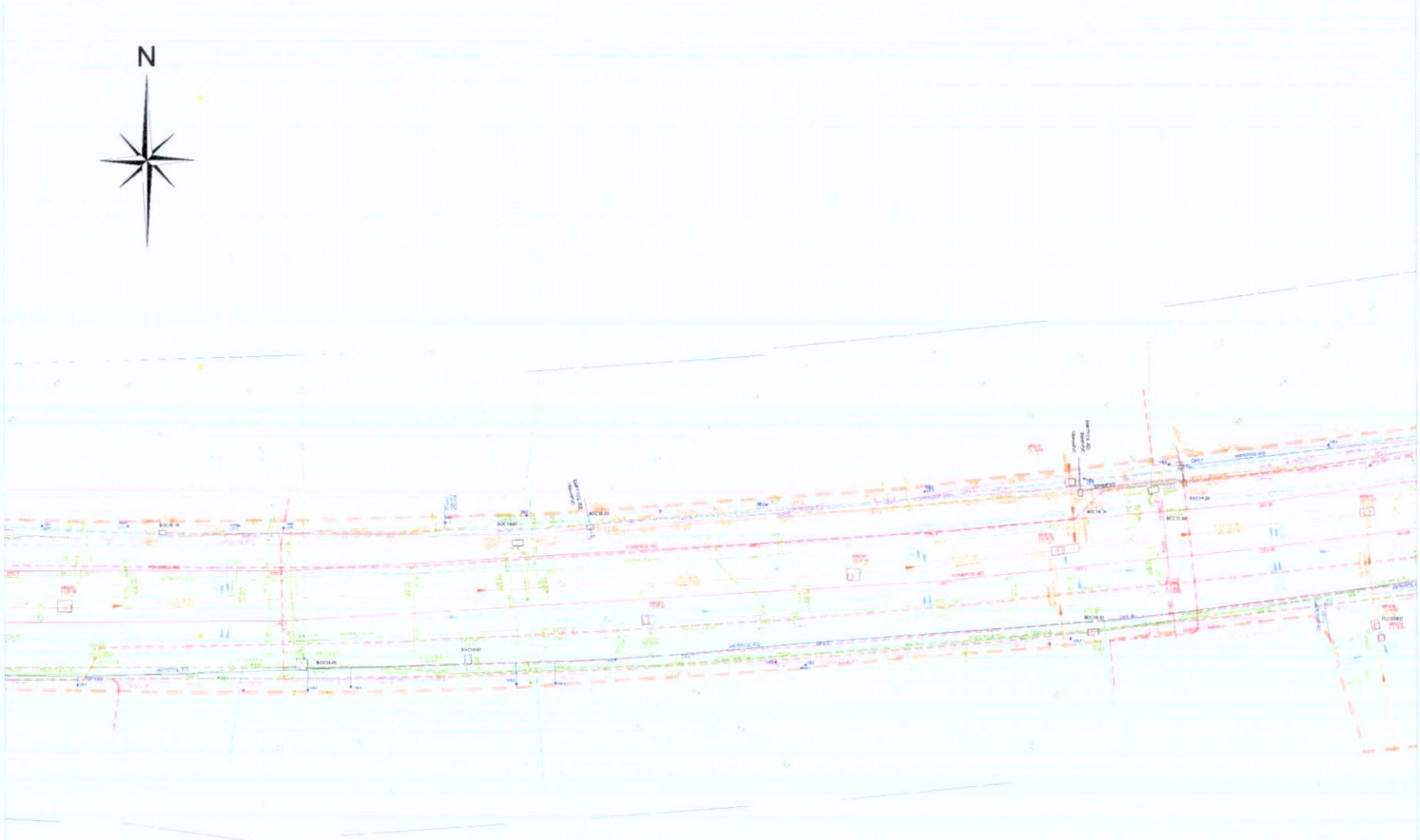
REVISIONS

No	Date	Description
301	04/03/20	Original Drawing
302	30/19/20	Additional Information Added

SCALE 1/200 A1
DRG No 4234
SHEET 9 of 10

DATE 04/03/2020

DESCRIPTION	2D Utilities
SURVEYED BY	Mario Gaspar
PROCESSED BY	Apex Surveys
BY	Alan Brady



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PAS 128: 2014 (Quality c Level Outputs):

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QL-D Drafted from utility records.

SITE RECONNAISSANCE
QL-C Location Demonstrated by visual reference to street furniture or evidence of previous streetworks ie - reinstatement scars

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QL-B4 A segment of utility suspected to exist but has not been detected by a geophysical technique
QL-B3 Horizontal location only of the utility detected by one of the geophysical techniques used
QL-B2 Horizontal and vertical location of the utility detected by one of the geophysical techniques used
QL-B1 Horizontal and vertical location of the utility detected by multiple geophysical techniques

VERIFICATION
QL-A Horizontal and vertical location of the top and/or bottom of the utility

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MANHOLE
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SURVEY CONTROL STATION

START OF RUN	SOR
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UNDERGROUND LEGEND

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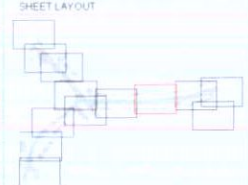

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GRID SYSTEM	Irish Transverse Mercator
DATUM	Malin Head (OSGM15)
NOTES	Drawing Contains Scale Factor

REVISIONS

No	Date	Description
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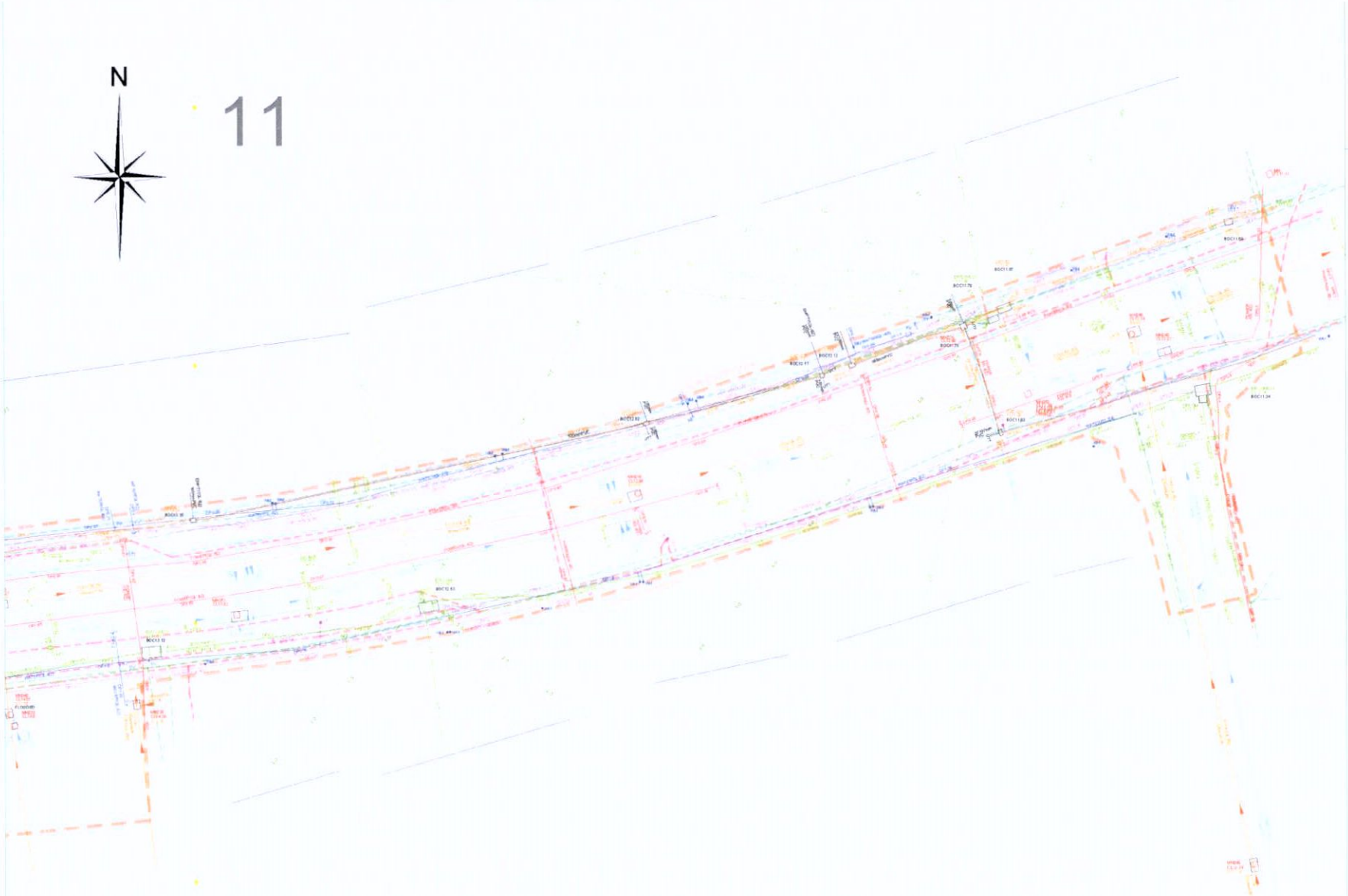
PROJECT

Sandford Park, Miltown

SCALE	1/200 A1
DRG No	4234
SHEET	10 of 10
DATE	04/03/2020
DESCRIPTION	2D Utilities
SURVEYED BY	Mario Cooper
PROCESSED BY	Apex Surveys
CHECKED BY	Alan Brady



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Acute bends in pipework: It may not be possible to trace a pipe past an acute bend.

Accuracy estimates:

Locational accuracy is determined by referring to the manufacturers guidelines for the detector used.

In ideal conditions the spatial accuracies for the underground utilities may be +/- 5% for Radiodetection and +/- 10% of depth for the GPR to 2.5m deep. However variations within the subsurface, depth below the ground, close proximity of other services and local magnetic, atmospheric or ground conditions, bends, lateral service connections and any of the other limitations listed in this disclaimer may alter this estimated accuracy.

Plan accuracies of + or - 150mm may be achieved but this figure will depend on the depth of service below ground level. However variations within the subsurface, depth below the ground, close proximity of other services and local magnetic, atmospheric or ground conditions, bends, lateral service connections and any of the other limitations listed in this disclaimer may alter this estimated accuracy.

GP represents distance from the surface level to the top of the service/ target.

