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NSP/007/002 – Guidance on Substation Design: Design Risk Assessment

1. Purpose

The Construction (Design and Management) Regulations ('CDM') and the Management of Health and Safety at Work Regulations require that risk resulting from the construction and future use of substations and other installations is identified, eliminated or reduced to a low level at the design stage. This document describes the process by which this responsibility is discharged.

This document supersedes the following documents, all copies of which should be destroyed;

Document Reference	Document Title	Version	Published Date
NSP/007/002	Guidance on Substation Design: Design Risk Assessment	2.0	Jan 2018

2. Scope

This process shall apply to all designs for new or modified Primary and Supply Point substations for use on the Northern Powergrid network.

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3. Design Risk Assessment

Each project at the design stage shall be subject to a risk assessment. All hazards and risks shall be identified and recorded in the Design Risk Assessment. Risk levels shall be recorded as High (H), Medium (M) or Low (L). Any changes or special measures introduced to the design, or special construction methods, or any control measure necessary to eliminate or mitigate the identified hazards shall be recorded in the Designer's Risk Assessment.

Appendix 1 'Design Risk Assessment Tables' of this document contains the Designer's Risk Assessments for standard substation designs that make reference to Design Guidance Documents and procedures that shall be applied to eliminate or reduce the level of risk. The Designer's Risk Assessment contained in *Appendix 1* shall be reviewed for every project.

NSP/007/001 'Guidance on Substation Design: Key Design Parameters', lists the statutory instruments, external Northern Powergrid Codes of practice, company policies and Northern Powergrid Codes of Practice that shall be considered during production and review of the Designer's Risk Assessment.

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4. References

4.1. External Documentation

Reference	Title
	Environmental Protection Act
	The Building Research Establishment Good Building Guide
	The Management of Health and Safety at Work Regulations
BS 5228	Noise and Vibration Control on Construction and Open Sites
CDM	Construction (Design and Management) Regulations
CHSM	Construction Federation Construction Health and Safety Manual Section 34: Environment
COSHH	Control of Substances Hazardous to Health Regulations
ER S2/4	Limitation of fire risk in substations at 132kV and below and in enclosed cableways
HSE ACOP L101	Confined Space Regulations
HSE ACOP L23	Manual Handling Regulations
HSE INDG 401	Working at Height Regulations
LOLER ACOP L113	Lifting Operations and Lifting Equipment Regulations

4.2. Internal Documentation

Reference	Title
ENV/001/001	Management of Oil and SF6 containing assets
ENV/002/001	Management of Noise, Dust and Visual Impact
ENV/006/002	Network Design and Development
HAS/013	Confined Spaces and Excavations
HAS/024	Control of Noise at Work
HAS/033	Work Equipment and Lifting Equipment
HAS/034	Work at Height
IMP/001/909	Code of Practice for Distribution System Parameters
IMP/001/913	Code of Practice for the Economic Development of the EHV System
IMP/001/914	Code of Practice for the Economic Development of the 132kV System
IMP/002	Policy for Security Measures at Major Operational Sites
NPS/002/018	Technical Specification for Pilot, Control and Telephone Cables
NPS/003/016	Technical Specification for 48V and 110V Battery and Charger Systems
NSP/007/001	Guidance on Substation Design: Key Design Parameters
NSP/007/003	Guidance on Substation Design: Construction Details
NSP/007/005	Guidance on Substation Design: Electrical Design Clearances
NSP/007/006	Guidance on Substation Design: Transformer Transport, Delivery and Installation
NSP/007/007	Guidance on Substation Design: 11kV and 20kV Switchgear
NSP/007/008	Guidance on Substation Design: 33kV Switchgear
NSP/007/020	Guidance on Substation Design: Transformer Noise
NSP/007/022	Guidance on Substation Design: Oil Containment
NSP/007/025	Guidance on Substation Design: Working at Height
NSP/007/026	Guidance on Substation Design: Confined Spaces

4.3. Amendments from Previous Version

Reference	Description
Whole Document	Full Document Review

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5. Definitions

Reference	Definition
n/a	

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6. Authority for Issue

6.1. CDS Assurance

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

		Date
Liz Beat	Governance Administrator	13/03/2024

6.2. Author

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

Review Period - This document should be reviewed within the following time period;

Standard CDS review of 3 years?	Non-Standard Review Period & Reason	
No	Period: 1 Year	Reason: To align with other NSP reviews
Should this document be displayed on the Northern Powergrid external website?		Yes
		Date
Mark Thompson	Specification & Design Manager	28/03/2024

6.3. Technical Assurance

I sign to confirm that I am satisfied with all aspects of the content and preparation of this document and submit it for approval and authorisation.

