

# Magnetic Dykes NW Midlands Ireland (ROI/NI) ITM

**Type** File Geodatabase Feature Class



**Tags** Ireland, Geology, IE/GSI, Tellus, Minerals, Exploration, MPM, Geophysics, Dykes, Magnetics

## Summary

This survey measures, from an airplane, the magnetic strength of rocks below. Because different rock types have different magnetic strengths, the survey allows us to map different types of rocks, even in areas where rocks are covered by soil. The findings tell us about the rocks in the ground. This helps if you want to drill for water or to help find minerals (materials taken from the ground used for things we need from mobile phones to the stones used to build roads and houses).

When maps of magnetic strength are looked at carefully, clear lines in the maps can be seen. These show where the rocks have been broken or fractured. These lines in the maps are called lineaments. Dykes are volcanic rocks that are sometimes found along fractures in rocks. Dykes can be seen on magnetic maps. Finding and mapping lineaments and dykes can help work out how the rocks have changed over time and can help in searching for minerals.

## Description

Structural lineaments (linear features) have been identified and mapped from magnetic maps of the Northwest (NW) Midlands of Ireland. The study area includes the south western part Northern Ireland. These magnetic maps show the magnetic field strength of rocks. This allows us to observe and map different types of rock beneath the soil. Linear features (lineaments) can also be mapped. These may be sharp margins (faults) between rock types, or fractures (breaks) in the rocks. The magnetic data in the NW Midlands of Ireland were collected between 2005 – 2017. They consist of a merge of data collected during a number of Tellus survey phases: Northern Ireland (NI), Tellus Border (TB), Cavan (CAV), North Midlands (TNM), A1, A2 and A3 survey blocks. The NW Midlands study area covers a total area of approximately 21,500 km<sup>2</sup>.

The magnetic data were collected using an airplane. The airplane flies at 60 m flight height along lines that are 200 m apart. Magnetic data are recorded at around 6 m intervals along the flight lines. The magnetometer system mounted on the airplane records the magnetic field strength of the rocks. The magnetic field changes depending on the type of rock beneath the aircraft. Iron rich rocks (for example, basalt) are strongly magnetic and have a strong magnetic field, while rocks with low iron content (for example, limestone) are weakly magnetic.

The data are collected as points in XYZ format. X and Y are the airplane coordinates. Z is the different recorded data, which include magnetic field strength and aircraft flight height. The XYZ data for each line contains thousands of points. The data from separate lines are merged to create a magnetic grid (map) for each survey block. Individual survey blocks are then merged to create a final magnetic grid for Ireland. The magnetic grid was cut to provide a window of data corresponding with the extents of the Northwest (NW) Midlands project area.

A number of different image enhancement filters are then used to improve the resolution of the magnetic grid and to help in identifying and mapping structural lineaments and dykes in the grids. This is a vector dataset. Mapping of lineaments and dykes in the magnetic grids was done using ArcGIS Pro software. The

lineament datasets are made available in a file geodatabase and shapefile format.

The Tellus project is a national survey which collects geochemical and geophysical data across Ireland. It allows us to study the chemical and physical properties of our soil, rocks and water. It is managed by the Geological Survey Ireland.

## Credits

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## Extent

West -9.760608    East -7.223954  
North 54.441875    South 53.894812

## Scale Range

Maximum (zoomed in) 1:5,000  
Minimum (zoomed out) 1:150,000,000

## Topics and Keywords ►

Themes or categories of the resource    Environment, Geoscientific, Location

Content type    ⇌ Downloadable Data

Export to FGDC CSDGM XML format as Resource Description    No

Theme keywords Soil

#### Thesaurus ►

Title GEMET - INSPIRE themes, version 1.0  
Alternate titles GEMET INSPIRE  
Publication date 2008-06-01 00:00:00  
Resource location online  
Online location (URL) <https://inspire.ec.europa.eu/theme/so>  
Connection protocol text/html  
Name INSPIRE theme register  
Function performed information  
Application profile INSPIRE theme register

Place keywords Ireland

#### Thesaurus ►

Title Metadata Registry of the Publications Office of the EU Named Authority Lists - Country  
Alternate titles MDR-COUNTRIES  
Publication date 2015-03-18 00:00:00  
Edition 20200624-0  
Resource location online  
Online location (URL) <https://op.europa.eu/en/web/eu-vocabularies/concept/-/resource?uri=http://publications.europa.eu/resource/authority/country/IRL>  
Connection protocol text/html  
Name Name authority list  
Description Name authority list  
Function performed information