Where technically possible, depth indications will be given. These along with plan positions should be used for guidance only and whenever critical accuracy is required these should be confirmed by the client by undertaking trial excavations or similar.

Record Drawing Information:

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Above ground services unless specifically requested.

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APEX SURVEYS

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00353 1 691 01F

STREET FURNITURE

BOLLARDS
BUS STOP
CRASH BARRIER
GATE
ELECTRICITY POLE
TELEPHONE POLE
EARTHING ROD
LAMP POST
MARKER POST
SIGN POST
TRAFFIC LIGHT
TELEPHONE BOX
POST
POST BOX
POSTBOX
BORE HOLE
TRIAL PIT

BOTTOM OF CHAMBER — BOC
CAST-IRON — CA
CONCRETE — CONC
DIAMETER — DIA

SERVICES

AIR VALVE
ARMSTRONG JUNCTION
CABLE TV JC
COVER LEVEL
EIRCOM COVER
EIRCOM JUNCTION BOX
ELECTRICAL CABLE PIT
ESAT COVER
ESB COVER
ESB JUNCTION BOX
FIRE HYDRANT
GAS VALVE
GULLY
INSPECTION COVER
MANHOLE
SEPTIC TANK
SLUICE VALVE

DOWNPIPE — DP
EARTHENWARE — EAW
NO FURTHER TRACE — NFT
OFFSITE — O/S

STOPCOCK
SERVICE BOX (UNKNOWN)
TRAFFIC COVER
VENT
WATER METER

LEVELS

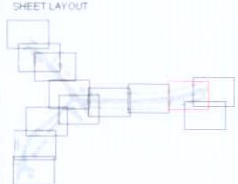
BED LEVEL
FLOOR LEVEL
INVERT LEVEL
ROAD LEVEL
SOFFIT LEVEL
SPOT LEVEL
TOP OF WALL LEVEL
WATER LEVEL
SURVEY CONTROL STATION

START OF P — SOR
UNABLE — UTO
UNABLE — U11

UNDERGROUND LEGEND:

WATER MAIN
GAS MAIN
STORM DRAIN
FOUL SEWER
COMBINED SEWER
ELECTRIC CABLE
ELECTRIC (OVERHD)
EIRCOM
FIBRE OPTIC CABLE
BROADBAND
CABLE TV
TRAFFIC AND SIGNAL CABLE
CCTV
IRRIGATION PIPE
EMPTY DUCT
OFR ANOMALY
UNKNOWN CABLE
OHBAD ELECTRICITY
OHBAD TELECOM

SHEET LAYOUT



PLAN PRODUCED BY:

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info@apexsurveys.ie
00353 1 691

CLIENT:

D.B.F.L.

GRID SYSTEM: Irish Transverse Mercator
DATUM: Malin Head (OSNI 1915)
NOTES: Drawing Contains Scale Factor

REVISIONS:

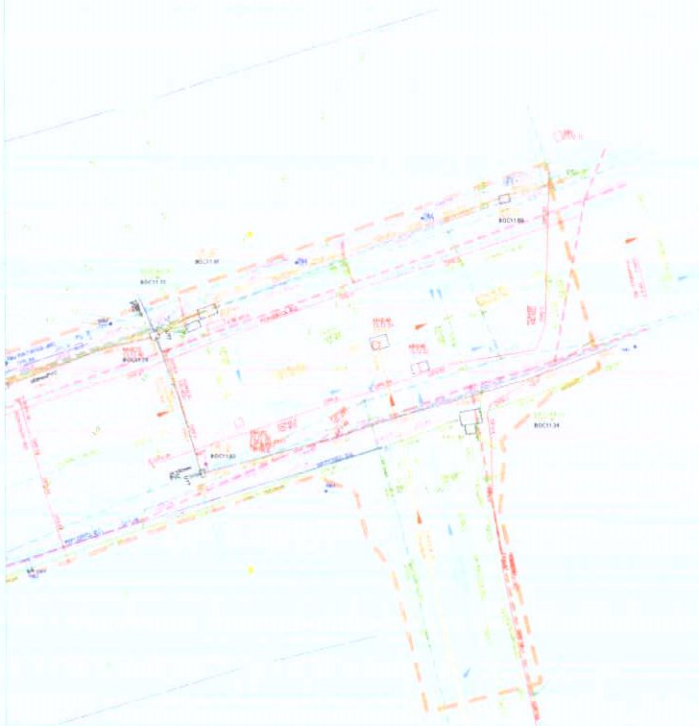
No.	Date	Description
201	04/03/20	Original Drawing
202	06/11/20	Additional Information Added

PROJECT:

Sandford Park, Miltown

SCALE: 1/200 A1
DRG No: 4234
SHEET: 11 of 16

DATE: 04/03/2020
DESCRIPTION: 2D Utilities
SURVEYED BY: Mario Gaspar
PROCESSED BY: Apex Surveys
BY: Alan Brady



N

PLAN NO: LRD6026/233
RECEIVED: 13/06/2023

12

PAS 128: 2014 (Quality / Level Outputs):

DESKTOP UTILITY RECORDS SEARC...
QL-D Drafted from utility reco...

SITE RECONNAISSANCE
QL-C Location demonstrated by visual reference to street furniture or evidence of previous streetworks ie : reinstatement scars

DETECTION
QL-B4 A segment of utility suspected to exist but has not been detected by a geophysical technique
QL-B3 Horizontal location only of the utility detected by one of the geophysical techniques used
QL-B2 Horizontal and vertical location of the utility detected by one of the geophysical techniques used
QL-B1 Horizontal and vertical location of the utility detected by multiple geophysical techniques

VERIFICATION
QL-A Horizontal and vertical location of the top and/or bottom of the utility

Apex Surveys Ltd. Disclaimer - Utility Survey

The Survey aims to map existing utilities and sub-surface structures and provide information with respect to pipe size, material type and drainage connectivity. However utility surveying is limited by the following guidelines and it may not be possible to accurately survey, define and locate all services and sub-surface features.

Please note that not all buried pipes, cables and ducts can be detected and mapped in consideration of their depth, location, material type, geology and proximity to other utilities. Even an appropriate and professionally executed survey may not be able to achieve 100% detection rate.

Although all reasonable steps have been taken to locate all features, there is no guarantee that all utilities and underground structures will be located and shown on the drawing.

The following is a non-exhaustive list of the limitations of utility surveys:

Depth of Utility: The depth and size of a utility affect the signal response and the degree with which a utility can be located.

Due to attenuation of the radar signal with depth, resolution is restricted, hence making identification of utilities more difficult with increasing depth.

Size of Utility: The smaller the diameter of a utility the more difficult it is to locate. This difficulty increases with depth.

Ground Conditions: The depth penetration and quality of the data depends on the ground conditions of the site. GPR Surveying works best within high resistivity material. Clay overburden can impair GPR Surveying. Poor data may be a result of areas with high conductivity.

Utility Congestion: Where different utilities converge together into a service corridor or cross paths it becomes difficult to isolate a specific utility and to map its route. The reflected signal will display a single response to multiple utilities. Therefore multiple utilities may appear to be a single utility. Where similar services run on close proximity, separation may be impossible.

Signal Jumping: Signal from surrounding services may 'jump' to a highly conductive line masking its true identity.

Shadowing: Of deeper utilities by shallower objects. Shallow utilities will mask the existence of deeper utilities where there are in close proximity. Also, high reflective materials close to the surface i.e. rebar may hide deeper anomalies.

Surface Obstructions: The GPR system relies on a relatively flat and even surface on which to perform radar passes. If ground obstructions such as vehicles, organic material (long grass, scrub) or undulating ground surface are present then the acquired data will be of lower resolution and in some cases not viable.

Loss of signal: It is not always possible to trace the entire length of each underground service.

Connections between manholes: Connections between manhole chambers are assumed to be straight.

Non-metallic objects: Nonmetallic objects are amongst the most difficult to trace therefore successful tracing of non-metallic pipes/ utilities may be limited.

Fiber Optic Cables: Fiber optic cables may not be possible to locate except where laid with a built in trace wire or similar conductor system.

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APEX SURVEYS

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00353 1 691 0156

STREET FURNITURE

BOLLARDS	
BUS STOP	
CRASH BARRIER	
GATE	
ELECTRICITY POLE	EP#
TELEPHONE POLE	
EARTHING ROD	
LAMP POST	
MARKER POST	
SIGN POST	
TRAFFIC LIGHT	
TELEPHONE BOX	
POST	
POST BOX	
ROADSIGN	
BORE HOLE	
TRIAL PIT	

BOTTOM OF CHAMBER	BOC	DOWNPIPE	DP
CAST IRON	CI	EARTHENWARE	EW
CONCRETE	CONC	NO FURTHER TRACE	NFT
DIAMETER	DIA	OFF SITE	O/S

SERVICES

AIR VALVE	AV
ANNEALTHING JUNCTION	AJ
CABLE TV IC	
COVER LEVEL	CL
ESB/CMI COVER	ESB/CMI
ESB/CMI JUNCTION BOX	
ELECTRICAL CABLE PIT	ECP
ESAT COVER	
ESB COVER	
ESB JUNCTION BOX	
FIRE HYDRANT	FH
GAS VALVE	
GULLY	
INSPECTION COVER	IC
MANHOLE	MH
SEPTIC TANK	
SLUICE VALVE	SV

STOPCOCK	
SERVICE BOX (UNKNOWN)	
TRAFFIC COVER	
VENT	VENT
WATER METER	WM

LEVELS

BED LEVEL	
FLOOR LEVEL	eFLOOR
INVERT LEVEL	
ROAD LEVEL	
SOFFIT LEVEL	
SPOT LEVEL	
TOP OF WALL LEVEL	
WATER LEVEL	
SURVEY CONTROL STATION	

START OF RUN	SOR
UNABLE TO OPEN	UTO
UNABLE TO TRACE	UTT

UNDERGROUND LEGEND

WATER MAIN	
GAS MAIN	
STORM DRAIN	
FOUL SEWER	
COMBINED SEWER	
ELECTRIC CABLE	
ELECTRIC LIGHTING	
ERCOM	
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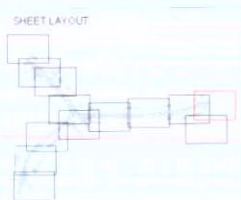
BROADBAND	
CABLE TV	
TRAFFIC AND SIGNAL CABLE	
CCTV	
IRRIGATION PIPE	
EMPTY DUCT	EMPTY
OPR ANOMALY	
UNKNOWN CABLE	
OHNAD ELECTRICITY	
OHNAD TELECOM	

SHEET LAYOUT



PLAN PRODUCED BY:

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00353 1 691 0156

CLIENT:

D.B.F.L.