		Date
David Johnson	Specification & Design Engineer	25/03/2024

6.4. Authorisation

Authorisation is granted for publication of this document.

		Date
David Sillito	Head of Major Projects	21/03/2024

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Appendix 1 – Design Risk Assessment Tables

Hazard	Risk	Risk Level	Design Action / Control Measure	Residual Risk (following design phase) to be Addressed by Construction Phase Health and Safety Plan YES/NO	Residual Risk Level		
					Public	Construction	Operational
<u>Site Selection</u>							
Past use	Explosion Fire Contamination Buried Structures	H	Where brownfield sites cannot be avoided Northern Powergrid Code of Practice NSP/007/023: Substation Design Guidance - Site Selection shall be followed. This incorporates the recommendations of the Building Research Establishment Good Building Guide (GBG) 51: Building On Brownfield Sites: Part 1 Identifying Hazards	Yes. The CDM Safety plan shall take account of hazards identified during the construction phase	M	M	M
Floodplain	Drowning Explosion Loss of supplies to public	H	Substations will preferably be constructed off floodplains. Where this is not possible measures described in Northern Powergrid Code of Practice NSP/007/023 Substation Design Guidance - Site Selection, will be followed.	Yes. The CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Trees adjacent to site	Crushing Electrocution Explosion Fire	H	Sites will be selected in compliance with Northern Powergrid Code of Practice NSP/007/023 Substation Design Guidance - Site Selection. Substations will generally be positioned and managed to avoid hazards from adjacent trees; way leave processes take account of tree clearance requirements.	Yes. The CDM Safety plan shall take account of hazards during the construction phase	M	M	M
<u>Environmental</u>							
Noise - transformers	Environmental nuisance	H	Northern Powergrid Code of Practice NSP/007/020: Substation Design Guidance: Transformer Noise, shall be applied to mitigate transformer	No	L	L	L

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			noise with Northern Powergrid document and the Environmental Protection Act (1990).				
Noise: Construction plant and machinery.	Environmental nuisance Safety risk	H	Any special requirements associated with the particular site will be identified in the site selection process described in Northern Powergrid Code of Practice NSP/007/023: Substation Design Guidance: Site Selection Measures. Measures for reducing noise nuisance during construction will be agreed in the CDM risk assessment in compliance with the company policies HAS/024, GSP/04, ENV/002/001, to ensure compliance with BS 5228: Noise and Vibration Control on Construction and Open Sites.	Yes. CDM Safety plan shall take account of noise hazards during the construction phase.	M	M	M
Insulating oil	Environmental contamination	H	Designs shall incorporate oil containment specified in Northern Powergrid Code of Practice NSP/007/022: Substation Design Guidance: Oil Containment to meet company policies ENV/006/002 and ENV/001/001 and the Construction Federation Construction Health and Safety Manual (CHSM) Section 34: Environment.	Yes. The CDM Safety plan shall take account of hazards during the construction phase	M	M	M
SF6	Environmental contamination Suffocation	H	The switchgear specifications and standards referred to in Northern Powergrid Code of Practices NSP/007/007: Substation Design Guidance: 11kV and 20kV Switchgear and NSP/007/008 Substation Design Guidance: 33kV Switchgear, define limits, and type and routine testing for SF6 leakage. Northern Powergrid Code of Practice NSP/007/003 Substation Design Guidance: Building Details New Build, and NSP/007/004: Substation Design Guidance: Building Details Existing Substations, incorporate requirement for ventilation to prevent the build-up of SF6.	Yes. The CDM Safety plan shall take account of hazards during the construction phase to ensure compliance with company environmental Northern Powergrid Northern Powergrid Code of Practice EOC 16.	M	M	M
SF6 decomposition products	Safety hazard	H	Northern Powergrid Operational Practice Manual clause WB 1.5.4 gives precautions for avoiding risk from SF6 decomposition products.	Yes. The CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Chemicals or Substances Hazardous to Health	Safety risk Environmental contamination	H	Only plant and equipment assessed for use on the Northern Powergrid network shall be incorporated in the design; the assessment process includes COSHH assessment. Construction work shall comply with COSHH regulations in compliance with company policy SAF/COS/01.	Yes. The CDM Safety plan shall take account of hazards during the construction phase	M	M	M