Other keywords IE/GSI

#### Thesaurus ►

Title Global Change Master Directory (GCMD) Data Center Keywords 9.1.5  
Alternate titles GCMD Data Center Keywords  
Publication date 2016-08-04 00:00:00  
Edition 9.1.5  
Resource location online  
Online location (URL) <https://vocabs.ardc.edu.au/repository/api/lda/ardc-curated/gcmd-providers/9-1-5-2020-02-06/resource?uri=https://gcmdservices.gsfc.nasa.gov/kms/concept/4bdbb012-4aed-485b-8ee8-16519985681e>  
Connection protocol text/html  
Name GCMD Data Center Keywords  
Description GCMD Data Center Keywords  
Function performed information

#### Citation ►

Title Magnetic Dykes NW Midlands Ireland (ROI/NI) ITM  
Creation date 2022-06-24 00:00:00  
Publication date 2022-06-28 00:00:00  
Revision date 2022-06-24 00:00:00

Presentation formats ⇔ digital map

FGDC geospatial presentation format vector digital data

Resource identifier

Value

GE\_AirborneGeophysicalSurvey\_IE\_GeologicalSurveyIreland\_Magnetic\_Dykes\_NW\_Midlands\_IE32\_ITM

Reference that defines the value ►

Title GSI

Creation date 2022-06-24 00:00:00

Publication date 2022-06-28 00:00:00

Revision date 2022-06-24 00:00:00

## Citation Contacts ►

Responsible party - point of contact

Individual's name Tellus Project

Organization's name Geological Survey Ireland

Contact's position Tellus Project Manager

Contact information ►

Phone

Voice +353-1-6782896

Address

Type both

Delivery point Block 1, Booterstown Hall, Booterstown Avenue, Booterstown, Blackrock

City Dublin

Postal code A94 N2R6

Country IE

e-mail address [support@geodata.gov.ie](mailto:support@geodata.gov.ie)

Online resource

Online location (URL) <https://www.gsi.ie>

Connection protocol text/html

Name GSI Website

Description GSI Website

Function performed information

## Resource Details ►

Dataset languages ⇔ English (IRELAND)

Dataset character set utf8 - 8 bit UCS Transfer Format

Status on-going

Spatial representation type vector

Spatial resolution

Dataset's scale

Scale denominator 50000

Ground sample distance

Precision of spatial data 500 m (meter)

Processing environment Esri ArcGIS 12.6.0.24783

Credits

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ArcGIS item properties

Name ⇔ NW\_MPM\_Magnetic\_Dykes\_ITM  
Size ⇔ 0.000

## Extents ►

### Extent

Geographic extent

Bounding rectangle

Extent type Extent used for searching

West longitude ⇔ -9.760608

East longitude ⇔ -7.223954

North latitude ⇔ 54.441875

South latitude ⇔ 53.894812

Extent contains the resource ⇔ Yes

### Temporal extent

Beginning date 2021-03-19 00:00:00

Ending date 2021-06-14 00:00:00

### Extent in the item's coordinate system

westBL ⇔ 485763.575500

eastBL ⇔ 650342.851900

southBL ⇔ 795334.529800

northBL ⇔ 854816.064400

exTypeCode ⇔ Yes

## Resource Points of Contact ►

### Point of contact - point of contact

Individual's name Tellus Project Manager

Organization's name Geological Survey Ireland

Contact's position Tellus Project Manager

Contact information ►

Phone

Voice +353-1-6782896

Address

Type both

Delivery point Block 1, Booterstown Hall, Booterstown Avenue, Booterstown, Blackrock

City Dublin

Postal code A94 N2R6

Country IE

e-mail address [support@geodata.gov.ie](mailto:support@geodata.gov.ie)

Online resource

Online location (URL) <https://www.gsi.ie>

Connection protocol text/html

Name GSI Website

Description GSI Website

Function performed information

## Resource Maintenance ►

### Resource maintenance

Update frequency   irregular

## Resource Constraints ►

### Legal constraints

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Access constraints   license

