

CURRAGHINALT 33KV CONNECTION PROJECT
STATEMENT OF CASE TECHNICAL REPORT
POPULATION AND HUMAN HEALTH

NI1851
Statement of Case
V.01
October 2024

REPORT

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
V.01	SoC	SM, OH, LN, RP	RP	SF	11.10.2024

Approval for issue

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11 October 2024

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Glossary

Term	Meaning
Extremely low frequency	Extremely low frequency (ELF) electromagnetic fields (EMFs) are a type of non-ionizing radiation that occupy the lowest part of the electromagnetic spectrum, typically in the frequency range of 1Hz to 3kHz
High voltage alternating current (HVAC)	Refers to the transmission of electrical power using alternating current (AC) at high voltages, typically ranging from 33 kV to 230 kV
Low Frequency EMF	Low-frequency electromagnetic fields (EMFs) are a type of non-ionizing radiation that occupy the lower part of the electromagnetic spectrum, typically in the frequency range of 1 Hz to 100 kHz
Health	State of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.
Population health	The health outcomes of a group of individuals, including the distribution of such outcomes within the group.
Significant health effect	An effect triggered by the Projects that is judged to be important for public health (a positive or negative effect), highly desirable for public health (a positive effect) or unacceptable for public health (a negative effect).

Acronyms

Term	Meaning
AIMD	Active implantable medical device
DECC	Department of Energy and Climate Change
ES	Environmental Statement
EIA	Environmental Impact Assessment
EMF	Electromagnetic field
ELF	Extremely low frequency
ENA	Energy Networks Association
HVAC	High voltage alternating current
ICNIRP	International Commission of Non-Ionising Radiation Protection
IEMA	Institute of Environmental Management and Assessment
IPH	Institute of Public Health
OHL	Overhead line
UGC	Underground Cable
WHO	World Health Organisation
5G	Fifth generation

Units

Term	Meaning
%	Percentage
Hz	hertz
kV	kilo volts
kHz	kilohertz
MHz	megahertz
GHz	gigahertz
mA m ⁻²	milliamperes per square meter

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kV m ⁻¹	kilovolts per meter
μT	microtesla
kV/m	kilovolts per meter
km	meter

1 INTRODUCTION

This Technical Report sets out the following summary of the assessment and outcomes:

- The methodology used in the assessment:
- Consideration of any changes to the baseline data, relevant policy, guidance and legislation since the completion of the Environmental Statement (“the ES”) in May 2021
- Impacts without mitigation.
- Proposed mitigation measures.
- Residual impacts.
- Cumulative impacts/interactions/transboundary impacts.
- Consideration of consultation replies from statutory agencies and relevant third-party representations.
- Conclusions.

This Technical Report has been prepared by Ryngan Pyper.

Ryngan is a Technical Director with RPS and is providing evidence in relation to the population and human health impact assessment contained in the ES associated with the 33kV power line involving both construction of above ground 33kV overhead line supported by wooden poles and underground 33kV cable laid below ground level in a fully ducted system, to serve Curraghinalt mine (Planning Ref LA11/2019/1000/F) (‘the Proposed Development’).

Ryngan is the Director of Health and Social Impact at RPS. He holds a MA & BA Hon in biological sciences and postgraduate diplomas with distinction in public health and legal practice. He advises Government and professional bodies on good practice. Ryngan has over 18 years’ experience as a professional consultant and has led health assessments for many community level and nationally significant infrastructure projects, including in Derry. Notable publications include:

First author of the Institute of Public Health (IPH) guidance on Health Impact Assessment, which covers Northern Ireland (Pyper et al., 2021). The guidance is formally endorsed and badged by the Department of Health’s Making Life Better framework. The guidance is also formally endorsed by the European Public Health Association, the umbrella organisation for public health across Europe funded by the European Union.

First author of the World Health Organization (WHO) publication: Learning from practice, Case studies of health in Strategic Environmental Assessment and Environmental Impact Assessment (EIA) across the WHO European Region (World Health Organization, 2022).

- First author of the Institute of Environmental Management and Assessment (IEMA) Guides: Effective Scoping of Human Health in EIA (IEMA, 2022a); Determining Significance for Human Health in EIA (IEMA, 2022b); and Competent Expert for HIA including Health in Environmental Assessments (Pyper et al., 2024). These guidance documents state they apply in Ireland and Northern Ireland.
- Ryngan is an Honorary Research Fellow and Member of the World Health Organization Collaborating Centre on Health in Impact Assessment at the University of Liverpool. He is a registered public health Practitioner with the Faculty of Public Health and member of the European Public Health Association. He is also a Chartered Environmentalist and member of the IEMA Impact Assessment Steering Group; and he chairs the Health Section of the International Association for Impact Assessment.
- This Technical Report should be read alongside Chapter 11 Population and Human Health of the ES, as well as the responses provided by the Derry City and Strabane Environmental Health Services (dated 28/07/2021) and the Fermanagh and Omagh District Council Environmental Health Services (dated 03/08/2021).

As outlined in Section 3 this report provides additional environmental information on the population health baseline relevant to the Proposed Development. This additional information provides additional context but does not change the original assessment scope or conclusion reached in relation to EMF risk to the public.

2 METHODOLOGY

The Strategic Planning Division of the Department of Infrastructure undertook an EIA screening determination for the Proposed Development under the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 and concluded that the planning application was 'EIA development' for the above ground 33kV overhead line supported by wooden poles and underground 33kV cable laid below ground level in ducts, to serve Curraghinalt mine.

The electricity network in Northern Ireland has multiple voltages, including 11kV, 33kV, 110kV, and 275kV. 11kV and 33kV are the distribution type lines. They are typically mounted on wooden poles rather than metal pylons. 33kV lines are a ubiquitous feature of communities and the landscape.