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Dust	Environmental contamination Safety Hazard	H	Any specific adverse site conditions and environmental impacts will be identified during site selection process in Northern Powergrid Code of Practice NSP/007/023: Substation Design Guidance: Site Selection. Any special controls or work methods will be agreed at this stage to ensure compliance with company policy ENV/002/001: Management of Noise Dust and Visual Impact.	Yes. The CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Batteries	Environmental contamination	M	DC systems shall comply with Northern Powergrid Code of Practice NSP/007/014: Substation Design Guidance: DC Systems, and be of a manufacturer and type approved for use on the Northern Powergrid network. They shall comply with Northern Powergrid Code of Practice NPS/003/016. Disposal of batteries shall be included in an end of life report produced in compliance with Northern Powergrid Code of Practice NSP/007/029: Substation Design Guidance: End of Life.	Yes. The CDM Safety plan shall take account of hazards during the construction phase	L	L	L
Equipment Selection							
Ratings	Explosion	H	The calculated site fault and load currents shall be used to check that the rating of the equipment to be used meets the required duty. Only equipment assessed for use on the Northern Powergrid network shall be used. Equipment shall comply with Northern Powergrid Code of Practices NSP/007/006, /007 and /008) and NPS Technical Specifications in compliance policy documents IMP/001/909, IMP/001/913 and IMP/001/914.	No	L	L	L
Approvals	Failure to meet performance standards	H	Only plant and equipment approved for use on the Northern Powergrid network in accordance with company Northern Powergrid Code of Practice PRC/200/913 and PRC/200/914 shall be installed.	No	L	L	L
Outdoor switchgear	Access to exposed switchgear	H	External compounds will be designed in accordance e with Northern Powergrid Code of Practice NSP/007/005: Electrical Design Clearances and BS 5347. Design clearances will be incorporated in the substation layout drawings and checked.	Yes. The CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Height of operating positions	Contact with live HV conductors	H	Operating positions will be arranged within the compound design to maintain compliance with Northern Powergrid Code of Practice NSP/007/005: Electrical Design Clearances and BS 5347 to enable switchgear to be operated without infringing safety clearances.	Yes. The CDM Safety plan shall take account of hazards during the construction phase	M	M	M

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Manual handling: Selection of fixed building materials, removable covers and panels, support structures, and HV and ancillary electrical equipment.	Injury Strains	H	Design and material selection shall be considered within Northern Powergrid Code of Practices NSP/007/003: Building Details New Building and NPS/003/004 Building Details Existing Substations. Switchgear assessment shall take account of manual handling. These considerations shall be made with regard to company policies HAS/024 and HAS/033 and the Manual Handling Regulations: HSE ACOP L23	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Site Layout							
Access and egress during construction	Slips Trips Falls Collision Crushing Electrical contact	H	Site layout will be arranged in compliance with Northern Powergrid Code of Practices NSP/007/030: Substation Design Guidance: Substation and Layout and NSP/007/005: Substation Design Guidance: Electrical Design Clearances to ensure sufficient room for access and manoeuvring and the segregation of vehicular and pedestrian access during construction	Yes. The CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Access and egress during operational activities	Slips Trips Falls Crushing Trapping Electrical contact Structural Failure Damage to plant	H	The substation shall be designed to comply with Northern Powergrid Code of Practice NSP/007/030: Substation Design Guidance: Substation and Layout and NSP/007/005: Substation Design Guidance: Electrical Design Clearances, and BS5347 to ensure safe access for foreseeable operational and maintenance activities.	Yes. The CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Access for cranes, concrete pumps, telehandlers and forklifts etc.	Slips Trips Falls Collision Crushing Electrical contact	H	The substation layout specified in Northern Powergrid Code of Practice NSP/007/030: Substation Design Guidance: Substation and Layout and NSP/007/005: Substation Design Guidance: Electrical Design Clearances shall provide suitable access and working areas to allow cranes and lifting equipment to be operated in compliance with the Lifting Operations and Lifting Equipment Regulations (LOLER): ACOP L113	Yes. The CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Access: Cable trenches, bunds, pits, basements, plant and switchgear,	Slips Trips Falls Collision	H	The substation shall be designed to comply with Northern Powergrid Code of Practice NSP/007/025: Substation Design Guidance: Working at Height and NSP/007/026 Substation Design Guidance: Confined Spaces to ensure adequate and safe access for foreseeable operational	Yes. The CDM Safety plan shall take account of hazards during the construction phase	M	M	M