GRID SYSTEM	Irish Transverse Mercator
DATUM	Malin Head (OSGM15)
NOTES	Drawing Contains Scale Factor

REVISIONS

No	Date	Description
301	3/03/2020	Original Drawing
302	26/11/20	Additional Information Added

PROJECT:

Sandford Park, Miltown

SCALE	1/200 A1	DATE	04/03/2020
DRG No	4234	DESCRIPTION	3D Utilities
		SURVEYED BY	Mario Gaspar
SHEET	12 of 10	PROCESSED BY	Apex Surveys
		CHECKED BY	Alan Brady

13

N

PAS 128: 2014 (Quality of Survey Level Outputs):

DESKTOP UTILITY RECORDS SEARCH

QL-D — Drafted from utility records

SITE RECONNAISSANCE

QL-C — Location Demonstrated by visual reference to street furniture or evidence of previous streetworks, ie - reinstatement scars

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VERIFICATION

QL-A — Horizontal and vertical location of the top and/or bottom of the utility

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TELEPHONE POLE
EARTHING ROD
LAMP POST
MARKER POST
SIGN POST
TRAFFIC LIGHT
TELEPHONE BOX
POST
POST BOX
ROADSIGN
BORE HOLE
TRIAL PIT

BOTTOM OF CHAMBER — BOC
CAST IRON — CI
CONCRETE — CONC
DIAMETER — DIA

SERVICES

AIR VALVE
ARMSTRONG JUNCTION
CABLE TV
COVER LEVEL
EIRCOM COVER
EIRCOM JUNCTION BOX
ELECTRICAL CABLE PIT
ESAT COVER
ESB COVER
ESB JUNCTION BOX
FIRE HYDRANT
GAS VALVE
GULLY
INSPECTION COVER
MANHOLE
SEPTIC TANK
SLUICE VALVE

D-DRAIN PIPE — DP
EARTHENWARE — EAR
NO FURTHER TRACE — NFT
OFFSITE — OS

STOPCOCK — ST
SERVICE BOX (UNKNOWN) — SB
TRAFFIC COVER — TC
VENT — VENT
WATER METER — WM

LEVELS

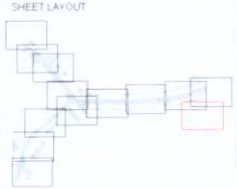
BED LEVEL
FLOOR LEVEL — +FLOR 50
INVERT LEVEL
ROAD LEVEL
SOFT LEVEL
SPOT LEVEL
TOP OF WALL LEVEL — +TOW 50
WATER LEVEL
SURVEY CONTROL STATION

START OF RUN — SOR
UNABLY — UTO
UNAD — UTT

UNDERGROUND LEGEND

WATER MAIN — WATER
GAS MAIN — GAS
STORM DRAIN — SD
FOUL SEWER — FS
COMBINED SEWER — CS
ELECTRIC CABLE — POWER
ELECTRIC LIGHTING — EL
EIRCOM — EIRCOM
FIBRE OPTIC CABLE — FIBRE OPTIC
BROADBAND — BROADBAND
CABLE TV — CABLE TV
TRAFFIC AND SIGNAL CABLE — TRAFFIC
CCTV — CCTV
IRRIGATION PIPE — IRRIGATION
EMPTY DUCT — EMPTY
OPR ANOMALY — OPR
UNKNOWN CABLE — UNKNOWN
OHNDAD ELECTRICITY — OHNDAD ELECTRICITY
OHNDAD TELECOM — OHNDAD TELECOM

SHEET LAYOUT



PLAN PRODUCED BY:

APEX SURVEYS

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CLIENT

D.B.F.L.

PROJECT

Sandford Park, Miltown

GRID SYSTEM	Irish Transverse Mercator
DATUM	Malin Head (OSGM15)
NOTES	Drawing Contains Scale Factor

REVISIONS

No.	Date	Description
001	04/03/26	Original Drawing
002	05/11/26	Additional Information Added

SCALE	1/200 A1
DRG No	4234
SHEET	13 of 16
DATE	04/03/2026
DESCRIPTION	2D Utilities
SURVEYED BY	Mario Gaspar
PROCESSED BY	Apex Surveys
CHK BY	Alan Brady

APPENDIX 16.3

CODE OF PRACTICE FOR AVOIDING DANGER FROM UNDERGROUND SERVICES

HEALTH AND SAFETY AUTHORITY

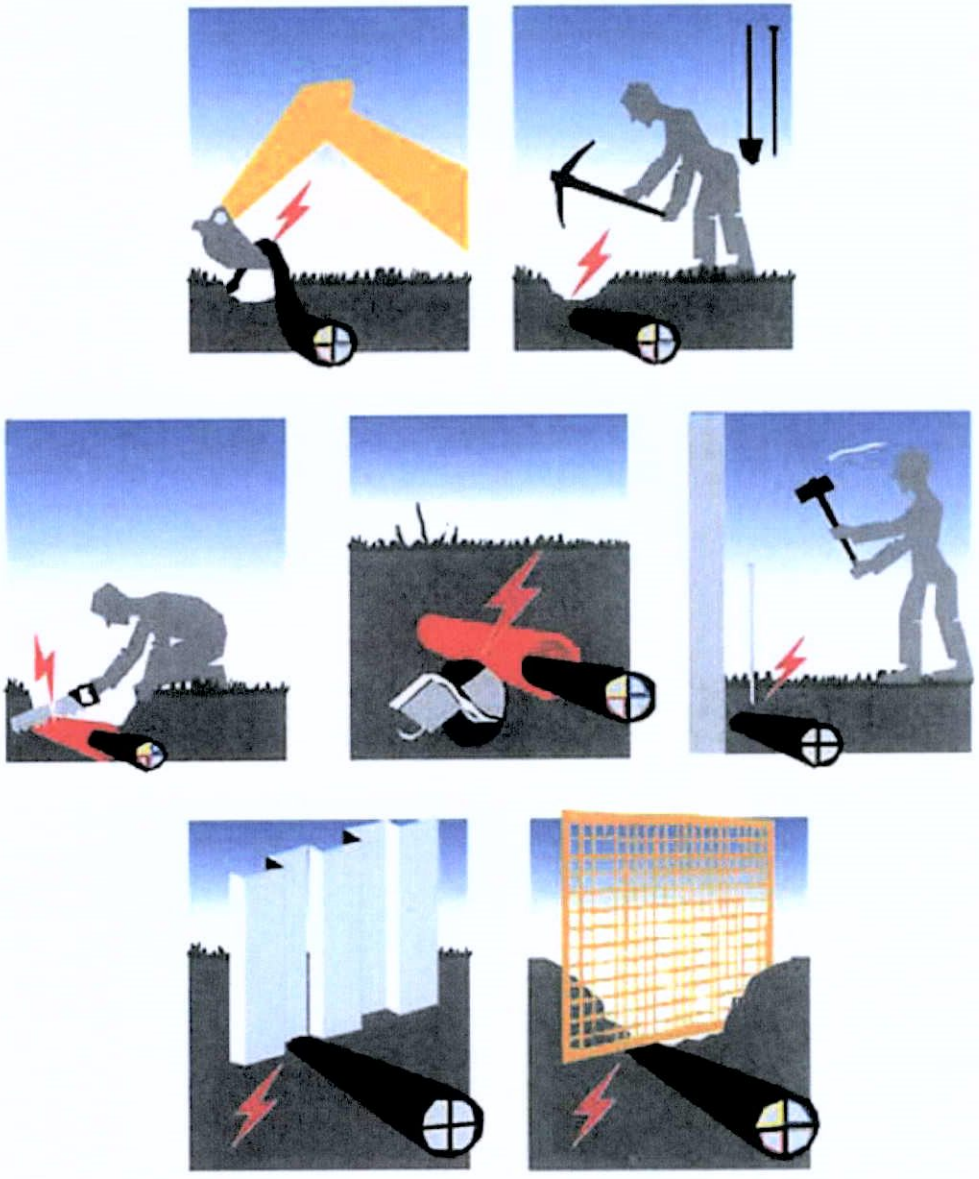
Code of Practice For Avoiding Danger From Underground Services

Our vision:
Healthy, safe and
productive lives.

Table of Contents

Originally published in January 2010 by the Health and Safety Authority, updated in May 2016, The Metropolitan Building, James Joyce Street, Dublin 1.

Table of Contents continued



Foreword

The Health and Safety Authority, with the consent of Mr Gerald Nash TD, Minister of State for Business and Employment, publishes this amended Code of Practice, titled "*Code of Practice for Avoiding Danger from Underground Services*", in accordance with Section 60 of the Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005).

The aim of the code of practice is to improve the level of safety with which excavation work, and other work involving underground services, is carried out. In particular, it aims to reduce the incidence of damage to underground services and in doing so to minimise risk to personnel who are involved in this work.

The code of practice provides practical guidance as to the observance of Part 5 of the Safety, Health and Welfare at Work (Construction) Regulations 2013 (SI No. 291 of 2013) which, inter alia, requires that adequate precautions are taken in any excavation, shaft, earthwork, underground works or tunnel to avoid risk to persons at work arising from possible underground dangers. Such dangers include underground cables or other distribution systems, the circulation of fluids and the presence of pockets of gas, and appropriate investigations to locate them must be undertaken before excavation begins. The Code of Practice also provides practical guidance as to the observance of Sections 19 and 20 of the Safety, Health and Welfare at Work Act 2005 in respect of relevant excavation work.

This amended code of practice comes into effect on Monday 30th May, 2016, and replaces the "Code of Practice for Avoiding Danger from Underground Services" issued by the Authority on 11 January, 2010. Notice of the issue of this amended code of practice, and revocation of the 2010 code of practice, was published in the Iris Oifigiúil on Friday 27th May, 2016.

As regards the use of codes of practice in criminal proceedings, section 61 of the Safety, Health and Welfare at Work Act 2005 provides as follows:

61.– (1) Where in proceedings for an offence under this Act relating to an alleged contravention of any requirement or prohibition imposed by or under a relevant statutory provision being a provision for which a code of practice had been published or approved by the Authority under section 60 at the time of the alleged contravention, [subsection (2) shall have effect with respect to that code of practice in relation to those proceedings.