The installation of 33kv lines is routine and there is not considered to be the potential for significant public health impacts from such works, or from decommissioning activities. As set out in the ES in relation to the consultation exercise for the EIA screening determination (see ES Chapter 11 section 11.2), and consistent with responses from the Environmental Health Services at Derry City and Strabane District Council and Fermanagh and Omagh District Council (see Section 8 of this statement of case), the only issue within the scope of the health assessment relates to the public EMF exposure. Community concern around EMF exposure that could give rise to population level mental health effects is unlikely. This is because the planning application has assessed actual risks and has confirmed in ES Chapter 11 that the electrical infrastructure meets relevant health protection standards. Given such information has been shared and that 33kv powerlines are common, further assessment of mental health effects linked to public understanding of risk is not considered proportionate or necessary.

Public EMF exposure

Exposure reference level

The methodology for determining public health exposure risks in relation to EMF is a comparison against recognised health protection standards.

The Northern Ireland electricity grid infrastructure use high-voltage alternating current (HVAC) at 50 Hz. The relevant assessment frequency range is 1 Hz to 100 kHz, which is termed Low Frequency, and within this the Extremely Low Frequency (ELF) element, which is 1 Hz to 3 kHz.

The assessment of the potential significant effects has been undertaken in the context of public exposure guidelines of the International Commission of Non-Ionising Radiation Protection (ICNIRP).

ICNIRP is the internationally recognised independent non-profit organization that provides scientific advice and guidance on the health and environmental effects of non-ionizing radiation. This includes the ICNIRP being formally recognised by the WHO, and the WHO state: "*The main conclusion from the WHO reviews is that EMF exposures below the limits recommended in the ICNIRP international guidelines do not appear to have any known consequence on health.*"(WHO, 2006)

The ICNIRP guidelines are adopted by the UK Government 2012 Power Lines: Demonstrating compliance with EMF public exposure guidelines, A voluntary Code of Practice [DECC report \(publishing.service.gov.uk\)](#), (hereafter the Government Code of Practice) which states that the Government Code of Practice has been agreed by the Northern Ireland Executive and Health and Safety Executive and is explicit that: "*This Code of Practice applies in England, Wales, Scotland and Northern Ireland ... [and] Government policy on electric and magnetic fields (EMFs) is that power lines should comply with the 1998 ICNIRP Guidelines*".

The Strategic Planning Policy Statement (Department of the Environment, 2015) paragraph 6.249 states "*In relation to power lines current Government policy is that exposures to powerline Electro Magnet Fields (EMFs) should comply with the 1998 International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines ...*".

ICNIRP have published the following:

- 2020 (ICNIRP, 2020): Guidelines for limiting exposure to electromagnetic fields (100 kHz to 300 GHz).
- The ICNIRP Guidelines for Limiting Exposure to Electromagnetic Fields are for the protection of humans exposed to radiofrequency electromagnetic fields (RF) in the range 100 kHz to 300 GHz.

- The guidelines cover many applications such as 5G technologies, WiFi, Bluetooth, mobile phones, and base stations. Published in: Health Phys 118(5):483-524; 2020.
- This publication replaces and supersedes the 100 kHz to 300 GHz part of the ICNIRP (1998) radiofrequency guidelines, as well as the 100 kHz to 10 MHz part of the ICNIRP (2010) low-frequency guidelines.
- 2010 (ICNIRP, 2010): Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (1Hz – 100 kHz). Published in: Health Phys 99(6):818-836; 2010.
- This publication replaces the low-frequency part of the 1998 guidelines (ICNIRP 1998).
- 1998 (ICNIRP, 1998): Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz). Published in: Health Phys 74 (4):494-522; 1998.

For the frequencies relevant to powerlines, the relevant ICNIRP publications are the 1998 and 2010 guidelines, which set out the reference levels for general public exposure.

The ICNIRP define 'reference levels' as levels of electric and magnetic fields "to which a person may be exposed without an adverse effect and with acceptable safety factors". Reference levels are defined for the general public and for occupational exposures; in this assessment the relevant reference levels are those for the general public. The ICNIRP define the term general public as "the entire population. It includes individuals of all ages, and of varying health status, and this will include particularly vulnerable groups or individuals such as the frail, elderly, pregnant workers, babies and young children" (ICNIRP, 2010).

The assessment is with regard to whether the Proposed Development would meet these guideline levels for general public exposure.

ICNIRP basic restrictions are: Mandatory limitations on the quantities that closely match all known biophysical interaction mechanisms with tissue that may lead to adverse health effects.

ICNIRP reference levels are: The levels to which a person may be exposed without an adverse effect and with acceptable safety factors. The reference levels may be exceeded if it can be demonstrated that the basic restrictions are not exceeded. Thus, the reference level is a practical or "surrogate" parameters that may be used for determining compliance with the Basic Restrictions.

For 50 Hz (the distribution network frequency) the relevant frequency range in Table 4 of the 1998 ICNIRP exposure guidelines is 4Hz – 1 kHz, which specifies the basic restriction for the public is an induced current density in the central nervous system that should not exceed 2 mA m⁻².

The Government Code of Practice equates ICNIRP basic restriction of 2 mA m⁻² to an induced current density equates to uniform unperturbed fields of 360 µT for magnetic fields and 9.0 kV m⁻¹ for electric fields.

For general public exposure the relevant ICNIRP 2010 reference level are 5 kV/m for the electric field and 200 µT for the magnetic field. 100 µT for the magnetic field is referenced in the 1998 ICNIRP guidelines and provides for a more conservative/robust basis of assessment.

As discussed in Section 4 of this statement of case, both the basic restrictions (the absolute limits that must not be exceeded) and the reference levels (the guide levels for if the basic restrictions are being approached) would be met by the Proposed Development.

