WHITESTONE
solar farm

WHITESTONE SOLAR FARM

Volume 6 – Environmental Statement

6.20 Appendix 11.2 – SF6 Technical Note

Application Document ref. EN0110020/APP/6.20
Revision 01
June 2026

Planning Act 2008
Infrastructure Planning
(Applications: Prescribed Forms and Procedure) Regulations 2009
Regulation 5(2)(a)

Document status					
Version	**Purpose of document**	**Authored by**	**Reviewed by**	**Approved by**	**Review date**
Rev01	DCO Submission	GU	JT	JT	June 2026

Approval for issue		
Whitestone Net Zero Ltd	[redacted]	1 June 2026

Prepared by:

Whitestone Net Zero Ltd

Prepared for:

Whitestone Net Zero Ltd

Contents

Glossary

Figure Number	Figure Title
The Applicant	Whitestone Net Zero Ltd
The Application	The Application submitted to the Secretary of State for a Development Consent Order.
The Proposed Development	The proposed Whitestone Solar Farm.

Acronyms

Term	Meaning
AIS	Air Insulated Switchgear
CO2	Carbon Dioxide
ESQCR	The Electricity Safety, Quality and Continuity Regulations 2002
F-gas	Fluorinated gas
GIS	Gas insulated switchgear
NPS	National Policy Statement
SF6	Sulphur Hexafluoride

Units

Acronym	Meaning
kV	Kilovolts
kW	Kilowatts
MW	Megawatts

1 INTRODUCTION

1.1 Overview

1.1.1 This Sulphur Hexafluoride (SF6) Technical Note has been prepared on behalf of Whitestone Net Zero Ltd ("the Applicant") for Whitestone Solar Farm (hereafter referred to as 'the Proposed Development').

1.1.2 This document has been produced in accordance with the National Policy Statement (NPS) for Electricity Networks Infrastructure (EN-5) and outlines the Applicant's approach to managing the potential use of SF6 across the Proposed Development.

1.2 Sulphur Hexafluoride

1.2.1 SF6 is one of the most powerful greenhouse gasses known. Over a 100-year period, its global warming potential is approximately 24,000 times greater than carbon dioxide (CO_2) on a per kilogram basis. This means that 1 kg of SF6 has the same warming effect as about 24 metric tons of CO_2.

1.2.2 SF6 is an artificial, odourless gas employed in the electricity industry to maintain the safe and dependable functioning of networks. It is characterised by its remarkable stability, non-toxic nature, non-flammable properties, and electronegativity, which ensures that it does not create other compounds that might affect its state or effectiveness.

1.2.3 SF6 is predominantly used in electricity transmission and distribution. Medium and high voltage switchgear commonly contains SF6 because it provides excellent insulation for live electrical components and enables the safe interruption and switching of electrical components. Such equipment is deployed across the wider electricity network, including infrastructure that supports the transmission and distribution of renewable energy.

1.2.4 Electrical equipment is engineered to prevent the release of SF6 into the atmosphere. Modern SF6 containing switchgear is typically sealed for life, with manufacturers achieving extremely low leakage rates through robust design and stringent quality control.

1.2.5 The energy industry is striving to reduce the use of SF6, for example National Grid has an ambition to reduce SF6 emissions by 50% by 2030 and remove all SF6 from electricity assets by 2050 in line with its Responsible Business Charter[i] published in 2020. Solutions to replace SF6 with greenhouse gas free alternatives

i National Grid Responsible Business Charter 2020.

are currently being developed by electrical transmission equipment manufacturers, and manufacturers of such equipment are increasingly able to offer SF6 free components. However, commercially available options can be limited.

1.3 Policy and Legislation

1.3.1 The following policies and legislation have been considered for the purpose of this technical note. National Policy Statement (NPS) for Electricity Networks Infrastructure (EN-5) states:

1.3.2 SF6 is an insulating and arc-suppressant gas used in high voltage switchgear for electricity networks" (paragraph 2.9.60).

1.3.3 "It is also an extraordinarily potent greenhouse gas, and fugitive emissions from electricity networks infrastructure are an object of increasing environmental concern, especially in light of the UK's commitment to net zero by 2050" (paragraph 2.9.61).

1.3.4 "Applicants should at the design phase of the process consider carefully whether the proposed development could be reconceived to avoid the use of SF6-reliant assets" (paragraph 2.9.62).