(2) (a) Where a code of practice referred to in subsection (1) appears to the court to give practical guidance as to the observance of the requirement or prohibition alleged to have been contravened, the code of practice shall be admissible in evidence.

(2) (b) Where it is proved that any act or omission of the defendant alleged to constitute the contravention—

(i) is a failure to observe a code of practice referred to in subsection (1), or

(ii) is a compliance with that code of practice, then such failure or compliance is admissible in evidence.

(3) A document bearing the seal of the Authority and purporting to be a code of practice or part of a code of practice published or approved of by the Authority under this section shall be admissible as evidence in any proceedings under this Act.

Dr. Marie Dalton
Secretary to the Board
Health and Safety Authority

1.0 Introduction

1.1 Background

This Code of Practice (COP) replaces the Code of Practice for Avoiding Danger from Underground Services issued by the Authority in 2010 and is the result of a joint initiative between the Health and Safety Authority, Construction Industry Federation, Irish Congress of Trade Unions, key utility companies/service providers and local authorities that are involved in the provision and maintenance of vital underground services. This COP takes into account legislative changes in the Safety, Health and Welfare at Work Act 2005 and the Safety, Health and Welfare at Work (Construction) Regulations 2013.

The aim of this COP is to improve the level of safety with which excavation work is carried out. In particular, it aims to reduce the incidence of damage to underground services and in doing so to minimise risk to personnel who carry out this work.

1.2 Status of the Code of Practice

This COP is published by the Health and Safety Authority under Section 60 of the Safety, Health and Welfare at Work Act 2005 and with the consent of the Minister of State at the Department of Jobs, Enterprise and Innovation.

This COP is intended to provide practical guidance to utility/service providers, clients, designers, planners, project supervisors (both design process and construction stage), contractors, safety representatives and any personnel who are involved in work where there is a risk from underground services.

A failure to observe any part of this COP will not in itself render a person liable to civil or criminal proceedings. However, where the COP gives practical guidance on the observance of any of the relevant statutory provisions, compliance or non-compliance with those provisions may be admissible as evidence in criminal proceedings. The requirements of this COP are without prejudice to the general obligations placed on employers and others by the current Safety, Health and Welfare at Work Act, Construction Regulations and other associated occupational safety, health and welfare legislation.

1.3 Scope of the Code of Practice

This COP gives recommendations and practical guidance on how to carry out excavation work safely in the vicinity of underground services. In this context 'excavation' means any work that involves penetrating the ground at or below surface level.

Excavation carried out in the vicinity of underground services includes work associated with a new or existing building that may involve the risk of damaging underground services. It encompasses all excavation work carried out on roadways, streets, footpaths and other open areas where there is a likelihood of buried underground services.

This COP also contains guidance on how to prevent future damage to services that are currently being installed.

2.0 General

2.1 Introduction

Electricity cables, gas pipes, water pipes and sewers, if damaged, may pose a direct danger to personnel who are working on the site. Damaged telecommunications cables may also be hazardous, although direct risk of personal injury is rare.

If an electricity cable, telecommunications cable, gas pipeline or water main suffers any impact or any damage, however slight, the incident must be reported to the network operator without any undue delay. Refer to Appendix 5, item 12.

2.2 Electricity cables

Injuries that result from damage to live electricity cables are usually caused by the explosive effects of arcing current and by any associated fire or flames that may follow when the sheath of a cable and the conductor insulation are penetrated by a sharp object such as the point of a tool, or when a cable is crushed severely enough to cause internal contact between the sheathing and one or more of the conductors. Typically, this causes severe and potentially fatal burns to the hands, face and body.

Some high-voltage electricity cables (e.g. 38kV and higher voltage) are filled with oil and, if damaged, the oil may auto-ignite and create an explosion or fire. Injuries may also be caused by the explosive effects of cable materials being vaporised by large currents. There is also a risk of electric shock when underground services are damaged.

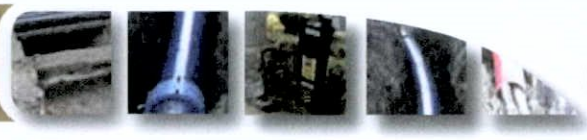
Incidents may also arise from cables that have been damaged, but have not been reported to the relevant utility/service provider and, therefore, have not been repaired. In such circumstances nearby services such as plastic gas pipes may be at risk from damaged live electricity cables, which could create explosions or increase the risk of fire.

2.3 Gas pipes

Damage to gas pipes can cause leaks and may lead to high-pressure gas being released, with associated flying debris, noise, fires or explosions. There are two types of damage:

- Damage that causes an immediate leak following a pipe rupture. Those most likely to be at risk are the personnel carrying out the work and others in the immediate vicinity.
- Damage that causes a leak some time after the event. For example, damage to a pipe wrapping or surface may occur while work is being carried out and this damage may lead to a leak at a later date. Damage may also occur after the work has been carried out. For example, poor reinstatement may leave a pipe inadequately supported or subjected to unequal forces. Those most likely to be at risk are members of the public.

Refer to Section 10 and Appendix 2 for requirements.



2.4 Water pipes and sewers

While damaged water pipes are less likely to cause an injury, a jet of water emanating from a high-pressure main could injure people or damage adjacent underground services. In addition, a water leak from an underground pipe could wash away subsoil, thereby reducing support for adjacent services, roads and structures. There is also a risk of flooding trenches or low-lying areas such as nearby basements.

Sewers are generally gravity fed, but some sewage is pumped at pressure. While the main risk to people associated with damage to sewers is the possibility of contamination, these pipes may also emit gases such as methane or hydrogen sulphide. At certain concentrations, methane may be flammable.

Water mains and sewers require ongoing maintenance to ensure that they function effectively; clear access should always be maintained to pipes, especially near flanges, valves, manholes etc. The laying of gas pipes or electricity cables in parallel above or in immediate proximity to a water main or sewer substantially increases the risk of injury to the crews who may have to carry out subsequent maintenance tasks.

2.5 Telecommunications cables

Although damage to telecommunications cables may be very expensive, generally there is no direct risk of personal injury. However, damage to cables can pose a risk to the general population served by these cables. A breakdown in service can result in isolation from essential services such as fire brigade, ambulance and gardaí. Therefore, it is imperative that all precautions necessary are taken to avoid damaging telecommunications cables. If damage does occur, it must be communicated to the utility/service provider without delay. In case of damage to a fibre optic cable, it is advised that an individual should never look into either end of a severed fibre optic cable as laser light might damage eyesight.

2.6 Accumulation of gases

Flammable and toxic gases from sewers and other services may enter and accumulate in service ducts, particularly if ducts have been damaged. Such gases may also accumulate in chambers and manholes and may pose a risk to personnel who are carrying out work in these areas. The gas may also be transported in these ducts to nearby structures where the risk of explosion may be even greater.

Where entry into a confined space is necessary, the requirements identified in the Confined Space Code of Practice must be complied with.

3.0 Role of the client

3.1 Introduction

Clients play a very important role when it comes to safety and health on construction projects. The Safety, Health and Welfare at Work (Construction) Regulations 2013 define a 'client' as a person for whom a project is carried out.

The Construction Regulations place duties on the client. Clients must make assessments and only appoint competent designers or contractors for the works. If the construction project involves more than one contractor, has a particular risk or will last longer than 30days/500 person days they must appoint a competent project supervisor design process (PSDP) and a competent project supervisor construction stage (PSCS). Project supervisors co-ordinate the management of health and safety with regard to the design and construction of the project.

Clients have a legal duty to be reasonably satisfied that the appointed project supervisors to carry out the work are competent to do so and will dedicate sufficient resources to the project to comply with their legal safety obligations.

3.2 Information from clients

Clients or their agents have a duty to pass on any relevant information relating to underground services that may be in their possession to the PSDP or the PSCS. This information should be as up to date as possible. The client should also make available a copy of any Safety File that is relevant to the construction work that is about to be undertaken.

3.3 Other duties that may apply

In accordance with Section 15 of the Safety, Health and Welfare at Work Act 2005, it is the duty of each person (or company) who has control to any extent of any place of work, or any part of a place of work, to take such measures as are reasonable for them to take to ensure, so far as is reasonably practicable, that the place of work is safe and without risk to health. In certain cases, this provision may be applicable to clients who commission projects that will involve carrying out excavation work near underground services.

Section 17 of the 2005 Act specifies duties to be complied with by persons who commission or procure construction work. Such persons must appoint in writing a competent person or persons to ensure, so far as is reasonably practicable, that the project is designed and is capable of being constructed to be safe and without risk to health.

4.0 Design process roles

4.1 Definition of designer

'Design' covers the preparation of drawings, design details, specifications and bills of quantities. A 'designer' is defined as any person who is involved in such work.

4.2 Project supervisor design process

All designers' work should be co-ordinated by a project supervisor for the design process (PSDP). The PSDP has a duty to prepare and provide to the project supervisor for the construction stage (PSCS) a preliminary safety and health plan if the project is expected to last more than 30 days or 500 person days, or if it contains a 'particular risk', as defined in the Safety, Health and Welfare at Work (Construction) Regulations 2013. One such 'particular risk' is working near high-voltage power lines (i.e. voltages greater than 1.0 kV), including overhead lines and underground cables.

The preliminary safety and health plan must contain an overall description of the project, its proposed timescale and appropriate information relating to other work on the site. It must also specify any work related to the project that will involve 'particular risks'.

Unforeseen circumstances may arise during the execution of the project and may result in a design change. This may in turn have safety, health and welfare implications. The PSDP has a duty to co-ordinate the designers in relation to the safety, health and welfare implications of any change in the original design.

The PSDP must prepare a Safety File for the project and present it to the client when the project is complete.

Where new services are being laid it is important that they do not prevent access to existing services. Any risk to crews carrying out maintenance on the existing services caused by the laying of new services must be identified at an early stage and minimised as far as is reasonably practicable.

The Principles of Prevention must be applied at all stages of the design process.

4.3 Use of plans during design

Where possible, the designers should obtain up-to-date maps and records of all potentially hazardous underground services in order to allow them to consider, at the design stage, the risks posed by those services. Plans and maps should be made available to prospective contractors at tender stage or contract negotiation stage. Before beginning any work on a site, the contractor should be satisfied that the drawings supplied contain the most up-to-date information available for the area in which the works are to be carried out.