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vehicle, pedestrian.			and maintenance activities in compliance with the DoE Building Regulations ADK (Rev).				
Offloading, manoeuvring and positioning plant and equipment.	Plant instability Crushing Electrical contact	H	Substation shall be designed to comply with Northern Powergrid Code of Practices NSP/007/003: Substation Design Guidance: Building Details New Build and NSP/007/004: Substation Design Guidance: Building Details: Existing Substations to ensure adequate entry, hardened access ways and anchor points.	Yes. The CDM Safety plan shall identify process for the management of the delivery, off-loading and delivery of plant and equipment during the construction phase.	M	M	M
Lighting	Slips, Trips, Falls	H	Standard substation lighting shall be installed as specified in Northern Powergrid Code of Practice NSP/007/011: Substation Design Guidance: Substation Heating and Lighting.	Yes. The CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Overhead lines over sailing access routes	Electrocution	H	Where practicable any such crossing to be undergrounded.	Yes, CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Storage of materials	Injury Damage to plant	H	Site layout will be arranged to allow sufficient room for the segregation of materials during construction.	Yes, CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Positioning of welfare facilities - construction	Insufficient room	M	Site layout will be arranged to allow sufficient room for construction welfare facilities.	Yes, CDM Safety plan shall take account of the provision of construction welfare facilities	L	L	L
Welfare facilities - finished substation	Inappropriate facilities	M	Substation welfare facilities will be provided as specified in Northern Powergrid Code of Practice NSP/007/003 and /004	No	L	L	L
Structural Design							
Design integrity of new civil engineering structures	Structural failure during construction or service	H	Structure designs shall be approved by accredited structural engineers. Standard designs shall be applied within agreed criteria.	No	L	L	L

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Electro-mechanical load on outdoor busbars	Failure in service	H	Busbar design is specified in Northern Powergrid Code of Practice NSP/007/024 and shall be applied within the parameters specified in BS7354	No	L	L	L
Fragile materials	Failure during construction or in service	H	None used in the standard substation design	No	L	L	L
Indoor trench covers - collapse	Slip Trip Fall	H	Trench cover selection and application is specified in Northern Powergrid Code of Practice NSP/007/003 and /004. Applications shall take account of load carrying capacity, safe access, and lifting and handling considerations.	No	L	L	L
Existing manhole / trench covers - collapse	Slip Trip Fall	H	The condition of existing covers shall be assessed and replaced as necessary. In compliance with Northern Powergrid Code of Practice NSP/007/003 and /004.	Yes, CDM Safety plan shall take account of the provision of construction welfare facilities	M	M	M
<u>Working at Height</u>							
Existing Plant and Switchgear	Falling from height	H	Substations shall be designed in accordance with Northern Powergrid Code of Practice NSP/007/025 to ensure that account is taken of working at height on existing plant and switchgear both during construction and operational to allow compliance with company safety policy HAS/034, and the Work at Height Regulations : HSE Industry Guide INDG 401.	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M
New Plant and Switchgear	Falling from height	H	Substations shall be designed in accordance with Northern Powergrid Code of Practice NSP/007/025 to ensure that account is taken of working at height on new plant and switchgear both during construction and operational to allow compliance with company safety policy HAS/034, and the Work at Height Regulations : HSE Industry Guide INDG 401.	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Existing Building and Ancillary Equipment	Falling from height	H	Substations shall be designed in accordance with Northern Powergrid Code of Practice NSP/007/025 to ensure that account is taken of working at height on existing building and ancillary equipment both during construction and operational to allow compliance with company	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M