1.3.5 "Where the development cannot be so conceived, the applicant must provide evidence of their reasoning on this point. Such evidence will include, for instance, an explanation of the alternatives considered, and a case why these alternatives are technically infeasible or require bespoke components that are grossly disproportionate in terms of cost." (paragraph 2.9.63).

1.3.6 "In particular, an accounting of the cost differential between the SF6- reliant asset and the appropriate SF6-free alternative should be provided" (paragraph 2.9.64).

1.3.7 "Where applicants, having followed the above procedure, do propose to put new SF6-reliant assets onto the electricity system, they should design a plan for the monitoring and control of fugitive SF6 emissions consistent with the Fluorinated gas (F-gas) Regulation and its successors." (paragraph 2.9.65).

1.3.8 "The climate-warming potential of SF6 is such that applicants should, as a rule, avoid the use of SF6 in new developments." (paragraph 2.10.14).

1.3.9 "Where no proven SF6-free alternative is commercially available, and where the cost of procuring a bespoke alternative is grossly disproportionate, the continued use of SF6 is acceptable, provided that emissions monitoring and control

measures compliant with the F-gas Regulation and/or its successors are in place" (paragraph 2.10.15).

1.3.10 "The Secretary of State should grant consent for an electricity networks development only if the applicant has demonstrated either;

i. That the development will not use SF6;

ii. Or;

a. that there is no proven commercially available alternative to the use of SF6; and

b. that a bespoke SF6-free alternative would be grossly disproportionate in terms of cost; and

c. This SF6 Technical Note has been prepared on behalf of Whitestone Net Zero Ltd ("the Applicant") for Whitestone Solar Farm (hereafter referred to as 'the Proposed Development'.

2 PROJECT APPROACH TO SF6

2.1 Where is SF6 used?

2.1.1 SF6 is typically used in gas insulated switchgear (GIS) and high voltage circuit breakers within substations to ensure protection against overloads and short circuits and to underpin reliable, uninterrupted electricity supply.

2.2 How has the project considered SF6?

2.2.1 After a review of technical and environmental requirements, as well as consideration of landscape visual impact, it was established that the alternative solution of Air Insulated Switchgear (AIS) would have a substantial footprint and greater visual impact. Given these considerations, GIS substations (SF6 or non-SF6) were retained as an option in addition to AIS to be evaluated further at the detailed design stage and to align with project constraints and environmental priorities.

2.2.2 Recognising EN-5's clear direction to avoid SF6 where possible, the Applicant's intent is to prioritise SF6 free equipment wherever viable and practicable, subject to safety, performance, and supply chain constraints. The worst-case scenario would require the use of GIS that is reliant on SF6. There are a variety of reasons why this may be required:

- **Emerging Technology Cost Uncertainty:** The cost differential for SF6- free equipment remains uncertain and challenging to forecast due to its status as an emerging technology, making budgeting and financial planning more challenging.
- **Commercial Availability:** Commercial availability of SF6-Free components, is particularly limited, raising concerns about procurement timelines and supplier capacity.
- **Risk of Project Delays and Cost Implications:** Limited availability of SF6-free equipment could result in delays, impacting ability to meet the required connection date. This poses risks to project deliverability, potential financing arrangements, and overall project timelines.

2.2.3 The Applicant's approach to SF6-free technology at this stage of design for relevant elements of the Proposed Development is as follows:

- **33kV Switchgear:** Where possible the applicant is committed to using SF6 free technology at 33 kV.
- **400kV Switchgear:** Where possible and economically proportionate, the applicant is committed to SF6-free solutions at the 400kV level, aligning with National Grid's proposed SF6-free substation approach at this voltage level.

2.2.4 The Applicant supports the principle of paragraph 2.10.14 of NPS EN-5. The Applicant is committed to not using SF6 at 33 kV and higher voltages where

possible and economically proportionate. This general approach to avoid the use of SF6-reliant assets aligns with paragraph 2.9.61 of NPS EN-5.

2.2.5 Acknowledging the limitations, the Applicant will engage with switchgear manufacturers and designers to investigate the use of SF6-free alternatives. When opportunities become available, the Applicant would perform an evaluation during the detailed design phase, post consent of the DCO, to ascertain the viability of these solutions for the Project.