4.4 Underground services and building work

4.4.1 Relocating underground services some distance away from the proposed construction site may provide a reasonably practicable means of avoiding the risk of causing damage to these services. Any request for the relocation of services should allow for sufficient time for the relevant utility/service providers to evaluate such proposals and carry out their work.

Buildings and other permanent structures should not be erected over underground services because this may create additional risks for construction workers and could prevent future access to those services. If it is not possible to avoid erecting a structure over an underground service, arrangements should be made with the relevant utility/service provider to relocate the service if this is practicable.

4.4.2 Other options to relocating the services may include:

- Repositioning structures or parts of structures to ensure that contact with underground services is avoided while the work is being carried out.
- Arranging for the supply contained within the underground services to be disconnected during the work.
- If neither of these options is practicable, then choosing methods to avoid contact, such as using ground beams to protect the service(s), may present a reasonably practicable option.

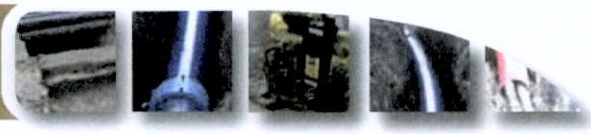
4.4.3 Designers should take into account any ancillary work that may be required, including the erection of perimeter fencing and walls or the construction of roadways. Early identification and planning are essential if risks are to be controlled.

4.4.4 Where new services such as electrical or gas supplies are being installed, it may be possible to reduce risks by not installing or commissioning these services until other ground works and installation works have been completed.

4.5 Underground services in paths and roadways

4.5. The options facing designers who are planning a new service in a roadway may be more limited. In order to select a route that avoids contact with existing services, it is important to have access to the most up-to-date information about those services. One option is to choose a route that has a low density of underground services. For example, a cable television duct might be routed at the side of a road, if that site has a reduced cable density. Designers of gas pipelines should also be aware of the requirements contained in IS 328:2003 Code of Practice for Gas Transmission Pipelines; IS 265:2000 Installation of Gas Service Pipes and I.S. 329:2003+A1:2009 Code of Practice for Gas Distribution Mains.

4.5.2 Having reduced the risks to a level as low as is reasonably practicable by design, information should be provided by the designer(s) about the risks that remain. In most cases the best way of informing those physically excavating in the vicinity of underground services is by providing the information on drawings, ensuring that the information given is the best available.



5.0 Construction stage roles

5.1 Project supervisor construction stage

The role of a project supervisor construction stage (PSCS) is to co-ordinate the project from a health and safety perspective. The PSCS must also develop the safety and health plan, which should outline how the management of the safety, health and welfare of on-site personnel is to be achieved. In addition, the PSCS must facilitate safe access to the site and co-ordinate the overall implementation of safe working procedures.

5.2 The contractor

All contractors on site must co-operate with the PSCS to allow the PSCS to comply with his or her statutory obligations and all contractors have a duty to co-operate with each other on issues concerning health and safety. The contractor must also supply accurate information in a timely fashion to the PSCS to allow for the preparation of the Safety File.

Contractors must carry out a site-specific risk assessment. They should also ensure that their employees have adequate training and that any plant or machinery is, so far as is reasonably practicable, safe and does not pose a risk to health. Contractors should also put in place measures to ensure that the health and safety of personnel employed by them will not be adversely affected by the work being carried out.

Sections 6 to 13 of this COP set out practical measures for protecting the safety, health and welfare of employees and non-employees while excavation work is being carried out in the vicinity of underground services.

5.3 Utility/service providers

All undertakings that have underground services should ensure that their records and maps are maintained as accurately as possible. They should make these records readily available to designers and contractors, as appropriate (see Section 7.3).

In circumstances where a utility/service provider is asked to provide permanent services for a building development, that company will be acting in the role of contractor. Therefore, while it is on site, it will be required to comply with any directions given by the PSCS. However, in circumstances where the provision of services is physically separated and demarcated from the site, then the utility company may assume the role of client for the purposes of the Safety, Health and Welfare at Work (Construction) Regulations 2013.

The utility/service providers should make all reasonable efforts to facilitate clients, designers and contractors to manage the safety risks arising from work activities close to underground services.

5.4 Employees

Safe systems of work must always be adhered to. All workers on site must take reasonable care to protect their own safety and the safety of others who might be affected by their actions. They must not engage in any behaviour likely to endanger health and safety on site. They should report without delay any defects in the safety and health regime that might endanger anyone in the workplace.

Employees must also attend training and assessments as might reasonably be prescribed by their employers with regard to health and safety and they must not misrepresent the level of training which they have attended.

6.0 Safe system of work

6.1 Introduction

Underground utility networks are a common feature in both rural and urban areas and their presence should be assumed until proved otherwise. The guidance given in this COP aims to minimise the risk involved in work that may expose persons to inadvertent contact with underground networks. It sets out a safe system of work that is based on obtaining as much information as possible about buried services before excavation or other ground penetration work begins and using that information to ensure that the work is carried out safely.

6.2 Basic elements

In the context of this COP, a safe system of work is defined as having three basic elements:

- **Plans:** Plans or other suitable information about all buried services in the area should be obtained before excavation work begins (see Section 4 and Section 7.4). This material should be passed on as early as is reasonably practicable by the designer through the project supervisors to the contractor who is tendering for, or is negotiating the carrying out of, the works.

  Plans that were used at the design stage and at the tendering stage may be out of date by the time excavation work begins. Therefore, before beginning any such work, the contractor should check that the plans supplied are the most up to date available.

  Account should also be taken of possible indications of the existence of underground services such as the presence of houses or other buildings, lamp posts, illuminated traffic signs, pit covers or evidence of reinstated trenches. However, the absence of such indicators does not necessarily mean that underground services do not exist.

- **Locators:** Suitable cable- and pipe-locating devices should be used in conjunction with any available plans to determine as accurately as possible the position of metallic underground services in or near the proposed work area. It should be noted, however, that these devices do not detect plastic pipes (see Section 8).

- **Safe digging practices:** Excavation work should be carried out carefully and should follow recognised safe digging practices (see Section 9).

These key elements – plans, locators and safe digging practices – complement each other and all three should be used when working near buried services. Using one element alone is not enough.

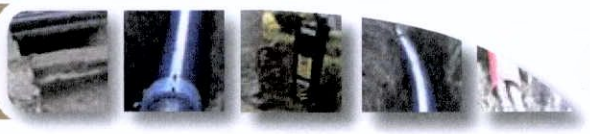
6.3 Employees

Employees should receive adequate instruction and training in the above procedures (see Section 14). A suggested job aid for workers' information is set out in Appendix 5. It is particularly important that anyone who is using a locator should have received thorough training in the use and limitations of that particular type or model of device. Most manufacturers will provide such training, and employers should ensure that this is adequate for their employees' needs.

Under the Safety, Health and Welfare at Work (Construction) Regulations 2013 persons carrying out certain named tasks – including locating underground services, signing, lighting and guarding on roads and assisting in the implementation of health and safety at roadworks – are required to be in possession of a relevant and valid Construction Skills Certification Scheme (CSCS) card. Training and instruction requirements are dealt with in Section 14.

6.4 Procedures

The organisation and arrangements necessary for avoiding danger from underground services should form part of employers' statutory Safety Statements. Written, site-specific risk assessments of the work being undertaken should be carried out and may include the appropriate use of the relevant Safe System of Work Plans (SSWP).



7.0 Use of plans in the preparation of projects

7.1 Introduction

Up-to-date plans of all potentially hazardous underground services in the area should be obtained before excavation work begins. Where possible, providers of all relevant underground services should be consulted. It should be noted that there may be more than one service provider in a particular catchment area for certain types of utility. For example, while most electricity cables under roads and other public areas are owned by ESB Networks, many electricity cables are the property of local authorities and are used for providing services such as public lighting, traffic lights and so on.

7.2 Emergency works

In the case of emergency* works it may not be possible to obtain all requisite up-to-date plans prior to beginning excavation work. In such situations, all other aspects of safe digging practice should be complied with (see Section 9) and the work should be carried out in the same manner as if there were underground services on the site.

7.3 Availability of plans from utility/service providers

7.3.1 Utility/service providers should make available either up-to-date, readable plans that show the recorded line and depth (where known) of all underground services in the proposed work area, or they should provide other suitable information that achieves the same objective. The inclusion of a symbol key will generally be necessary to help the recipient understand the plans.

7.3.2 Utility/service providers should do everything that is reasonably practicable to ensure that such information is made available to enquirers. They are likely to receive many routine applications for information and they should consider how best to make this information available at short notice. In cases where utility/service providers have reservations about releasing copies of plans for commercial or security reasons, they should offer an alternative method of co-operation. For example, they might send a representative to the site to communicate the requisite information to designated contractor personnel only.

7.4 Use and limitation of plans

Plans vary in scale, content and style and adequate instruction and training in how to read and interpret them should be given to anyone who needs to use them.

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* If the question arises in criminal or civil proceedings as to whether works were emergency works, it is for the person alleging that they were to prove that this was the case. Clients and contractors should not use 'emergency' work as an excuse to justify a failure to plan properly when starting work without plans or other suitable information about underground services in the area.

Plans may give an indication of the location, configuration and number of underground services on a particular site. However, they are rarely drawn accurately to scale and, even if they claim to be accurate, they should not be relied upon in order to obtain accurate distance measurements. Errors may have been made during drafting or the scale may have been altered during reproduction, particularly if the original data was obtained from a microfiche slide or a digital map. Accuracy may be further limited because:

- Use of low-scale maps may not give a reasonable indication of location or configuration of underground services. Where possible use 1:500 in preference to 1:1000.
- The position of reference points (e.g. the kerb line) may have changed since the plans were prepared.
- The re-grading of a particular surface area may mean that the depths shown on the plan are no longer correct.
- Fixtures such as cables may have been moved without the knowledge of the utility/service provider.
- In many cases service connections are not marked.
- Services that appear as straight lines on a map may, in fact, be laid out in a snake-like formation; excessively long cables may have been laid in horizontal loops outside substations and switch rooms.
- Plans may show spare ducts.
- The routes of older services in particular may not have been recorded and so the absence of records should never be taken as proof that the area in question is free of underground services.