Use constraints   license

### Security constraints

Classification   unclassified

Additional restrictions

no limitations to public access

### Constraints

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## Spatial Reference ►

ArcGIS coordinate system

Type ⇔ Projected

Geographic coordinate reference ⇔ GCS\_IRENET95

Projection ⇔ IRENET95\_Irish\_Transverse\_Mercator

Coordinate reference details ⇔

ProjectedCoordinateSystem

WKID 2157

XOrigin -5022200

YOrigin -15179500

XYScale 10000

ZOrigin -100000

ZScale 10000

MOrigin -100000

MScale 10000

XYTolerance 0.001

ZTolerance 0.001

MTolerance 0.001

HighPrecision true

LatestWKID 2157

WKT PROJCS["IRENET95\_Irish\_Transverse\_Mercator",GEOGCS["GCS\_IRENET95",DATUM["D\_IRENET95",SPHEROID["GRS\_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Transverse\_Mercator"],PARAMETER["False\_Easting",600000.0],PARAMETER["False\_Northing",750000.0],PARAMETER["Central\_Meridian",-8.0],PARAMETER["Scale\_Factor",0.99982],PARAMETER["Latitude\_Of\_Origin",53.5],UNIT["Meter",1.0],AUTHORITY["EPSG",2157]]

Reference system identifier

Value 2157

Version ⇔ 6.5.1(8.1.2)

Codespace ⇔ EPSG

Reference that defines the value ►

Title European Petroleum Survey Group (EPSG) Geodetic Parameter Dataset

Alternate titles EPSG

Publication date 2004-04-07 00:00:00

Edition 9.8.12

Resource location online

Online location (URL) <http://www.opengis.net/def/crs/EPSG/0/2157>

Connection protocol text/html  
Name EPSG  
Description EPSG  
Function performed information

## Spatial Data Properties ►

### Vector ►

Level of topology for this dataset ⇔ geometry only  
Geometric objects  
Feature class name NW\_MPM\_Magnetic\_Dykes\_ITM  
Object type ⇔ composite  
Object count ⇔ 1177

### ArcGIS Feature Class Properties ►

Feature class name NW\_MPM\_Magnetic\_Dykes\_ITM  
Feature type ⇔ Simple  
Geometry type ⇔ Polyline  
Has topology ⇔ FALSE  
Feature count ⇔ 1177  
Spatial index ⇔ TRUE  
Linear referencing ⇔ FALSE

## Data Quality ►

### Scope of quality information ►

Resource level dataset  
Data quality report - Domain consistency ►

Conformance test results  
Test passed No  
Result explanation  
The INSPIRE Directive or INSPIRE lays down a general framework for a Spatial Data Infrastructure (SDI) for the purposes of European Community environmental policies and policies or activities which may have an impact on the environment.

### Product specification ►

Title D2.8.III.3 Data Specification on Soil – Technical Guidelines  
Alternate titles INSPIRE Data Specifications v3.0  
Publication date 2013-12-10 00:00:00  
Data quality report - Domain consistency ►

Conformance test results  
Test passed Yes  
Result explanation  
See the reference specification

### Product specification ►



Title COMMISSION REGULATION (EC) No 1205/2008 of 3 December 2008 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata  
Publication date 2008-12-04 00:00:00  
Data quality report - Domain consistency ►

Conformance test results  
Test passed No  
Result explanation  
See the reference specification

Product specification ►

Title Regulation 1089/2010 COMMISSION REGULATION (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services  
Publication date 2010-12-08 00:00:00

## Lineage ►

### Lineage statement

Electromagnetic Data Quality\Lineage:

Airborne electromagnetic data were recorded and processed by Sander Geophysics Ltd. and delivered to Geological Survey Ireland, where they were further processed and gridded prior to data release. Airborne survey specifications and the data processing routines applied to the data are described below.

Airborne Survey Specifications (Tellus airborne survey):

- 1) Electromagnetics (four-frequency (0.9 kHz, 3 kHz, 12 kHz and 25 kHz), wing-tip mounted transmitter-receiver system).
- 2) Flight-line spacing: 200 m.
- 3) Flight altitude (ground clearance): nominal 60 m, increasing to 214 m over sensitive areas (e.g., livestock farms) and 305 m over larger population centres.

Electromagnetic Data Processing:

The following corrections and calculations were performed on the recorded electromagnetic data by Sander Geophysics Ltd. using purpose-developed, proprietary software. More detail on each data processing step may be found in, for example, Sander Geophysics Limited's document "Technical Report – Fixed-Wing High-Resolution Aeromagnetic, Gamma-ray Spectrometric and Frequency-Domain Electromagnetic Survey – Tellus A1 Block, Republic of Ireland 2015 – For Geological Survey Ireland".