2.2.6 It is the Applicant's intention to prioritise SF6-free equipment, wherever viable and practicable.

2.3 Cost and Programme Considerations

2.3.1 As a relatively new and evolving technology, SF6 free GIS at higher voltage levels currently attract price premiums, longer manufacturing lead times, and supplier capacity constraints when compared with conventional SF6 based GIS.

2.3.2 These factors may introduce risks to achieving required grid connection dates and could influence project financing. The precise extent of any cost differentials and delivery impacts will only become clear during the post consent tendering phase, once market tested bids from manufacturers are available; until then, the exact cost and programme implications cannot be confirmed.

3 SF6 CONTROL APPROACH

3.1.1 The Applicant is committed to implementing a monitoring and control strategy for any SF6-reliant assets in accordance with applicable legislation including EU Regulation No. 517/2014 and the UK Fluorinated Greenhouse Gases Regulations 2015. These measures will ensure that fugitive emissions are minimised and managed in line with regulatory expectations.

3.1.2 Assuming a worst-case scenario where the Project has to install SF6 reliant assets, the control of SF6 gas would be in line with the following regulations and standards:

- EU Regulation No.517/2014 (Retained) and the UK Fluorinated Greenhouse Gases Regulations 2015 working with fluorinated gases.
- BS EN 62271-4:2013 High-voltage switchgear and control gear. Handling procedures of SF6 gas and its mixtures.
- Energy Networks Association 2013 ER G69 Guidance on working with sulphur hexafluoride.
- BS EN 60376:2018 Specification of technical grade SF6 for use in electrical equipment.
- BS EN IC 60480:2019 Guidelines for the checking and treatment of sulphur hexafluoride (SF6) taken from electrical equipment and specification for is re-use.
- The Electricity Safety, Quality and Continuity Regulations 2002 (ESQCR).
- Health and Safety Executive guidance document HSG230 – keeping electrical switchgear safe.

3.2 Operation and Maintenance

3.2.1 In line with standard practice relating to the operation of GIS, to prevent leaks (thus minimising the risk of causing harm to the environment), all equipment would be maintained in line with manufacturer's instructions. Only personnel trained and competent under EU Regulation No.517/2014 (Retained) and the UK Fluorinated Greenhouse Gases Regulations 2015, will be allowed to operate and maintain equipment containing SF6.

3.2.2 In the unlikely occurrence of a leak, automatic monitoring systems would be employed to detect the issue. Any identified leaks would be addressed and repaired at the earliest opportunity following discovery. In accordance with relevant regulations and guidelines, suitable safe working systems would be implemented to safeguard employees from the hazards associated with this type of work.

3.2.3 Only trained and competent persons will be permitted to access areas where equipment containing SF6 is located. These areas will be secured in such a way as to prevent unauthorised access in compliance with the ESQCR Regulations 2002. This will help to mitigate any risk to public health.

3.3 Monitoring, maintaining records and auditing

3.3.1 Areas of the Proposed Development that have equipment containing SF6 will hold a register, which keeps record of the equipment containing SF6, and the quantity of SF6 used (as set in outline **Operational and Environmental Management Plan [EN0110020/APP/5.10].**

3.3.2 The register will also keep records of any leaks and repairs including the amount of SF6 used during the operational life of the equipment.

3.3.3 In the rare event of a leak occurring, leaks will be managed to ensure leakage rates of equipment stays under the maximum rates per year, in accordance with relevant regulations as outlined above. Leakage rates per year will be linked to the volume of gas contained within equipment, as stated by the manufacturer.

3.4 Decommissioning Approach

3.4.1 During the decommissioning phase of the Proposed Development, any SF6 will be removed in accordance with the legislation and best practice measure in place at the time. This would likely include re-using SF6 wherever possible. Where it is not reusable, it will be recovered and then either recycled or destroyed by licensed companies. During decommissioning, gas would be recovered from equipment by qualified personnel as set out in the outline **Decommissioning Management Plan [EN0110020/APP/5.11].**

4 REFERENCES

- National Grid Responsible Business Charter 2020 (National Grid Responsible Business Charter 2020 US.

WHITESTONE
solar farm

Contact

Whitestone Net Zero Ltd

info@whitestonesolarfarm.co.uk

0800 688 9936