Table 2.1: ELF EMFs exposure guidelines adopted in the UK

Description	1998 ICNIRP guidelines, as adopted in the UK in the Government Code of Practice.
	Public
'Basic restriction' (the quantity that must not be exceeded)	Induced current density in the central nervous system 2 mA m ⁻²
Government Code of Practice 'basic restriction' in alternative units	Magnetic field 360 µT
	Electric field 9 kV m ⁻¹
ICNIRP reference level (not a limit in itself but a guideline for when 'basic restriction' investigation may be required)	Magnetic field 100 µT
	Electric field 5 kV m ⁻¹

Sensitivity, magnitude and significance

This section covers the methods set out in Chapter 11 Population and Human Health of the ES as well as refinements of EIA methodologies for Human Health published by IEMA in 2022; the original basis of assessment is still considered valid and reflects practice at the time of the assessment. Applying more recent methods does not change the conclusions reached. For the IEMA 2022 indicative criteria the guidance recognises that criteria are likely to span categories when considering a particular impact, so it is a professional judgement as to which the most relevant category taking into account relevant criteria. It remains the case, whether applying the ES chapter 11 (2021) criteria or the IEMA 2022 criteria, that sensitivity of the local population is considered high driven by the presence of vulnerable groups.

2.1.1.1 Receptor sensitivity

Table 2.2: Definition of terms relating to the sensitivity of the receptor

Sensitivity	ES Chapter 11 (2021)	Indicative criteria (IEMA 2022)
High	Within a defined population, individual sensitivity can vary due to a range of factors such as age, socio-economic deprivation and the prevalence of any pre-existing health conditions which could become exacerbated. These individuals can be considered particularly vulnerable to changes in environmental and socio-economic factors (both adversely and beneficially) whereby they could experience disproportionate effects when compared to the general population. A precautionary approach has been applied, where it is assumed that the	High levels of deprivation (including pockets of deprivation); reliance on resources shared (between the population and the project); existing wide inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or concern ; people who are prevented from undertaking daily activities; dependants ; people with very poor health status; and/or people with a very low capacity to adapt.
Medium		Moderate levels of deprivation; few alternatives to shared resources; existing widening inequalities between the most and least healthy; a community whose outlook is predominantly uncertainty with some concern; people who are highly limited from undertaking daily activities; people providing or requiring a lot of care ; people with poor health status; and/or people with a limited capacity to adapt.
Low		Low levels of deprivation; many alternatives to shared resources; existing narrowing inequalities between the most and least healthy; a community whose outlook is predominantly ambivalence with some concern; people who are slightly limited from undertaking daily activities; people providing or requiring some care ; people with fair health status; and/or people with a high capacity to adapt.
Very low		Very low levels of deprivation; no shared resources; existing narrow inequalities between the most and least healthy; a

entire population within community whose outlook is predominantly **support** with some the study area are of concern; people who are **not limited** from undertaking daily uniformly high sensitivity activities; people who are independent (not a carer or in order to capture the dependant); people with **good** health status; and/or people with most sensitive individuals a **very high** capacity to adapt. within that population.

2.1.1.2 Magnitude of impact

The criteria for defining magnitude in this chapter are outlined in **Table 2.3**.

Table 2.3: Impact magnitude criteria

Magnitude of impact ES Chapter 11 (2021)	Indicative criteria (IEMA 2022)	
High	Change in environmental or socio-economic factor sufficient to result in a major change in baseline population health or socio-economic circumstance (adverse or beneficial).	High exposure or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness/injury outcomes; majority of population affected; permanent change; substantial service quality implications.
Medium	Change in environmental and socio-economic factor sufficient to result in a moderate change in baseline population health or socio-economic circumstance (adverse or beneficial).	Low exposure or medium scale; medium-term duration; frequent events; severity predominantly related to moderate changes in morbidity or major change in quality-of-life; large minority of population affected; gradual reversal; small service quality implications.
Low	Change in environmental and socio-economic factor sufficient to result in a minor change in baseline population health or socio-economic circumstance (adverse or beneficial).	Very low exposure or small scale; short-term duration; occasional events; severity predominantly related to minor change in morbidity or moderate change in quality-of-life; small minority of population affected; rapid reversal; slight service quality implications.
Negligible	Change in environmental and socio-economic factor below that for which it is possible to result in any manifest health outcome at a population level but may impact at an individual level (adverse or beneficial).	Negligible exposure or scale; very short-term duration; one-off frequency; severity predominantly relates to a minor change in quality-of-life ; very few people affected; immediate reversal once activity complete; no service quality implication.

2.1.1.3 Significance of effect

The significance of the effect has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method is informed by an indicative matrix that is a guide to reaching a professional judgement. Where a range of significance levels are presented, the overall assessment for each effect is based upon evidence based expert judgement.

The matrices for the ES Chapter 11 (2021) and IEMA (2022) are set out in Table 2.4 and Table 2.5 respectively. The matrices are very similar. The ES Chapter 11 matrix (Table 2.4) is slightly more conservative, i.e. likely to assign a higher significance value, so remains the basis of assessment. It is however noted that the conclusions of ES Chapter 11 would be unchanged if the IEMA Table 2.5 matrix was used. This reflects that, as explained in Section 4, the magnitude is negligible as a 33 kV overhead line or buried cable is, by design, not capable of exceeding the ICNIRP basic restrictions. A provisional judgment on the population health implications of a negligible magnitude, whether informed by Table 2.4 or Table 2.5, would indicate a not-significant effect conclusion.

As previously noted, in all cases, a precautionary approach has been applied by applying a uniformly high receptor sensitivity and the evaluation is underpinned by narrative to explain the conclusions reached.

For the purpose of the assessment, and following the IEMA 2022 guidance, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations.