To determine the actual position of services and the depth of these services on site, safe digging practices must be used at all times. Such practices include the use of detection equipment and the hand digging of trial holes as required. See Section 9.

8.0 Cable- and pipe-locating devices

8.1 Position of services

The position of any services in or near the proposed work area should be pinpointed as accurately as possible by means of a locating device. This device should be used in conjunction with plans and other relevant information (see Section 8.2) as a guide to the possible location of services and to help interpret the signal.

8.2 Types of locating devices

The main types of locator available are:

- **Hum detectors:** (e.g. a cable-locating device set on power mode) are receiving instruments that detect the electromagnetic field radiated by live electricity cables, which have a current flowing through them. However, these instruments will not detect service connection cables to unoccupied premises or street lighting cables during the daytime, as little or no current will be flowing through those cables at that time. They may also fail to detect some well-balanced high-voltage cables that generate little magnetic field. It should be noted that the absence of current in a live cable does not in any way alter the risk of injury to a person if the cable is damaged.

- **Radio frequency detectors:** (e.g. a cable-locating device set on radio mode) are receiving instruments that respond to low-frequency radio signals, which may be picked up and re-emitted by cables and long metallic pipes. If radio frequency detection is used, other metallic objects may re-radiate the signal and results may vary appreciably according to locality, length of the buried cable or pipe, distance from the termination and geographical orientation.

- **Transmitter-receiver instruments:** With these instruments a small portable transmitter or signal generator is connected to a cable or pipe, or placed very close to it, so that the signal is induced into it. The receiver then detects that signal. Usually, some part of the cable or pipe will need to have been located in advance of the operation in order to ensure that the transmitter is positioned correctly. Transmitter-receiver instruments generally require more skill to operate than other types of locators. They may, however, provide useful information in difficult situations where using other locator equipment has not proved successful. In addition, they can provide a depth-measuring facility.

- **Metal detectors:** Conventional metal detectors will usually locate flat metal covers, joint boxes and so on, but may well miss round cables or pipes. They can be a useful tool for finding inspection points, which may provide connection points for a transmitter for use of transmitter-receiver instruments.

- **Ground-penetrating radar:** Such devices are capable of detecting anomalies in the ground, which may indicate the presence of an underground service. However, the sole use of this method would not determine the precise nature of the service and it should be used in conjunction with maps and other information about the services and ground conditions present. It is also preferable that this technique is used together with more conventional forms of locating device.

Most commercially available instruments use more than one of these techniques and may also include a depth-measuring facility.

8.3 Locating the service

The degree of confidence with which buried services may be detected depends on a number of factors such as the characteristics of the devices being used; the type and depth of the service; the magnitude of any electric current carried by the service cable; the effects of other cables and metal pipes close by; and the training, skill, hearing and experience of the operator.

A locator may not be able to distinguish between cables or pipes running close together and may represent them as a single signal. If two cables or pipes are sited one above the other, it may not detect the lower one. For that reason, frequent and repeated use of the locator should be made during the course of the work.

A locator may not detect plastic pipes or other non-metallic ducts and services unless:

- A metallic tracer wire has been laid with the pipe, which enables a signal transmitter-receiver to be used. Plastic gas, water, sewage pipes and fibre optic cables are the most likely type of non-metallic services to be encountered and some of these may have been laid with metallic tracer wires.

- A small signal transmitter is inserted into and then pushed along the pipe. This is a sophisticated technique and is not likely to be appropriate for many sites.

A locating device should always be used in accordance with the manufacturer's instructions, including being calibrated at regular intervals and not being used outside the specified date. A locating device should be checked regularly and maintained in good working order.

The line of any identified services should be noted and marked with waterproof crayon, chalk or paint on paved surfaces. Any residual markings should be erased after excavation, as far as possible.

On grassed or unsurfaced areas, wooden pegs should be used. Steel pins, spikes or long pegs, which could damage services laid at shallow depth, should not be used.

Under the Safety, Health and Welfare at Work (Construction) Regulations 2013, persons carrying out the task of locating underground services are required to be in possession of a Construction Skills Certification Scheme (CSCS) card. This is dealt with in more detail in Section 14.6.

9.0 Safe digging practices

9.1 Excavating

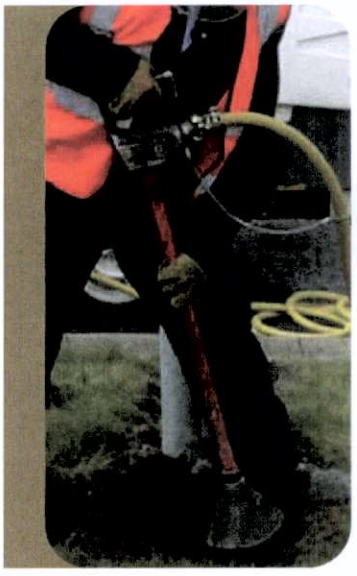
Once plans and a locator device have been used to determine the position of underground services, excavation may proceed. This work should be carried out carefully, following recognised safe digging practices.

Trial holes should be dug using hand tools to confirm the position of any buried services. Special care should be taken when digging above or close to the assumed lines of any such services. Hand-held power tools are the main source of danger to personnel and they should not be used too close to underground services. (See Appendices 1 and 2 for advice on appropriate safety margins for electricity cables and gas pipelines respectively.)

Hand tools, incorrectly used, are a common cause of accidents. However, if they are used carefully and if the approximate position of services has been determined through the use of plans and locators, these tools may provide a satisfactory method for exposing underground services. Every effort should be made to excavate alongside the service rather than directly above it. Final exposure of the service by horizontal digging is recommended as the force applied to hand tools may be controlled more effectively.

In particular:

- Spades and shovels should be used rather than other tools. They should not be thrown, or spiked into the ground. Rather, they should be eased in with gentle foot pressure.
- Picks, pins or forks may be used with care to free lumps of stone and other materials and to break up hard layers.
- Picks should not be used in soft clay or other soft soils in areas close to buried services.



Particular care should be taken in cases where gas leak search techniques, such as barholing, are used. Refer to Bord Gáis guidance material for advice. Similar precautions should apply when piles or earth rods are being driven into the ground.

Alternative excavation methods such as hydro or air digging tools and vacuum excavation may be used in certain circumstances. However, a detailed, site-specific risk assessment will need to be carried out first to estimate the specific risks associated with the use of these techniques, such as the presence of gas, spark ignition and injuries from ejected soil.

9.2 Damaged services

If an underground service suffers damage, no matter how slight, the utility/service provider should be informed immediately.

In the case of electricity cables, gas pipes, fibre optic telecommunications cables or high-pressure water mains, arrangements should be made to keep personnel well clear of the area until the damage has been repaired or otherwise made safe by the utility/service provider.

9.3 Identification of services

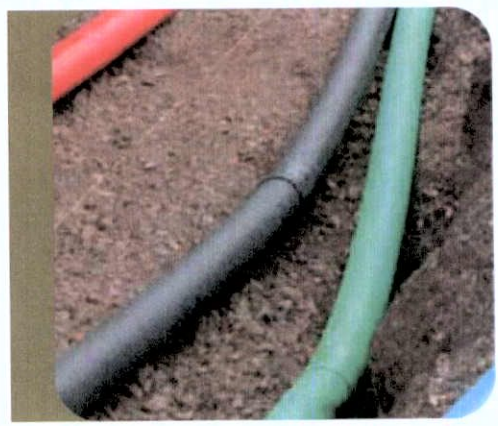
Failure to identify underground services correctly can cause accidents. Correct identification may prove difficult as the utility/service providers may have used a wide variety of materials and colours over a number of years. It is important to remember that colours may appear differently under poor or artificial lighting. In addition, ducts may well contain any one of a number of services, irrespective of the type or colour of the duct.

Some services are very similar in appearance and the following approaches should be adopted until such time as their identity has been positively confirmed:

- The housing for some water pipes and a significant proportion of electricity cables and telecommunications cables are made from black plastic. If a black plastic-covered service is encountered, it should be assumed to be a live electricity cable until proved otherwise. A small percentage of directly buried electricity cables are red in colour, these should not be mistaken for red-coloured electricity cable ducting.

- Iron and steel water pipes may look very similar to gas pipes. Therefore, if any iron or steel pipe is uncovered, it should be handled as if it is a gas pipe.

- Some services run in ducts, which may make these services difficult to identify. Where red ducts are uncovered, the services inside those ducts are likely to be electricity cables of modern installation and they should be treated as such. Where yellow ducts are uncovered, they are likely to be gas pipes and should be treated as such. Black and orange ducts have been used as standard colours for electricity cables in the past and they should be handled as if they contain electricity cables.



- Electricity cables may also be installed in concrete pipes, steel pipes and in plastic ducts in a range of colours. Where there is any doubt about the identity of an exposed service, it should be treated as if it is an electricity cable or gas pipe until proved otherwise.

- Telecommunications cables may be installed in concrete pipes, smooth black ducting or grey corrugated ducting. All cables should be assumed to be live until disconnected and proved to be safe. Contractors should obtain written confirmation of disconnection from the utility/service provider before removing a redundant service or arrange for the utility/service provider to remove the service.

  All new buried plastic piping should meet the requirements of Irish Standard (IS) 370:2007 for new installations (see Appendix 6). For example, new ducts installed since 2005 for electricity cables (where the voltage exceeds 125V) should be coloured red. See also Appendix 1 for other relevant specification details.

  While colour coding is intended to give an indication of which service is contained within the buried plastic piping, caution must be exercised until the precise nature of the service has being confirmed.

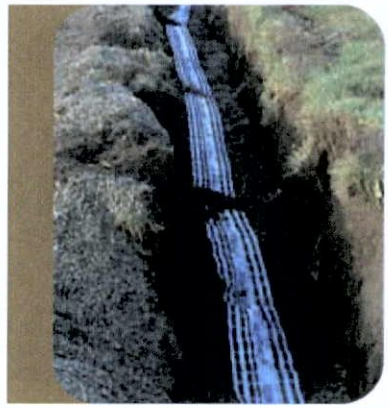
9.4 Support to exposed services

Services uncovered in an excavation may need to be supported and should never be used as handholds or footholds by personnel when climbing out of an excavation.