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			safety policy HAS/034, and the Work at Height Regulations : HSE Industry Guide INDG 401.				
New Building and Ancillary Equipment	Falling from height	H	Substations shall be designed in accordance with Northern Powergrid Code of Practice NSP/007/025 to ensure that account is taken of working at height on new building and ancillary equipment both during construction and operational to allow compliance with company safety policy HAS/034, and the Work at Height Regulations : HSE Industry Guide INDG 401.	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M
<u>Confined Spaces</u>							
Trenches	Drowning Asphyxiation	H	Trench design shall comply with Northern Powergrid Code of Practice NSP/007/026 to ensure compliance with company safety instruction HAS/013 and the Confined Space Regulations: HSE ACOP L101. Trenches shall be no deeper than necessary, preferably above surrounding ground level and ventilated.	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Excavations	Drowning Asphyxiation Crushing	H	Northern Powergrid Code of Practice NSP/007/026 specifies precautions that shall be taken in substation design to minimise risk from excavations in compliance with the company safety policy HAS/013 and the Construction Health and Safety Manual Section 8B	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Cable Basements	Drowning Asphyxiation	H	Northern Powergrid Code of Practice NSP/007/026 specifies precautions that shall be taken in the design of cable basements to minimise risk and ensure compliance with the company safety instruction HAS/013 and the Confined Space Regulations: HSE ACOP L101.	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Cable Tunnels, Pits and Sumps	Drowning Asphyxiation	H	Northern Powergrid Code of Practice NSP 007/026 specifies precautions that shall be taken in the design of cable basements to ensure compliance with the company safety instruction HAS/013 and the Confined Space Regulations: HSE ACOP L101.	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M
<u>Security</u>							
Unauthorised access: during construction	Injury or electrocution to	H	Substation layout described in Northern Powergrid Code of Practice NSP/007/017 shall take account of the need to ensure security during	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M

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	members of the public		construction the IMP/002 and the Health and Safety Guidance document HS (G) 151.				
Unauthorised access: in service	Injury or electrocution to members of the public	H	Northern Powergrid Code of Practice NSP/007/017 shall be applied to ensure compliance with company policy IMP/002 on security of operational sites.	No	L	L	L
Vermin	Disease Bites Damage to equipment	H	Measures are included in Northern Powergrid Code of Practice NSP/007/003 and /004 to mitigate risk to plant from vermin. Risk during construction will be considered in CDM risk assessment.	Yes	M	M	M
Vegetation	Assists unauthorised access to substation	H	Northern Powergrid Code of Practice NSP/007/017 requires no vegetation other than grass to be planted within 2 m of a perimeter fence.	Yes. CDM Safety plan shall take account of existing vegetation during the construction phase	M	M	M
<u>Fire Mitigation</u>							
Transformers, switchgear, ancillary equipment,	Burns, Smoke inhalation Fumes Explosion	H	The fire mitigation systems specified in Northern Powergrid Code of Practice NSP/007/010 shall ensures compliance with the company safety instruction HAS/037 and DSS/031.	Yes. CDM Safety plan shall take account of existing vegetation during the construction phase	M	M	M
Emergency exit routes, signs, emergency lighting	Slips, trips, falls Smoke inhalation,	H	Northern Powergrid Code of Practice NSP/007/010 shall be applied to ensure compliance with Engineering Recommendation S2/4	No	L	L	L
Pressurisation of buildings	Blast	H	Application of Northern Powergrid Code of Practice NSP/007/003 and /004 shall include measures to limit pressure rise within the substation building.	No	L	L	L
<u>Electrical</u>							

