Scottish & Southern Electricity Networks

TRANSMISSION

LT132 Spittal – Loch Buidhe – Beauly 400 kV OHL Connection

EIA Scoping Report – Appendix B: Justification for Scoping Out EMF Assessments for Proposed 400 kV Overhead Lines

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APPENDIX B: JUSTIFICATION FOR SCOPING OUT EMF ASSESSMENTS FOR PROPOSED 400 KV OVERHEAD LINES

Introduction

1. The information provided in this Appendix has been included in this Scoping Report for the purpose of explaining the basis upon which the Applicant proposes to scope out electric and magnetic fields ("EMFs") from the EIA Report. The justification for scoping out EMF as a topic for assessment of impacts is based on calculated exposure limits which are known to be compliant with and below national and international standards. It is concluding that EMFs are not likely to have a significant effect and as a result scoped out of the EIA.

2. In addition, project specific Electric and Magnetic Fields[1] (EMF) compliance reports will be produced by the Applicant to accompany the application for consent for the Proposed Development under section 37 of the Electricity Act 1989.

Guidelines for Public Exposure

3. To prevent known effects of EMFs on health, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) developed health protection guidelines in 1998 for both public and occupational exposure to time-varying electric, magnetic and electromagnetic fields with a frequency of up to 300GHz.

4. In March 2004, the UK adopted the ICNIRP 1998 guidelines on the advice of the National Radiological Protection Board (now part of the National Institute for Health Protection's Centre for Radiation, Chemical and Environmental Hazards (NIHP CRCE)). These guidelines set conservative exposure levels for the public to electric and magnetic fields, and they are endorsed by the World Health Organisation and the UK Government.

5. The NIHP CRCE keeps under review emerging scientific research and/or studies that may link EMF exposure with various health problems and provides advice to the Department of Health and Social Care on the possible need for introducing further precautionary measures.

6. A voluntary Code of Practice was developed by the Government and published in 2012, which is entitled "Power Lines: Demonstrating compliance with EMF public exposure guidelines", for the purpose of implementing Government's policy to comply with ICNIRP Guidelines on exposure to electromagnetic fields ("EMFs")[2]. The voluntary Code of Practice has been agreed by the Department of Energy and Climate Change (now part of the Department for Energy Security and Net Zero), the Department of Health, the Energy Networks Association (of which SSEN Transmission is a member company), the devolved administrations for Wales, Scotland and Northern Ireland, and the Health and Safety Executive. The voluntary Code of Practice remains in force and applies in Scotland and is hereafter referred to as "the Code of Practice." It sets out what will be required to demonstrate compliance with the exposure guidelines in respect of sources of EMFs within the electricity system, including high-voltage double circuit overhead lines (OHLs). The equipment included are OHLs and underground cables that operate at voltages of 275 kV or 400 kV, and associated substations.

Relevant National Planning Policy

7. The UK Government's latest policy statement on EMFs is contained in the National Policy Statement for Electricity Networks Infrastructure (NPS EN-5)[3], which was re-issued in November 2023 and came into force on 17 January 2024. This latest policy statement is in line with current UK guidance on EMFs, which in turn is

[1] Electric and Magnetic Fields – as it applies to the technologies that form the basis of a proposed development, in which electric and magnetic fields derived from distribution and use of electricity.

[2] ICNIRP (1998) – Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz). Available to download from: https://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf

[3] UK Government Department for Energy Security & Net Zero (2023) National Policy Statement EN-5 (NPS EN-5). Available to download from: Electricity Networks National Policy Statement - EN-5 (publishing.service.gov.uk)

informed by relevant international guidance; and which is considered appropriate by the UK Government and their public health experts as previously referenced.

8. NPS EN-5 states at paragraph 2.9.51 that: "The levels of EMFs produced by power lines in normal operation are usually considerably lower than the ICNIRP 1998 reference levels". The Applicant is also advised to consider the factors set out in paragraph 2.10.11 of the NPS, and in respect of which the relevant factors are currently:

    a) compliance with the measures specified in regulations 17 and 18 of the Electricity Safety, Quality and Continuity 2002 Regulations[4]; and

    b) that optimal phasing of high voltage OHLs is introduced wherever possible and practicable in accordance with the companion Code of Practice on optimal phasing entitled "Optimum phasing of high- voltage double-circuit headlines," as updated in March 2012 ("the Phasing Code of Practice")

    c) On that basis, in paragraph 2.10.12 it is provided that: "*Where it can be shown that the line will comply with the current public exposure guidelines and the policy on phasing, no further mitigation should be necessary*."

9. Whilst the determination of applications for statutory consent for the installation and operation of overhead lines is devolved to Scottish Ministers, as noted in paragraph 1.4.3 of the NPS, aspects of NPS EN-5 are a relevant consideration for Scottish Ministers to take into account in decision-making. SSEN Transmission will evidence through a project specific compliance report that the proposed design complies with the guidelines as set out in the Codes of Practice and paragraph 2.10.11 of NPS EN-5. The report will include the measures that adhere to recommendations and guidance on ground clearance requirements and ensuring optimum phasing of high voltage double-circuit overhead lines.