- 1) Conversion of the recorded EM responses from volts to parts per million (ppm) for four frequencies and two data components (in-phase and quadrature), providing eight data components in total.
- 2) Non-linear drift corrections – to correct for drift effects, largely due to temperature variation during flight, on the zero level of the recorded data.
- 3) De-rotation of the data – to correct for data phase errors and ensure orthogonality between in-phase and quadrature data components.
- 4) Hanning low-pass filter application (10 samples, 1 second) – to reduce noise levels in the data, leaving the geological response signal in place.
- 5) Levelling - line-to-line data levelling of each of the eight data components to bring each flight line to a matching amplitude level with neighbouring lines, using DC shifts and differential polynomial levelling (following the method of Beiki et al., 2010, Geophysics, Vol. 75, No. 1, L13-L23).

Electromagnetic data conversion to ground resistivity values, gridding and merging:

The following corrections and calculations were performed on the final eight-component electromagnetic response data by GSI using Geosoft Oasis Montaj software.

- 1) Data conversion to resistivity. Conversion of in-phase and quadrature data (jointly) for each frequency to apparent resistivity using Geosoft HEM software.

- 2) Micro-levelling of four apparent resistivity data sets (at each frequency: 0.9 kHz, 3 kHz, 12 kHz and 25 kHz) – to remove residual linear line-to-line artefacts in the data.
- 3) Gridding of apparent resistivity data for each frequency using inverse distance weighted method with a grid cell size of 50 x 50 m.
- 4) Merging of all completed survey block grids into one all-island grid for each data frequency. The 3 and 12 kHz frequency data provide coverage of both Ireland (Republic) and Northern Ireland, while the 0.9 and 25 kHz frequencies are only available in the Republic.
- 5) Resampling of the merged apparent resistivity grids for each frequency back to a final master database.

Preparation of the data for structural lineament picking:

The following steps were carried out by GSI using Geosoft software to prepare the 3 and 12 kHz apparent resistivity data for lineament picking.

- 1) The 3 and 12 kHz resistivity data from GSI's two-frequency "2F\_MERGE\_2019B" dataset were gridded using inverse distance weighted method with a grid cell size of 50 x 50 m.
- 2) The resistivity grids were cut to provide a window of data corresponding with the extents of the Northwest (NW) Midlands project area.
- 3) Computation of fractional vertical derivatives of the apparent resistivity grids, for each frequency, to sharpen and enhance features in the grids. Fractional derivatives of order = 0.25 and order = 0.75 were applied. In the case of the 0.75 order vertical derivative, a Butterworth low-pass filter (rejecting wavelengths less than 250 m) was applied to the resistivity grids beforehand, to attenuate cultural noise present in the grids
- 4) Output of geotiff map images of the resistivity and vertical derivative grids for both 3 and 12 kHz. Geotiff pixel resolution: 23.911 x 23.911 m in ground units.

Lineament picking:

The following steps were carried out by GSI using ArcGIS Pro software.

- 1) Import of geotiff images.
- 2) Lineaments visible in the map images were digitised as "polylines". The objective was to pick structural/tectonic lineaments exclusively and to avoid linear features associated with stratigraphic layering (where possible and using geological knowledge provided by the GSI 1:100,000 bedrock geology map). A number of different "types" of lineaments were picked (but not explicitly classified): (i) lineaments associated with disruption of a series of resistivity anomalies along the length of a fault/fracture, (ii) lineaments associated with sharp and distinct, straight or curved edges to anomalies, (iii) lineaments in an otherwise uniform resistivity host "background" and (iv) lineaments where the geometry of juxtaposed resistivity anomalies, with different orientations, suggest the presence of a fault between the anomalies.
- 3) Vector data was saved in a file geodatabase. The polyline lineament feature class was exported as a shapefile, with the following attributes:

Field	Data Type	Description
OBJECTID	Number	Object ID
Shape	Text	Polyline
GUID	GlobalID	Unique Global ID
Shape_length	Number	Length of polyline

Final Dataset: NW\_MPM\_Geophysical\_Lineaments\_Vector\_Data.gdb

Shapefile: NW\_MPM\_em\_lineaments.shp

Projection: IREN95 / Irish Transverse Mercator (ITM); EPSG:2157

## Distribution ►

### Distributor ►

Contact information - publisher  
Individual's name Information Management

Organization's name Geological Survey Ireland  
Contact's position Head of Information Management  
Contact information ►