Table 2.4: ES Chapter 11 matrix used for the assessment of significance of the effect

Sensitivity Receptor	Magnitude of Impact			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	Negligible or Minor	Minor	Moderate	Moderate or Major
High	Minor	Minor or Moderate	Moderate or Major	Major or Substantial

Table 2.5: IEMA 2022 matrix used for the assessment of significance of the effect

Sensitivity Receptor	Magnitude of Impact			
	Negligible	Low	Medium	High
Very Low	Negligible	Negligible	Negligible or Minor	Minor
Low	Negligible	Minor	Minor	Minor or Moderate
Medium	Negligible or Minor	Minor	Moderate	Moderate or Major
High	Negligible or Minor	Minor or Moderate	Moderate or Major	Major

3 BASELINE

The following baseline indicators have been selected to provide coverage of the wider determinants of health. The selected indicators also reflect a focus on smaller area statistics, which are the most relevant spatial resolution for project level effects. Data was collected from the 2021 Census in Northern Ireland (Northern Ireland Statistics and Research Agency, 2021) and the Health Inequalities 2023 Annual Report at district electoral areas level, local government districts level, and national level from 2021 onwards. from the 2021 Census in Northern Ireland (Northern Ireland Statistics and Research Agency, 2021) and the Health Inequalities 2023 Annual Report (Department of Health, 2023), at district electoral areas level, local government districts level, and national level from 2021 onwards.

Table 3.1: Population structure, key age groups (Northern Ireland Statistics and Research Agency, 2021)

Indicator	Year	District Electoral Areas		Local Government Districts			National Northern Ireland
		Sperrin	Mid Tyrone	Derry and Strabane	City Fermanagh and Omagh		
Aged 0 to 14	2021	20%	22%	20%	20%	19%	
Aged 15 to 64	2021	63%	62%	64%	62%	63%	
Aged 65+	2021	17%	15%	16%	18%	17%	

As seen in Table 3.1, the population structure in Sperrin and Mid Tyrone generally aligns with local government and national trends, with some notable variations. Mid Tyrone has a slightly higher population of children and young people (aged 0 to 14) (22%) compared to Fermanagh and Omagh (local government district level) (20%) and Northern Ireland (national) (19%). For the older population aged 65 and above, Mid Tyrone has a slightly lower percentage in this age group (15%) compared to Fermanagh and Omagh (18%) and Northern Ireland (17%). The working age population (aged 15-64) shows minimal variation with Sperrin at 63% and Mid Tyrone at 63% which are consistent with both local government district and national averages.

Table 3.2: General health baseline indicators (Department of Health, 2023)

Indicator	Year	District Electoral Areas		Local Government Districts			National Northern Ireland
		Sperrin	Mid Tyrone	Derry and Strabane	City Fermanagh and Omagh		
Life Expectancy							
Male Life Expectancy at Birth	2019-21	79.4	79.3	77.3	78.9	78.4	
Female Life Expectancy at Birth	2019-21	81.6	81.9	81.1	82.6	82.2	
General Health							
Very good	2021	50%	56%	49%	51%	50%	
Good	2021	27%	26%	27%	28%	29%	
Fair	2021	15%	13%	15%	14%	14%	
Bad	2021	6%	4%	7%	5%	6%	
Very bad	2021	2%	2%	2%	2%	2%	
Long-term health problem or disability							
Activities not limited	2021	74%	78%	73%	76%	76%	
Limited a little	2021	13%	12%	13%	13%	13%	
Limited a lot	2021	13%	10%	14%	11%	11%	
Long-term health conditions							
No conditions	2021	65%	70%	63%	66%	65%	
1 condition	2021	18%	16%	18%	18%	18%	
2 conditions	2021	8%	7%	9%	8%	8%	
3 or more conditions	2021	9%	7%	10%	8%	9%	

Table 3.2 provides insights into general health baseline indicators across district electoral areas and compares these with both local government districts and national averages.

Sperrin reports a male life expectancy at birth of 79.4 years, which is higher than the local government district of Derry City and Strabane (77.3 years) and the national average of 78.4 years. Female life expectancy at birth in Sperrin is 81.6 years, slightly above the figure for Derry City and Strabane (81.1 years), though below the national average of 82.2 years.

In Mid Tyrone, male life expectancy at birth is 79.3 years, which is higher than the local government district of Fermanagh and Omagh (78.9 years) and the national average (78.4 years). Female life expectancy at birth in Mid Tyrone is 81.9 years, slightly lower than in Fermanagh and Omagh (82.6 years) and lower but closer to the national figure of 82.2 years.

Regarding general health, 50% of the population in Sperrin report “very good” health, which is slightly higher than Derry City and Strabane (49%) and in line with the national average (50%). Mid Tyrone has a higher proportion of people reporting “very good” health (56%), exceeding both Fermanagh and Omagh (51%) and the national average (50%).

In terms of bad health, Sperrin has 6% of the population reporting “bad” health, slightly below Derry City and Strabane (7%) but same as the national average (6%). Mid Tyrone has a lower percentage with 4% of the population reporting “bad” health, which is better than both Fermanagh and Omagh (5%) and the national average (6%).

For long term health problems or disability, Sperrin has 13% of the population reporting their activities being “limited a lot” by long-term health problems or disability, which is slightly lower than in Derry City and Strabane (14%) but higher than the national average (11%). Mid Tyrone shows 10% of the population reporting their activities being “limited a lot”, which is slightly lower than the average in Fermanagh and Omagh (11%) and nationally (11%). The percentage of the population reporting their activities as “not limited” by a long-term health problem or disability in Mid Tyrone is 78%, which is higher than the average for Fermanagh and Omagh (76%) and Northern Ireland (76%). The percentage of the population reporting their activities as “not limited” by a long-term health problem or disability in Sperrin is 74%, which is slightly higher than Derry City and Strabane (73%) but lower than the national average (76%).