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Earthing System	Step and touch potential.	H	Substation earthing systems shall be designed in compliance with Northern Powergrid Code of Practice NSP/007/012 in order to maintain step and touch potential to safe values.	No	L	L	L
Selection of chippings for compounds and bunds	Step and touch potential.	H	External compound coverings shall be specified in accordance with Northern Powergrid Code of Practice NSP/007/012 to maintain step and touch potentials to safe values.	No	L	L	L
Electrical clearances - working and access clearances	Contact with live HV conductors	H	The use of exposed HV conductors shall be avoided wherever practicable. Compounds with exposed HV electrical conductors shall comply with Northern Powergrid Code of Practice NSP/007/005 to achieve requirements in BS7354 and the Distribution Safety Rules.	No	L	L	L
Indoor Switchgear - arc containment	Internal arc products from switchgear failure	H	Switchgear shall be selected in accordance with Northern Powergrid Code of Practice NSP/007/003 and /004; only switchgear assessed for use by Northern Powergrid with known arc containment performance can be purchased. Any special arc-containment or arc-venting requirements shall be incorporated into the switch room design.	No	L	L	L
Outdoor Switchgear	Contact with live HV conductors	H	Where outdoor switchgear is used the electrical clearances specified in Northern Powergrid Code of Practice NSP/007/005 shall be applied to the substation design.	Yes. CDM Safety plan shall take account of hazards during the construction phase	L	L	L
Power cables - electrical performance	Electrical duty not achieved	H	Power cables shall be approved for use on the Northern Powergrid network and rated in compliance with policy documents' IMP/001/909, /913 and /914.	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Power cables - installation	Damage to cable. Injury during installation	H	Substations shall be designed to allow power cables to be installed in compliance with Northern Powergrid Policy Document DSS/026	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Protection / control cables	Electrical duty not achieved	H	Protection and control cables shall comply with Northern Powergrid Technical Specification NPS/002/018	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Plant and equipment:	Electrical duty not achieved.	H	Plant, equipment, cables and conductors shall be selected in compliance with Northern Powergrid Codes of Practice. Ratings will be checked against required duties at the design stage.	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M

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Normal and fault ratings:							
DC system	Electrical duty not achieved,	H	DC system shall comply with Northern Powergrid Code of Practice NSP/007/014 in order to achieve required duty.	Yes. CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Heating and lighting system	Minimum functional specification not achieved	H	Heating and lighting shall be designed in compliance with Northern Powergrid Code of Practice NSP/007/011. Installation shall be in accordance with IET Regulations.	Yes, CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Operation of electrical equipment - risk to operator	Injury Burns	H	Plant and switchgear shall be selected in compliance with the Northern Powergrid Codes of Practice and the Northern Powergrid Technical Specifications. Substations shall be designed in compliance with Northern Powergrid Code of Practice NSP/007/005 (electrical clearance) and NSP/007/012 (substation earthing).	Yes, CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Risk of trip - accidental contact with protection/control equipment or secondary wiring	Loss of supply	H	Secondary equipment, relay panels and control panels will be to Northern Powergrid Technical Specifications and generally to ENATS 50-18	Yes, CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Operation of fault interfering isolator	Injury Burns Shock	H	Where fault interfering disconnectors are installed, warning labels shall be applied as specified in Northern Powergrid Code of Practice NSP/007/018.	Yes. Agreed operating procedures must be applied.	M	M	M
Electric fence	Shock	H	Security requirements shall be assessed and designed in compliance with Northern Powergrid Code of Practice NSP/007/017 including warning signs and mesh-fence protection when adjacent public paths to prevent accidental contact.	Yes. Agreed operating procedures must be applied.	M	M	M

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<u>Pressure systems and vessels</u>							
SF6 pressure systems	Disruptive release Pressure vessel failure	H	Switchgear shall comply with Northern Powergrid Code of Practice NSP/007/007 and /008, and be assessed for use on the Northern Powergrid network. Standards require type and routine testing of SF6 pressure systems. Systems shall be installed, operated and maintained to agreed procedures.	Yes, CDM Safety plan shall take account of hazards during the construction phase	M	M	M
Fire suppression system	Disruptive release Pressure vessel failure	H	System designs shall comply with Northern Powergrid Code of Practice NSP/007/010 and be approved for use on the Northern Powergrid network. Pressure vessels will be proof tested routinely inspected. Systems shall be operated and maintained within agreed procedures.	Yes, CDM Safety Plan shall take account of hazards during the construction phase	M	M	M
<u>Future Maintenance</u>							
Routine maintenance operations	Switching incidents Accidents	M	Low maintenance or maintenance-free equipment shall be utilised wherever possible. Maintenance requirements and manuals shall be forwarded to the relevant maintenance section prior to commissioning.	No	L	L	L
<u>End of Life</u>							
Environmental and safety hazard at end of life	Environmental contamination Safety risk	H	An end of life report must be completed as part of the CDM file.	Yes. Check that end of life report is included in the CDM file.	L	L	L