9.5 Back-filling

Back-filling of any excavation should be carried out carefully. Warning tiles, bricks, tapes and any other protective materials that are lying above the services should be replaced in their original position unless an expert adviser confirms that the original position was incorrect. If the original position turns out to have been incorrect, then the warning tiles and other materials should be placed above the services to which they refer.

Warning tape should not be used for any other purpose (such as guarding an excavation trench) and waste tape should not be left in the excavation area when it is back-filled.



Fill material that contains items such as large pieces of rock and hardcore should not be used as this could cause damage to the services.

For specific advice on back-filling in the vicinity of gas pipes (i.e. where long-term damage is a particular hazard) see Appendix 2. Alternatively, utility/service providers may provide direction and advice on how to back-fill trenches in which their services have been exposed.

9.6 Burial of existing services

If underground services have been found to be too shallow, or if the plans or other information have proved to be inaccurate, the relevant utility/service provider should be informed – preferably before the excavation is back-filled. The utility/service provider should then amend its records accordingly.

9.7 Protection against burns

Burns are the main injuries that result from damage to live electricity cables, or from fire or explosion following a gas leak. Burns are likely to be most severe where skin is not covered and therefore, based on a site-specific risk assessment, appropriate skin cover for hands, arms, legs and upper body should be used.

The wearing of protective clothing should never be used as a substitute for a safe system of work.

9.8 Insulated digging tools

Where excavation work is being carried out near live cables, the use of insulated tools is strongly recommended. Generally, tools such as shovels, spades or picks should have insulated fibreglass or wooden handles. Fibreglass crowbars are also available and these should be used where feasible. If this is not feasible, then the crowbars should be fitted with insulated handles.

10.0 Safe systems of work for trenchless methods

Increasingly, trenchless methods are being used for the laying or renovation of underground pipes and cables, particularly in cases where it is necessary to avoid disturbing surface areas. The most widely used techniques are impact-moling, pipe-bursting and auger-boring. Care should be taken when using trenchless methods to avoid colliding with, and thereby damaging, other services. With moling and pipe-bursting it is also important not to work too close to other services as displaced soil may escape into nearby pipes or ducts.

As moling takes place underground, the actual path taken is unseen and not guaranteed, the pertinent risks associated with moling must be taken into account at both the design and construction stages. Possible damage using trenchless methods includes damage to structures and damage to other services.

Consideration must be given to the location of all services present and may involve appropriate consultation with the relevant utility/service providers. Competent planning, organisation and implementation will be required before and during trenchless works. The recommendations for safe digging practices outlined in Section 9 must be referred to.

Plans, locators and trial holes should be used to determine the position of existing services. The path of the equipment to be used should then be calculated accordingly. In order to avoid danger and allow sufficient clearance for the maintenance of existing services, the general guideline is that the minimum clearance between adjacent services should be either 300mm or one and a half times the diameter of the pipe being laid, whichever is the greater. For electricity cables, gas mains, telecommunications cables and water mains, clearances for maintenance work should be a minimum 300mm in all directions. Trenchless methods (moling/directional drilling) must not take place within ten metres of a gas pipeline unless the gas network operator has been consulted.

In certain circumstances, clearances may need to be varied. Therefore, contractors should take into account factors such as the construction of adjacent plant; ground conditions; bore diameter; the accuracy and reliability of the technique/equipment being used; and whether the other plant is parallel or crossing the proposed line. In addition, the requirements of nearby utility/service providers may need to be taken into account.

Moles are prone to deflection from their planned course and, if there are existing services in the vicinity, a mole-tracking device should be used. Where trenchless methods are being used, all equipment which is electrically bonded to the mole should be earthed at all times in case the equipment strikes a power cable and this causes it to become live. As an additional precaution, an equipotential mat can be used for the operator to stand on.

The use of no-dig technology carries its own risks. Several recorded examples exist where, unknown to the installing contractor, a new service such as a gas main had been pushed through a sewer pipe, resulting in a blockage in the sewer pipe. The subsequent use of clearing techniques such as jetting machines by the sewer maintenance teams put these crews at risk when they unknowingly cut through the gas pipe.

11.0 New housing developments

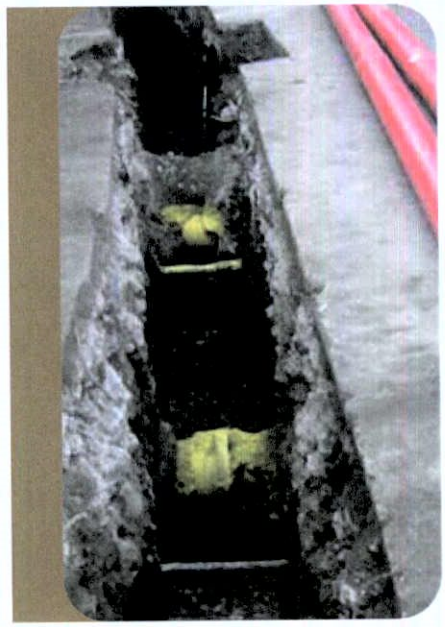
Underground services that are located within the confines of partly completed new housing developments are especially prone to damage from the numerous site operations that may need to be carried out.

The construction of a single trench may help to control the position and separation of underground services. Where services are laid on a partly developed site, special arrangements may be required for their temporary protection at vehicle/plant crossing points.

Close liaison should be maintained between the developers, their contractors and the utility/service providers. A marked-up plan of the estate, showing the up-to-date position of underground services (including any variations from planned routes) should be kept on site and referred to in advance of carrying out excavations or other ground penetration works.

12.0 Installation of new services near existing services

New underground services often have to be laid in ground that already contains other services. Where it is reasonably practicable to do so, the utility/service provider that is planning the new installation should aim to position it in such a way that it is separated from all existing underground services by an adequate distance. Guidance on the requisite distances to be maintained may be found in the UK publication *National Joint Utilities Group (NJUG) Guidelines on the Positioning and Colour Coding of Underground Utilities' Apparatus 2013*. The Irish Standard for colour code for buried plastics piping (IS 370:2007) should be referred to (see Appendix 6). Every effort should be made to comply with these standards (unless otherwise noted in this COP) or other equivalent standards of good practice for new installations in order to minimise risk to personnel now or at some future date.



Where the installation of a new service is likely to obstruct access to an existing service for more than a few metres, then all reasonably practicable measures should be used to avoid this situation. In particular, the practice of laying multiple ducts directly above other services should be avoided.

In circumstances where it is not possible to comply with the recommended services separation standard, because of underground services congestion or some other factor, the relevant utility/service provider must be contacted and as great a separation as is reasonably practicable should be maintained.

Designers and contractors must be aware that if placing services in parallel to existing utilities that are closer than the specified distances, unacceptable risks may be introduced, particularly to persons who at a later stage may require access for utility maintenance.

Unless formal agreement has being obtained from the utility/service provider or the relevant person representing the utility/service provider there should be no circumstance where access is restricted to existing services. Access to services is essential for maintenance work and possible emergency response.

13.0 Demolition sites

Special difficulties may arise in the case of service terminations in a derelict property or on a demolition site.

Contractors who plan to engage in demolition work have a duty to give adequate notice to the relevant gas, electricity and water authorities of their intention to carry out this work. Demolition should not begin until the relevant authorities have confirmed in writing that the supply has been disconnected or some other appropriate safeguarding action has been taken.

As noted in Section 4, there is an onus on the PSDP who is co-ordinating the design team to identify hazards associated with the existing environment, including known hazardous underground services.

Underground services on industrial or commercial sites may be the property of the site occupier. A contractor who is planning to demolish buildings or plant on such a site should contact the site occupier or the site owner to ensure that all relevant services are isolated before demolition work begins.

Even where supplies have been disconnected, contractors should be aware that:

- Services that run through a site may not be providing a service to that site.
- Bottle-ended or pot-ended cables must be treated as live unless confirmed otherwise.
- Some services may not have been recorded on the original plans and, consequently, may not have been identified or disconnected.

14.0 Training and instruction

14.1 Introduction

Digging close to underground services is potentially dangerous. Both the workers and the supervisors who are involved in this activity need an appropriate level of knowledge, skills and experience in order to ensure that the work is carried out safely. Anyone who does not possess these attributes should work under the close supervision of someone who does have the requisite experience and competencies.

14.2 Provision of information and instruction

Prior to work commencing on site all employees/operatives must be given appropriate information and instruction, through induction, toolbox talks or other equivalent means of communication. The information and instruction provided may include all or some of the following, as appropriate:

- Completion and communication of a relevant Safe System of Work Plan.
- Site-specific risk assessments.
- Operating procedures.
- Permits to work procedures.
- Relevant drawings, maps and other related information.

14.3 Training for supervisors and operatives

In accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013, operatives must satisfactorily complete the one-day Safe Pass safety awareness programme. However, this is an introductory course in construction safety and does not in itself provide sufficient training in relation to the hazards and risks involved in digging close to underground services.

Personnel* who are involved in either the supervision or carrying out of excavations in the vicinity of hazardous underground services should be appropriately trained in one or more of the following areas, as required:

- Planning of the work.
- Legislation.

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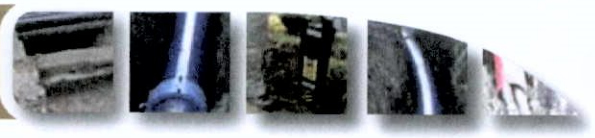
* These include workers who manually work on excavations in streets, utility/service provider employees who manually work on excavations and those directly supervising these workers. Excavator drivers may be excluded if they received sufficient relevant training on an excavator driving course. However, if they are involved in excavation outside the excavator, they should receive the stipulated training.



- Risk assessment.
- Liaison with utility/service providers.
- Use of plans and drawings from the various utility/service providers.
- Appropriate use of cable- and pipe-locating devices.
- Location of underground services (CSCS, see Section 14.6.1).
- Identification of services.
- Safe digging practices.
- Personal protective devices.

Refresher training will be required periodically depending on the work being carried out by personnel. Employees should not refuse reasonable offers of training; they should co-operate with their employers regarding training and they should make relevant documentation demonstrating receipt of training available for inspection as appropriate.

14.4 Site-based direct managers/supervisors

Those involved in direct management and supervision of site-based work require relevant competencies to deliver safety standards on site. They will need health and safety training in order to:

- Assess and prioritise the risks on a particular project.
- Design safe systems of work that are appropriate to specific site conditions.
- Prepare clear, simple safety method statements that can be used and understood by site workers.
- Check that suitable personal protective clothing and appropriate equipment has been provided and is being used correctly.