Regarding long-term health conditions, 70% of the population in Mid Tyrone reports having “no conditions”, which is higher than the percentage for Fermanagh and Omagh (66%) and Northern Ireland (65%). The reverse trend is observed for the reporting of 1, 2, 3 or more conditions: 16% of the population in Mid Tyrone report having 1 long-term health condition, which is lower than the percentage for Fermanagh and Omagh (18%) and Northern Ireland (18%). The percentage of the population reporting having 2 conditions in Mid Tyrone is 7%, which is also lower than the average for Fermanagh and Omagh (8%) and Northern Ireland (9%), Similarly, 7% of the population in Mid Tyrone also report having 3 or more conditions, which is lower than the average for Fermanagh and Omagh (8%) and Northern Ireland (9%).

The percentage of the population reporting no conditions in Sperrin (65%) is slightly higher than in Derry City and Strabane (63%) but the same as the national average. The percentage of the population reporting 1 condition (18%), 2 conditions (8%), and 3 conditions or more (9%) in Sperrin is the same as the local government and national averages.

Table 3.3: Mental health baseline indicators (Department of Health, 2023)

Indicator	Year	District Electoral Areas		Local Government Districts			National
		Sperrin	Mid Tyrone	Derry City and Strabane	Fermanagh and Omagh	Northern Ireland	
Standardised Admission Rate – Self Harm (Admission per 100,000 population)	2017/18 – 2021/22	NA	NA	91	83	102	
Crude Death Rate – Suicide (Deaths per 100,000)	2017-21	9.9	10.1	11.9	13.7	11.6	
Standard Prescription Rate – Mood and Anxiety (person prescribed per 1,000 population)	2021	225	179	256	201	221	

Table 3.3 compares mental health baseline indicators in district electoral areas with local government districts and national averages.

The standardised admission rate for self-harm is not available for Sperrin and Mid Tyrone. However, Derry City and Strabane report an admission rate of 91 per 100,000 population. For Fermanagh and Omagh, the rate is 83 per 100,000 population. Both these rates are lower than the national rate of 102 per 100,000 population.

For the crude death rate for suicide, Sperrin reports a rate of 9.9 deaths per 100,000 which is lower than the rate for Derry City and Strabane (11.9 deaths per 100,000) and the national rate (11.6 deaths per 100,000). In Mid Tyrone the crude death rate for suicide is 10.1 deaths per 100,000 which is lower than the rate for Fermanagh and Omagh (13.7 deaths per 100,000) and the national rate (11.6 deaths per 100,000).

In terms of standard prescription rate for mood and anxiety, Sperrin records a rate of 225 persons prescribed per 1,000 population, lower than the rate for Derry City and Strabane (256 persons prescribed per 1,000 population) but exceeding the national average of 221 persons prescribed per 1,000 population. In contrast, Mid Tyrone reports the lowest prescription rate at 179 per 1,000, which is lower than the rate for Fermanagh and Omagh (201 per 1,000) and Northern Ireland (221 per 1,000).

4 IMPACTS WITHOUT MITIGATION

Research findings

ES Chapter 11 sets out relevant scientific literature on EMF exposures and health. This includes evidence underpinning the ICNIRP (ICNIRP, 1998) and ICNIRP (ICNIRP, 2010) guidelines.

It is noted that ICNIRP keep the literature under review and have not changed their guidelines for ELF EMF. The current (checked October 2024) WHO EMF position is that the ICNIRP guidelines are levels which the WHO state “do not appear to have any known consequence on health.” (WHO, 2006)

Assessment findings

Introduction

The proposed distribution infrastructure development will comprise c26.9 km of 33 kV OHL and c11 km of 33 kV UGC.

The impacts relate only to the operational stage. During construction and decommissioning there would not be current flowing through the system so no EMF exposures would arise.

The Government Code of Practice (page 4) states that compliance with the public exposure guidelines is assumed, based on evidence published by the Energy Networks Association (ENA) for types of infrastructure that by design are not capable of causing exceedance of the public exposure guideline limits.

The Government Code of Practice states that compliance with the public exposure guidelines set to protect health is assumed for OHLs and UGCs operated at 132 kV or less, without the need for more detailed assessment, on the basis of evidence published by the ENA showing that by design such infrastructure is not capable of causing exceedance of the public exposure guideline limits.

Public safety statements are available on medical devices, such as pace-makers (EMFs.info, 2024c). These confirm that given we are all surrounded by EMFs in our daily lives, the Medical Devices Regulations (The Medical Devices (Northern Ireland Protocol) Regulations 2021, Regulation (EU) 2017/745 of the European Parliament and of The Council of 5 April 2017, paragraph 14.2(b)) enforce an obligation on designers and manufacturers of active implantable medical devices (AIMDs) to make them immune to interference in “risks connected with reasonably foreseeable external influences or environmental conditions, such as magnetic fields, external electrical and electromagnetic effects, electrostatic discharge, ...”. For population health, the assessment is on the basis that devices are designed to be immune up to the public reference levels as set by the ICNIRP.

Community proximity

Chapter 11 of the ES stated that over the c37.9 km of route length, a total of 84 residential receptors are located within 100 m of the proposed route, 5 of which the route will pass either directly over or under.

Baseline information, relevant to the receptors has been reviewed and updated following a survey undertaken in August 2024, to confirm receptor numbers and locations. The updated survey information indicates that within 100m there are 58 receptors. The OHL and UGC do not run directly over or under any residential properties. The location of the receptors are illustrated in the Noise Technical Report, Figures 14.1 - 14.25.

