Environmental Risk Assessment - JP3647JU

Kao Data Centre – KLON 06

Date:	February 2023	**Issue:**	1.0
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Issuing Office: Glasgow

DOCUMENT CONTROL

Issue	Date	Status	HDR Author	HDR Approval	Notes
1.0	28/02/2023	Issue	28/02/2023_JL	28/02/2023_NS	First issue

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APPENDICES

1.0 INTRODUCTION

This Environmental Risk Assessment (ERA) has been prepared by HDR on behalf of the operator KD 2 Limited (Kao Data*)* in support of the application for a new bespoke Environmental Permit (ref JP3647JU).

This ERA relates to the proposed operation of the combustion plant exceeding 50MWth and the associated fuel storage facilities at the Slough Data Centre located at:

Kao Data
672 Galvin Road
Slough
SL1 4AN
NGR: SU 96096 80630

This ERA aims to identify potentially significant environmental risks associated with the installation's activities, the applicable source pathway receptors, and the control measures in place to help mitigate the identified risks.

This ERA has been produced in accordance with Environment Agency (EA) guidance – "Risk assessments for your environmental permit" [1].

Please refer to the following reports for detailed risk assessments that have been submitted as part of the application for a permit:

- Air Quality assessment
- Noise assessment
- Site condition report / Site Baseline assessment

The requirement to complete a Climate Change Risk Assessment (CCRA) as part of the application for a new bespoke Installation EP was withdrawn in August 2022[2]. As is now required, this will be integrated into the sites management system.

[1] https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit
[2] https://www.gov.uk/guidance/adapting-to-climate-change-risk-assessment-for-your-environmental-permit

2.0 METHODOLOGY

2.1 Approach

This ERA has been prepared in accordance with EA guidance. This guidance recommends that the following steps are undertaken in preparing a risk assessment:

1. Identify and consider risks for your site, and the sources of the risks.
2. Identify the receptors (people, animals, property, and anything else that could be affected by the hazard) at risk from your site.
3. Identify the possible pathways from the sources of the risks to the receptors.
4. Assess risks relevant to your specific activity and check they are acceptable and can be screened out.
5. State what you will do to control risks if they are too high.
6. Submit your risk assessment as part of your permit application.

2.2 Risk scoring

This ERA has been completed using the scoring matrix shown in Table 2.1 – Risk Matrix with definitions for each score as follows:

Probability of exposure:

- High – exposure highly likely to occur
- Medium – considered to be likely
- Low – considered to be unlikely
- Very Low – considered to be highly unlikely / very rare event / mitigation in place

Consequence:

- High – potential for significant impact requiring mitigation / remediation
- Medium – potential for moderate impact which may require mitigation / remediation
- Low – negligible impact that may require mitigated
- Very Low – no significant / perceivable impact to receptor

Table 2.1 – Risk Matrix

	Probability of exposure / Likelihood			
Consequence	High	Medium	Low	Very Low
High	High	High	Medium	Low
Medium	High	Medium	Medium	Low
Low	Medium	Medium	Low	Very low
Very low	Low	Low	Very low	Very low

3.0 SITE CONTEXT

We have presented a high-level summary below. Please refer to the Non-technical Summary (NTS) document submitted with the application for a permit for further details.

3.1 Site location

The installation is located approx. 1.6kn to the West of Slough town centre on the south-eastern corner of Slough Trading Estate, Galvin Road, Slough, SL1 4AN (see Appendix A). The National Grid Reference for the centre of the site is SU 96096 80630.

The site is bound by to the north by Axel Avenue, beyond which are commercial / light industrial properties, including a car garage. To the north-east of the site is a similar data centre building. To the west and south the site is bound by residential properties. To the west the site is bound by Galvin Road, beyond which are similar data centre properties.

3.2 Site activities

The installation has been operating as a Data Centre since 2009. Expansion works in 2023/24 will see 7 no. additional Emergency Standby Generators (ESGs) installed and commissioned. This will see the total thermal capacity exceeding 50MWth for the first time in the sites history. The development will occur in 2 stages, with the first stage taking place in the first half of 2023 for 3 no. ESGs. The site plan and emissions points can be seen in Appendix B.

The ESGs are “excluded MCPs” as they are purely standby plant and there is no capacity agreement in place. All the ESGs due to be commissioned are over 1MWth and are therefore classed as ‘Medium Combustion Plant ‘(MCP). Details of the existing and new MCPs are in the table below with more details found in the Non-technical Summary submitted with the application.