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Type both  
Delivery point Block 1, Booterstown Hall, Booterstown Avenue, Booterstown, Blackrock  
City Dublin  
Postal code A94 N2R6  
Country IE  
e-mail address [support@geodata.gov.ie](mailto:support@geodata.gov.ie)  
Online resource  
Online location (URL) <https://www.gsi.ie>  
Connection protocol text/html  
Name GSI Website  
Description GSI Website  
Function performed information

Distribution format  
Version 10.7  
Name ⇔ File Geodatabase Feature Class

Transfer options  
Online source  
Online location (URL) <https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=b8576fe6efca43058953573dbbd71f25>  
Connection protocol text/html  
Name Webmapping Viewer  
Description Webmapping Viewer  
Function performed information

Online source  
Online location (URL) <https://www.gsi.ie/en-ie/data-and-maps/Pages/Geochemistry.aspx>  
Connection protocol application/vnd.shp  
Name Data Download  
Description Data Download  
Function performed download

Online source  
Online location (URL) <https://gsi.geodata.gov.ie/server/rest/services/Geochemistry>  
Connection protocol text/html  
Name REST Service  
Description REST Service  
Function performed information

## Fields ►

Details for object NW\_MPM\_Magnetic\_Dykes\_ITM ►

Type ⇔ Feature Class  
Row count ⇔ 1177  
Definition

## Magnetic Dykes

Definition source

MPM Project

### Field OBJECTID ►

Alias ⇔ OBJECTID

Data type ⇔ OID

Width ⇔ 4

Precision ⇔ 0

Scale ⇔ 0

Field description ⇔  
Internal feature number.

Description source ⇔  
Esri

Description of values ⇔  
Sequential unique whole numbers that are automatically generated.

### Field Shape ►

Alias ⇔ Shape

Data type ⇔ Geometry

Width ⇔ 0

Precision ⇔ 0

Scale ⇔ 0

Field description ⇔  
Feature geometry.

Description source ⇔  
Esri

Description of values ⇔  
Coordinates defining the features.

### Field GUID ►

Alias ⇔ GUID

Data type ⇔ GlobalID

Width ⇔ 38

Precision ⇔ 0

Scale ⇔ 0

Field description  
Unique Global ID

Description source  
MPM Project

### Field Shape\_Length ►

Alias ⇔ Shape\_Length

Data type ⇔ Double  
Width ⇔ 8  
Precision ⇔ 0  
Scale ⇔ 0  
Field description ⇔  
Length of feature in internal units.

Description source ⇔  
Esri

Description of values ⇔  
Positive real numbers that are automatically generated.

## Metadata Details ►

Metadata language ⇔ English (IRELAND)  
Metadata character set utf8 - 8 bit UCS Transfer Format  
Metadata identifier  
MD\_GE\_AirborneGeophysicalSurvey\_IE\_GeologicalSurveyIreland\_Magnetic\_Dykes\_NW\_Midlands\_IE32\_ITM  
Scope of the data described by the metadata ⇔ dataset  
Scope name ⇔ dataset  
Last update ⇔ 2022-06-24  
ArcGIS metadata properties  
Metadata format ArcGIS 1.0  
Created in ArcGIS for the item 2020-07-27 17:58:55  
Last modified in ArcGIS for the item 2022-06-24 15:54:51  
Automatic updates  
Have been performed Yes  
Last update 2022-06-24 15:54:51

## Metadata Contacts ►

Metadata contact - point of contact  
Individual's name Information Management  
Organization's name Geological Survey Ireland  
Contact's position Head of Information Management  
Contact information ►

Phone  
Voice +353-1-6782896

Address  
Type both  
Delivery point Block 1, Booterstown Hall, Booterstown Avenue, Booterstown, Blackrock  
City Dublin  
Postal code A94 N2R6  
Country IE  
e-mail address [support@geodata.gov.ie](mailto:support@geodata.gov.ie)

Online resource  
Online location (URL) <https://www.gsi.ie>  
Connection protocol text/html  
Name GSI Website  
Description GSI Website  
Function performed information

## Metadata Maintenance ►

### Maintenance

Update frequency as needed

## Metadata Constraints ►

### Legal constraints

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Access constraints license

Use constraints license

### Security constraints

Classification unclassified

Additional restrictions

no limitations to public access

### Constraints

#### Limitations of use

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## Thumbnail and Enclosures ►

Thumbnail

Thumbnail type   Image file