Confirmed compliance by design

The statement of compliance with public exposure limits by the UK electricity industry is set out here (EMFs.info, 2024a): and in the Appendix of this statement of case (Section 10). This includes categorically stating that:

- “Overhead lines which operate at 132 kV and below are inherently compliant as even the largest capacity lines cannot exceed the public exposure limit by design.”

- “Underground cables do not produce external electric fields because they are surrounded by a metal sheath which screens the electric field. The largest magnetic fields produced by an underground cable are produced by the design of cable where the individual cores are furthest apart, and which carry the largest currents. Underground cables are not constructed to specific designs as overhead lines are; each one is potentially slightly different. We therefore take a hypothetical highest field-case design that has the cores separated by more than any physical cable would, and which carries a larger load than any physical cable would. If this hypothetical design is compliant, then any physical design, which will produce lower fields, will also be compliant. This hypothetical design could be operated at any voltage, as the magnetic field depends only on the current and geometry, and not on the voltage.”

The ENA certificates of compliance with public exposure limits are available here:

- Overhead cables operating at 132 kV and below (Energy Networks Association, 2024a)
- Underground cables operating at 132 kV and below (Energy Networks Association, 2024b)

Table 4.1 and Table 4.2 confirm the worst / highest case designs and that these are within the public exposure limits. These tables are reproduced from the electrical industry’s compliance statement (EMFs.info, 2024a).

Table 4.1: Confirmation of 132kv Overhead lines being compliant by design

Overhead lines at 132kV and below	Electric field	Magnetic field
Worst-case design criteria: 132 kV, “L7” pylon 7 metre clearance of conductors to ground 1400 Amps per circuit Untransposed phasing	3.6 kV/m	40 µT
Public exposure limits	9 kV/m	360 µT
Conclusion	COMPLIANT	COMPLIANT

Table 4.2: Confirmation of 132kv Underground lines being compliant by design

Underground lines at 132kV and below	Electric field	Magnetic field
Hypothetical highest field-case design criteria: Cable cores separated by 1 metre 1000 Amps per phase	0.0 kV/m	72 µT
Public exposure limits	9 kV/m	360 µT
Conclusion	COMPLIANT	COMPLIANT

The 33kV electrical infrastructure of the Proposed Development is considerably lower than the 132kV benchmarks.

Chapter 11 states for the overhead lines: “typical field strengths would be significantly lower: a maximum of 0.9 kV/m and 25.7 μ T underneath the OHL, with field strength further decreasing rapidly with distance away from the OHL.”

For the underground cables Chapter 11 states: “design specifications shows that the maximum magnetic field produced by the cable would be 1.82 μ T, which would occur at ground level directly above the centreline”.

It is therefore the case that the Proposed Development’s electrical infrastructure is inherently compliant by design with the nationally and internationally recognised ICNIRP standards that provide appropriate public health protection. Chapter 11 concludes: “the magnitude of impact would be negligible, with no identifiable health effects even taking a precautionary approach of assuming uniformly high sensitivity across the entire population”.

This conclusion is correct. The Proposed Development would not result in any significant public health effect.

5 PROPOSED MITIGATION MEASURES

None required. Compliance with health protection standards is achieved by the design.

6 RESIDUAL IMPACTS

No change from the ES.

7 CUMULATIVE IMPACTS, INTERACTIONS AND TRANSBOUNDARY

Cumulative Impacts

ES Position on Cumulative Effects (2021)

The cumulative impacts of the Proposed Development were primarily assessed in relation to the local Zone of Influence (ZoI) for human health, which extends 1 km from the site. Environmental factors including air quality, noise and vibration, and surface water quality, were examined for their potential to interact with existing sources of pollution. The key development that could present cumulative effects is the Curraghinalt mine site, but based on its Health Impact Assessment (2017) reports, no significant health risks are anticipated for any of the health determinants assessed (air quality, noise and vibration, transport, employment, surface water, groundwater and naturally occurring radioactive material).

The Proposed Development would connect to the electrical infrastructure at the proposed Curraghinalt mine site. However, on the basis that no adverse population health effects associated with ELF EMF are predicted for the Proposed Development and all electrical infrastructure at the proposed Curraghinalt mine site would also be compliant by design (i.e. ≤ 132 kV) no cumulative effects are likely.

Additionally, other nearby developments within the 1 km radius include:

- Industrial Projects:
 - LA11/2018/0250/F – proposed light industrial building for the washing maintenance and refurbishment of formwork equipment used for concrete shuttering (238 m from the Proposed Development).
- Livestock and Poultry Developments:
 - LA11/2017/0993/F – proposed free range poultry houses, max 32,000 birds with four meal bins and a litter shed (247 m from the Proposed Development).
- OHLs and Electrical Connections:
 - LA11/2016/0444/F – 11 kV three phase wooden pole power line (515 m from the Proposed Development).
- Wind Farms and Turbines:
 - LA10/2020/0512/F – The proposed retention of an operational Vesta V52 wind turbine (60m hub height; 52m blade diameter 86m blade tip height) (200 m from the Proposed Development).
 - LA10/2018/0673/F – The proposed erection of a 50m hub height Vesta V52 wind turbine with a max output of 225KW to replace wind turbine approval K/2012/0170/F (399 m from the Proposed Development).
- Waste Facilities and Wastewater Treatment Works:
 - LA11/2018/0463/F – replacement wastewater treatment plant within the existing site boundary (280 m from the Proposed Development).
 - LA11/2018/0724/F – extension to car parking area to include ramp GAS compound along with waste enclosure and associated perimeter fencing (767 m from the Proposed Development).

The assessment concludes that no cumulative effects are likely from the overlap of construction activities between the Proposed Development and other nearby projects, as these impacts would be temporary and intermittent. Additionally, the separation distance between the Proposed Development and other projects means no significant cumulative effects are expected during operation. For ELF EMFs, all distribution infrastructure complies with safety standards, ensuring no cumulative population or human health effects are likely from EMF exposure.