14.5 Role of the project supervisor construction stage in training

As part of their duty to co-ordinate site safety, the PSCSs must have a system in place for checking that on-site operatives have been appropriately trained, even if those operatives are not their employees. The PSCS should have a system in place for ensuring that all craft and general construction workers on site have an up-to-date Safe Pass card and appropriate Construction Skills Certification Scheme (CSCS) cards where required.

14.6 Construction Skills Certification Scheme

The Construction Skills Certification Scheme (CSCS) is managed by the Further Education and Training Authority, SOLAS. This scheme is backed up by legislation, in particular Schedule 5 of the Safety, Health and Welfare at Work (Construction) Regulations 2013. The regulations list tasks which are common to the construction industry. If a task is listed in the schedule then you must hold a CSCS card to carry out that task on a construction project. Some of the common CSCS tasks in relation to avoiding dangers from underground services are set out in the sections below.

A large number of underground services are located under roads (including footways, cycle tracks, roadways etc.). Carrying out construction work on or near a roadway brings additional hazards, the most obvious being live traffic. The Safety, Health and Welfare at Work (Construction) Regulations 2013 (SI No. 291 of 2013) sets out the CSCS training requirements in regards to protecting workers and the public when working on roads.

For further information on the CSCS, contact SOLAS Tel: + 353 (0) 1 53302500 or Email: info@solas.ie.

14.6.1 Locating of underground services (CSCS): The 2013 regulations require persons carrying out the task of locating underground services to be in possession of a CSCS card. Contractors must ensure that underground services are located before excavation begins. This task and the methods involved are dealt with in detail in Section 8.

14.6.2 Signing, lighting and guarding (CSCS): Where any construction work which obstructs the roadway (part of the road where vehicles travel) or where pedestrians, people with disabilities or cyclists are diverted on to the roadway due to construction work, there must be on that site at all times when road signing, lighting and guarding is being installed, modified or removed, at least one person who has been issued with a valid construction skills registration card relating to signing, lighting and guarding on roads. In general this relates to works which interfere with the roadway traffic. Furthermore, the works both on and off the roadway must also be supervised by a competent person who has been issued with a valid construction skills registration card relating to signing, lighting and guarding on roads.

14.6.3 Assisting in the implementation of health and safety at roadworks (CSCS): When construction works on roads are in progress you must have a person on site who has been issued with a valid construction skills registration card relating to 'assisting health and safety at roadworks', where the person possessing a valid signing, lighting and guarding CSCS is not present. In general this relates to work which does not interfere with the roadway traffic.

HEALTH AND SAFETY AUTHORITY

Appendices

Appendices 1 to 4 give advice on matters relating to each of the five main types of underground services (gas, electricity, water and telecommunications). This is additional information and should be read and used in conjunction with the advice contained in the main text.

Appendix 1: Electricity cables

Plans

A1.1 The electricity service providers should be consulted wherever possible and all relevant plans obtained. (Note: While most electricity cables are owned by ESB Networks, many underground cables are the property of local authorities and are used for the provision of services such as public lighting, traffic lights and so on. Other underground cables may be the property of public bodies or private companies.)

A1.2 The representation of underground cables on plans may vary depending on the density of the underground networks (i.e. the number of cables running in close proximity), the scale of the plans and local historical recording conventions. Advice for interpretation should be sought from the issuing office. It should be noted that low/medium-voltage cables and high-voltage cables may be shown on separate plans.

Cable-locating devices

A1.3 While hum detectors (e.g. cable-locating devices set on power mode) are the easiest devices to use, they do not respond to unloaded or direct current cables. Furthermore, they may fail to detect lightly loaded low-voltage cables (such as those used for street lighting) and well-balanced high-voltage cables. A locator with a radio frequency detection mode may detect these cables and, therefore, should be used for additional back-up checks.

In some situations it may be possible to use a generator (genny) to induce a traceable signal on to a cable and this signal can then be used to trace the position/depth of the cable at locations remote from the genny using a cable detector.

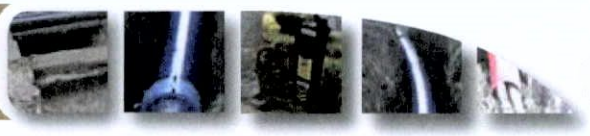
A1.4 Even where a locating device does not give a positive reading, there may still be cables present and these may still be live.

A1.5 If a cable that is recorded on a plan cannot be located, appropriate assistance or advice should be sought. If digging has to start before such assistance or advice has been obtained, extreme care should be taken.

Safe digging practices

A1.6 In the vast majority of cases there will be no permanent surface markers or other visible signs to indicate the presence of a buried cable. Even if no cables are shown on plans or detected by a locator, a close watch should be kept for any signs that might indicate their presence.

A1.7 Underground cables are normally laid in trenches between 400mm and one metre deep. However, depths should never be assumed. Cables are often found just below the surface. As a result, therefore, even shallow excavations may present a source of danger. This factor should always be borne in mind, particularly if the ground has been disturbed or if there are cellars or other structures such as bridges in the area, which may have prevented cables being laid at standard depths.



A1.8 Cables may have been laid in any of a number of different ways – directly in the ground with a bed or surround of fine soil or sand; in earthenware or concrete pipes; in pitch-filled cast iron formers; or in plastic pipes or ducts. Occasionally they may be encased in steel pipes, or a covering of tiles, bricks, slabs, timber boards or coloured plastic marker tape may be laid above them. However, such coverings may have been disturbed and moved subsequently and should not be relied upon to give an accurate indication of cable position. These factors further emphasise the importance of using safe digging practices.

A1.9 During digging work, a careful watch should be kept for evidence of cables and repeat checks should be made with a locator to determine more precisely the position of any cable. Note: a cable should be considered positively located only after it has been safely exposed. Even then, digging should proceed with care, as there may be other cables, particularly high-voltage cables, nearby or lower down.

A1.10 Occasionally, cables are terminated in the ground by means of a seal or some other form of external mechanical protection. These pot-ended or bottle-ended cables should always be treated as live and should not be assumed to be abandoned or disused. They may be difficult to detect with locators even when live.

A1.11 When joints on electricity cables are encountered, they should be treated with extreme care. The joints may be enclosed in cast iron, earthenware or plastic casings. They need proper support and should never be disturbed, except following consultation and agreement with the utility/service provider.

A1.12 The use of hand-held power tools to break up paved surfaces often leads to accidents. Where practicable, such power tools should not be used within 500mm of the indicated line of a cable buried in or below a hard surface. Where power tools have been used to break away the surface from the indicated line of the cable, it should then be positively located by careful hand digging under the hard surface. The material under the hard surface should be removed gradually until the cable is exposed. If the cable is not exposed, then it must be assumed to be embedded in the hard surface. Where possible, a cable locator should be used as a depth guide down the side of the excavation.

The 500mm safety margin may be reduced:

- Where congestion of buried cables renders it impracticable.

- Where surface obstructions limit the space available; but only if the line of the cable has been positively identified by plans and confirmed by a locator.

Because it may be difficult to confirm depth, hand-held power tools should never be used over the cable unless either:

- The cable has already been exposed by digging under the surface to be broken out and is at a safe depth (at least 300mm) below the bottom of the hard surface material.

or

- Physical precautions have been taken to prevent the tool striking the cable. Advice on the safe use of hand tools is given in Section 9.

A1.13 Excavating close to electricity cables buried in concrete is dangerous. For this reason alone electricity cables should not be buried in concrete and the utility/service providers should ensure that their employees and contractors are aware that this practice is unacceptable.

A1.14 Using mechanical means to break up concrete can cause damage to cables. If the cable is live, anyone present is likely to be injured.

A1.15 Alternative routes should be carefully considered as a means of avoiding cables that are buried in concrete.

A1.16 Where it is necessary to break away or disturb the concrete in which a cable is embedded, the utility/service provider should be asked to disconnect it from the supply, or an alternative safe method of excavation should be agreed with the utility/service provider before excavation work begins. It is important to note that the use of powered hand tools close to cables is likely to represent the greatest risk of injury.

A1.17 Where a buried cable has been disconnected from the supply to allow for safe excavation, it is essential that liaison should be maintained between the parties involved to ensure that the work has been completed and that workers have cleared the site before the cable is reconnected.

A1.18 Where mechanical excavators are being used in an area likely to be in the vicinity of underground cables, the work should be arranged in such a way as to ensure that damage to cables is avoided. In addition, all personnel should be kept well clear of the excavator bucket while digging work is going on.

Drivers should be instructed to remain in the cab if a cable is struck. If the driver has to leave the cab, he or she should jump clear of the machine, rather than climb down, to avoid the risk of electrocution. A designated person should be assigned to guard the excavator and ensure that no person enters the area or touches either the excavator or the cable until the utility/service provider has made the damaged cable safe.

A1.19 The most common injuries resulting from cable accidents are flash burns, splatter burns from molten metal or ignited oil and electrical burns. Burns are likely to be most severe where skin is not covered and therefore, based on a site-specific risk assessment, appropriate skin cover for hands, arms, legs and upper body should be used.

A1.20 Accidents sometimes occur after underground cables have been exposed. Cables should not be used as handholds or footholds by anyone climbing in and out of the trench. Where a cable that is exposed for more than one metre crosses a trench, support should be provided. If the exposed length is less than one metre, support should still be considered if joints have been exposed or if the cable appears otherwise vulnerable to damage. If advice or help is needed, the cable service provider should be contacted.

Suitable precautions should be taken to prevent damage from ongoing work in the excavation area (e.g. by use of physical means such as timber boards or sand bags). Cables that are lying at the bottom of an excavation area should be protected by nail-free wooden planks, troughing or some other suitable means. Care should be taken not to use materials or equipment that could damage or penetrate the outer sheath of the cables. Cables should not be moved aside unless the operation is supervised by the utility/service provider. Precautions should be taken to prevent access to exposed cables by children or other unauthorised personnel.

A1.21 Hard or sharp materials, such as pieces of rock, large stones, hard-core or surplus concrete, should not be tipped into open cable trenches. Advice on back-filling cable trenches should be obtained from the cable service provider. As a general rule, all exposed cables should be back-filled with a 75mm minimum surround of compacted sand. Disturbed tiles and bricks should be replaced and new yellow-coloured warning tape should be placed above the excavated area.