Compliance Reports

10. SSEN Transmission designs all new equipment to comply with the Government's guidelines as set out in the Code of Practice. The approach to design also takes account of statutory requirements in relation to the minimum height of overhead lines and ground clearance, and, position, insulation, and protection of overhead lines to ensure compliance with the Electricity Safety, Quality and Continuity Regulations 2002[5]. In addition, it takes account of the guidelines contained in the companion Phasing Code of Practice[6].

11. This design approach described in the parameters of measurement which will be set out in the Compliance Report will demonstrate electric and magnetic fields are below the ICNIRP guideline levels. Table 1 below sets out in summary form the exposure limits in relation to the proposed OHL design. In addition to the above over-arching analysis, project specific compliance reports will accompany the application for consent for the Proposed Development under section 37 of the Electricity Act 1989. The compliance report will provide detailed calculations and measurements that will underpin evidence of compliance with the ICNIRP guideline levels for exposure levels for all fields at a project level.

Table 1: Compliance Parameters for AS4 Tower Design (with Triple Araucaria at 500mm spacing)

DESCRIPTION	Magnetic Field (under the line)	Electric Field (under the line)
DESIGN: 400kV Double Circuit OHL, AS4 Tower Design (*Triple Araucaria at 500mm spacing*) 9 m conductor ground clearance	89.55 µT	8.22 kV/m

[4] The Electricity Safety, Quality and Continuity Regulations 2002 downloaded at : UK Statutory Instruments2002 No. 2665 PART V Regulation17 & 18 https://www.legislation.gov.uk/uksi/2002/2665/regulation/17 & 18

[5] Electricity Safety, Quality and Continuity Regulations 2002. Downloaded at The Electricity Safety, Quality and Continuity Regulations 2002 (legislation.gov.uk)

[6] Optimum Phasing of high voltage double-circuit Power Lines a Voluntary Code of Practice as updated in March 2012. This document replaces "Optimum Phasing of high voltage double-circuit Power Lines: A voluntary Code of Practice" published by DECC in February 2011

DESCRIPTION	Magnetic Field (under the line)	Electric Field (under the line)
5 kA continuous current per circuit Transposed phasing		
UK Exposure Limits as per ICNIRP Guidelines (1998).	360 µT	9 kV/m
Conclusion	COMPLIANT	COMPLIANT

12. The calculations within the Compliance Report will be based on the Code of Practice. Calculations performed in accordance with the following are acceptable evidence of field levels:

    - for linear sources such as overhead lines and underground cables, are based on the infinite-straight-line approximation;
    - are of the unperturbed field;
    - take account of the correct conductor(s) number, type, and size;
    - ignore zero-sequence and negative-sequence currents, and voltages and currents induced in the sheath, ground, or earth wire;
    - for electric fields, treat the ground as a perfect conductor;

13. In addition, the report will:

    - take account of the basic tower geometry for the design of line in question but ignore variations in conductor spacing at angle towers.

14. More detailed evidence will also include:

    - Calculations based on the actual conductor geometry rather than the infinite straight-line approximation;
    - Calculations taking account of perturbations to the electric field from conducting objects.

15. For the Proposed development, technical evidence of compliance with EMF exposure guidelines defined in a statement with supporting calculations will confirm compliance with the Code of Practice. Specifically, a supporting compliance report will provide a calculation from the technical measurement of the maximum fields (i.e. directly under the line) demonstrating that where this maximum value is less than the ICNIRP guideline levels, all fields and exposures from that source will be compliant.

Additional References and Further Information

16. The full suite of relevant source information on EMFs used to inform this position statement including:

    i. www.emfs.info – National Grid information site on EMFs

    ii. Energy Networks Association (2017) – Electric and Magnetic Fields: The Facts. Available to download from http://www.emfs.info/wp-content/uploads/2017/09/EMF_The_Facts_250917.pdf

    iii. Electricity Safety, Quality and Continuity Regulations 2002. Downloaded at The Electricity Safety, Quality and Continuity Regulations 2002 (legislation.gov.uk)

    iv. Optimum Phasing of high voltage double-circuit Power Lines a Voluntary Code of Practice This document replaces “Optimum Phasing of high voltage double-circuit Power Lines: A voluntary Code of Practice” published by DECC in February 2011

    v. Department of Energy and Climate Change (DECC, 2012) – Power Lines: Demonstrating compliance with EMF public exposure guidelines – a voluntary Code of Practice. Available to download from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48308/1256-code-practice-emf-public-exp-guidelines.pdf

vi. ICNIRP (1998) – Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz). Available to download from: https://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf

vii. UK Government (2016) - The Control of Electromagnetic Fields at Work Regulations 2016. Available to download from: The Control of Electromagnetic Fields at Work Regulations 2016 (legislation.gov.uk)

viii. UK Government Department for Energy Security & Net Zero (2023) National Policy Statement EN-5 (NPS EN-5). Available to download from: Electricity Networks National Policy Statement - EN-5 (publishing.service.gov.uk)