Updated Position on Cumulative Effects (2024)

The following identified 33kV projects have been assessed alongside the Proposed Development for their cumulative effects:

LA11/2023/1691/F – Strabane - Ardstraw - Proposed 33kV Network Upgrade consisting of both overhead line on wooden pole type construction & underground cable. Underground cable commencing at location 50m SE of 89 Woodend Road, Ballymagorry, BT82 0BP and ending at 70m North of 14 C (NI Planning Portal, 2024a).

LA11/2024/0491/F – Strabane - Plumbridge - Proposed new 33kV Network consisting of both overhead line on a wooden pole type construction and underground cable. The overhead line total route length is approximately 13.83km and the underground cable 4.67km. The total route length is 18.5km all within the Derry & Strabane Council area (NI Planning Portal, 2024b).

The assessment is that whilst in close proximity to the Proposed Development, being 33 kV line projects they are by design compliant with the ICNIRP health protection standards. As noted in Section 4 of this statement of case, the 33 kV lines are a fraction of the 132 kV basic restriction levels shown in **Table 2.1**. On the basis that they comply with Government policy and the Government Code of Practice, including the Statements of Compliance included in the Appendix (Section 10 of this statement of case), the individual effects will also be of negligible magnitude and not significant for public health. Even if the projects cables are run together the maximum field will always be designed to comply with the ICNIRP EMF exposure guidelines (EMFs.info, 2024b). Collectively the projects are considered to result in negligible EMF exposures to the public, and therefore also no discernible health effect.

Interactions

There are no additional population health effects expected from the interaction between the OHL and UGC as these have already been assessed.

Transboundary

Since the distribution infrastructure is located entirely within Northern Ireland, with the UGC and OHL situated 1.5 km and 4 km from the border respectively, no transboundary effects on population or human health can occur.

8 CONSULTATION RESPONSES AND SUBMISSIONS

Members of the public

The following concerns in relation to the Proposed Development have been raised by members of the public and are summarised below:

Concerns about health risks associated with prolonged exposure to EMFs from overhead power lines, especially for those living close to the Proposed Development.

Concerns about the carcinogenic potential of EMFs.

Concerns about the impact of EMFs on the wellbeing of local populations, suggesting correlations between EMFs and health issues such as cancer, childhood leukaemia and neurodegenerative diseases.

Concerns around the increased risks to health for residents living close to high-voltage power lines, noting that the local population would be especially vulnerable.

Concerns raised around the intensity of magnetic fields suggesting it could be higher in areas where power lines are buried at shallow depths, leading to increased exposure risks.

We acknowledge the concerns regarding the potential health risks associated with exposure to EMFs from the Proposed Development. The Proposed Development electrical infrastructure is by design compliant with relevant public health and safety standards as set out in **section 4.2.3**, levels which the WHO endorse as safe.

Derry City and Strabane Environmental District Council Health Services (dated 28/07/2021)

The following consultation was provided (emphasis added):

“Section 11 - Population and Health, of the ES, discusses the electrical and magnetic field emissions from the Overhead Cable (OHC) and the Underground Cable (UGC) in relation to the public health and protection guidelines of the 1998 International Commission of Non-Ionising Radiation Protection (ICNIRP). It is stated that the maximum electrical field strength from the proposed 33kV OHC is 0.9 kV.m⁻¹ (kilovolts per metre as opposed to the guideline level of 9 kV.m⁻¹ and the maximum magnetic field strength is 25.7 uT (microteslas) with the guideline level being 360 uT.

*In relation to the UGC, the maximum magnetic field strength would be 1.82 uT. The report states that there is no measurable electric field strength expected above ground due to cable sheath and fill material. **It is therefore concluded and the EHS would concur, that the proposed electrical cables are therefore compliant with the 1998 ICNIRP guidelines.** The report deems the magnitude of the impact from the EMF emissions as negligible with no identifiable health effects.”*

It is noted that there is agreement that the proposed electrical cables would be compliant with the 1998 ICNIRP guidelines. No concerns are raised and there is no disagreement made with the conclusion that there would be no indefinable health effects.

Fermanagh and Omagh District Council Environmental Health Services (dated 03/08/2021).

The following consultation was provided (emphasis added):

“Section 11 - Population and Health, of the ES, discusses the electrical and magnetic field emissions from the Overhead Cable (OHC) and the Underground Cable (UGC) in relation to the public health and protection guidelines of the 1998 International Commission of Non-Ionising Radiation Protection (ICNIRP). It is stated that the maximum electrical field strength from the proposed 33kV OHC is 0.9 kV.m⁻¹ (kilovolts per metre as opposed to the guideline level of 9 kV.m⁻¹ and the maximum magnetic field strength is 25.7 uT (microteslas) with the guideline level being 360 uT.

*In relation to the UGC, the maximum magnetic field strength would be 1.82 uT. The report state that there is no measurable electric field strength expected above ground due to cable sheath and fill material. **It is therefore concluded and the EHS would concur, that the proposed electrical cables are therefore compliant with the 1998 ICNIRP guidelines.** The report deems the magnitude of the impact from the EMF emissions as negligible with no identifiable health effects.”*

It is noted that there is agreement that the proposed electrical cables would be compliant with the 1998 ICNIRP guidelines. No concerns are raised and there is no disagreement made with the conclusion that there would be no indefinable health effects.

9 CONCLUSION

The large pylons seen crossing landscapes are 400 kV and 275 kV. The Proposed Development's 33 kV lines are one of the smallest high voltage lines found in the UK and are found throughout the countryside and communities. There is no indication that these pose an EMF risk to the public.

ICNIRP is the internationally recognised independent non-profit organization that provides scientific advice and guidance on the health and environmental effects of non-ionizing radiation.

As confirmed in the Strategic Planning Policy Statement (Department of the Environment, 2015) paragraph 6.249 the ICNIRP guidelines are adopted by the Government Code of Practice, which states it has been agreed by the Northern Ireland Executive and Health and Safety Executive and is explicit that: *"Government policy on electric and magnetic fields (EMFs) is that power lines should comply with the 1998 ICNIRP Guidelines"*.

The ICNIRP define safe levels for the public which includes *"individuals of all ages, and of varying health status, and this will include particularly vulnerable groups or individuals such as the frail, elderly, pregnant workers, babies and young children"* (ICNIRP, 2010).

The WHO state: *"The main conclusion from the WHO reviews is that EMF exposures below the limits recommended in the ICNIRP international guidelines do not appear to have any known consequence on health."*(WHO, 2006)

The Government Code of Practice states that compliance with the public exposure guidelines set to protect health is assumed for OHLs and UGCs operated at 132 kV or less. This is specifically and explicitly confirmed by the industry, including through publicly published certificates of compliance (see the Appendix Section 10 of this technical report):

Overhead cables operating at 132 kV and below (Energy Networks Association, 2024a)

Underground cables operating at 132 kV and below (Energy Networks Association, 2024b)

It is therefore the case that the Proposed Development's electrical infrastructure is inherently compliant by design with the appropriate public health protection standards.

Even this is a highly conservative finding as the Proposed Development's 33 kV infrastructure is considerably lower than the 132 kV benchmarks and the OHL and UGC do not run directly over or under any residential properties.

Health impacts would have a negligible magnitude at these exposures, including for vulnerable groups.

The ES Chapter 11 conclusions have been reviewed by the Derry City and Strabane Environmental Health Services and the Fermanagh and Omagh District Council Environmental Health Services. Both agree that the proposed electrical cables are compliant with the 1998 ICNIRP guidelines.

It is my evidence that the Proposed Development's 33 kV electrical infrastructure would not result in any identifiable public health effect. This is a not significant effect in EIA terms.

As concluded in ES Chapter 11, EMFs from the OHLs and UGCs of the proposed transmission infrastructure would be well below the guideline public exposure reference levels set to protect health. As such, the magnitude of impact would be negligible, with no identifiable health effects even taking a precautionary approach of assuming uniformly high sensitivity across the entire population.

10 APPENDIX: ENA STATEMENTS OF COMPLIANCE FOR 132 KV LINES



Statement of Compliance of overhead lines operating at 132 kV and below with Public Exposure Limits for Electric and Magnetic Fields

The UK has a carefully thought-out set of policies for managing and protecting against electric and magnetic fields (EMFs). This includes numerical exposure guidelines to protect against established, acute effects of EMFs. It is Energy Network Association members policy to ensure electricity assets comply with the exposure limits.

This Statement confirms that overhead lines operating at 132 kV or below are compliant with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) to power-frequency electric and magnetic fields (EMFs).

It is compiled in accordance with the provisions of "Power Lines: Demonstrating compliance with EMF public exposure guidelines. A voluntary Code of Practice." Issued by DECC March 2012 (see more details at the end of this Statement).

The Code of Practice states:

"The Electricity Industry agrees that whenever evidence is required of compliance with EMF exposure limits, it will provide evidence according to this Code of Practice. Government agrees that such evidence will be regarded as sufficient to demonstrate compliance."

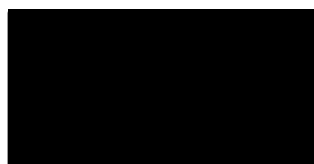
Situations envisaged in the Code of Practice where the need for evidence of compliance with exposure limits may arise include applications under the Planning Act 2008 and the Electricity Act 1989 and related activities such as property sales.

Thus, this Statement is regarded as sufficient to demonstrate compliance. Further calculations or measurements are not necessary.

For further information on EMFs, the exposure limits in the UK and compliance, see www.emfs.info

Prepared by: Dr Hayley Tripp, CSci, MRSB, MIET, MIEEnvSc.
Company Technical Expert for EMFs, National Grid

Signature:





Statement of Compliance of underground cables operating at 132 kV and below with Public Exposure Limits for Electric and Magnetic Fields

The UK has a carefully thought-out set of policies for managing and protecting against electric and magnetic fields (EMFs). This includes numerical exposure guidelines to protect against established, acute effects of EMFs. It is Energy Network Association members policy to ensure electricity assets comply with the exposure limits.

This Statement confirms that underground operating at 132 kV or below are compliant with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) to power-frequency electric and magnetic fields (EMFs).

It is compiled in accordance with the provisions of "Power Lines: Demonstrating compliance with EMF public exposure guidelines. A voluntary Code of Practice." Issued by DECC March 2012 (see more details at the end of this Statement).

The Code of Practice states:

"The Electricity Industry agrees that whenever evidence is required of compliance with EMF exposure limits, it will provide evidence according to this Code of Practice. Government agrees that such evidence will be regarded as sufficient to demonstrate compliance."

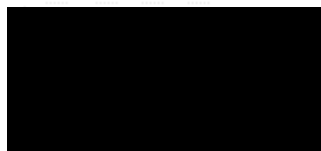
Situations envisaged in the Code of Practice where the need for evidence of compliance with exposure limits may arise include applications under the Planning Act 2008 and the Electricity Act 1989 and related activities such as property sales.

Thus, this Statement is regarded as sufficient to demonstrate compliance. Further calculations or measurements are not necessary.

For further information on EMFs, the exposure limits in the UK and compliance, see www.emfs.info

Prepared by: Dr Hayley Tripp, CSci, MRSB, MIET, MIEEnvSc
Company Technical Expert for EMFs, National Grid

Signature:



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