Table 3.1 Summary of MCP details

MCP type	No. of ESGs	Thermal capacity	Install date
Existing	6	40.54MWth	2010
New	7	60.09MWth	2023-2025
Total after expansion	**13**	**100.6MWth**	

The location of the generators, fuel tanks, emissions points (flues / stacks) and surface water connections are shown in the Site plan found in Appendix B. The installation boundary encompasses the listed activities only.

3.3 Site sensitivity

Please refer to the site condition / baseline report for a description of the following:

- Geology
- Hydrogeology
- Hydrology
- Ecology & heritage

According to the EA's Conservation Screening report shown in Appendix C, there are 3 Local Wildlife Sites within 2000m of site: Railway Triangle (off Stranraer Gardens), Jubilee River and Dorney Wetlands and Haymill Valley. In addition, there is one report of a Protected Species within 500m of site. This is a Bullhead, a type of protected fish, and is located to the East of the installation.

The site is in the administrative boundaries of Slough Borough Council (SBC). SBC has declared four Air Quality Management Areas (AQMAs), the closest of which, the Three Tuns AQMA, is located 200m to the east of the site.

3.4 Sensitive receptors

Sensitive receptors are either human/ecological receptors that could potentially be affected by the permitted activities. The sensitive receptors identified as part of this ERA are presented in the tables below.

Table 3.2 Human Receptors

Location / description	Distance (m)	X grid ref	Y grid ref
Hadlow Court Residence	130	496182.1	180518.0
Pitts Road Residence	180	496177.1	180459.6
Thirkleby Close Residence	210	496101.3	180420.1
Pitts Road Residence	230	496178.1	180406.7
Bath Road/ Salt Hill Avenue Residence	380	496222.1	180261.8
Thirkleby Close Residence	300	496091.3	180331.1
Farnham Road Residence (opp. Grace Court)	340	496351.4	180357.2
Farnham Road/ Salt Hill Way Residence	300	496400.7	180491.2
Grace Court Residence	390	496454.6	180405.0
Bath Road/ Glentworth Place Residence	470	496322.2	180191.0
Bath Road/ Cranbourne Road Residence	400	496159.0	180226.4
Pitts Road Residence	260	496282.3	180421.5
UCB (Pharmaceuticals)	400	495709.4	180533.4
Rotunda Youth Centre	300	496324.6	180869.8
Phoenix House Apartments	220	496323.9	180523.9
Gym Group Slough (Gym)	180	496235.9	180772.9
Frank Sutton Way Residence	420	496527.9	180777.0
Hershel Grammar School	400	496422.2	180919.1
Eden Girl's School	360	495912.7	180331.1
Frank Sutton Way Residence	380	496502.3	180690.5
Northampton Place	370	496327.4	180966.5
Hadlow Court Residence	160	496243.7	180518.3
Astoria Heights Flats (Residence)	260	496225.5	180878.1

Table 3.3 Ecological Receptors

Site Name	Distance from Site (m)	Designation	X grid ref	Y grid ref
Haymill Valley Local Nature Reserve	2000	Local Nature Reserve	494252	181477

4.0 RISKS IDENTIFIED

Using the guidance and approach outlined in Section 2.0, the following risks have been identified as having potential to cause harm to the environment and / or human receptors:

- Controlled releases to air
- Accidents
- Odour
- Noise and Vibration
- Fugitive Emissions (from uncontrolled sources)
- Visible emissions
- Global warming potential
- Waste
- Water discharges

Section 5.0 presents the risk assessment for each of the above including identification of the potential hazard, receptors, pathway, risk management practices, probability of exposure, consequence of exposure and overall risk.

5.0 ENVIRONMENTAL RISK ASSESSMENT

5.1 Controlled releases to air

Hazard	Receptors	Pathway	Controls / Mitigation / Risk management	Probability of exposure	Consequence of exposure	Overall risk
Point source emissions to air- NO_x, CO, SO_2, PM_{10} emissions from generator stacks	Employees, residents, and adjacent premises / pedestrians / road users immediately surrounding the installation.	Airborne	An Air Quality Impact Assessment & Dispersion Model has been completed and submitted in support of this permit application ("Air Quality Assessment"). This report concluded that "all long-term and short-term increase in pollution concentrations as a result of the normal operation (testing and maintenance) of the SBGs are not expected to have a significant impact on local air quality." The report indicated that significant short-term impacts on NO2 as a result of a prolonged emergency grid failure are not anticipated. The ESGs are designed to provide power in the event of grid failure, and during operation are a point source of emissions to air. The National Grid report (see Appendix D) for 2021-2022 stated the overall reliability of grid supply was 99.999936% for substations above 132kV supplies. This equates to the probability of a 1-minute outage occurring once in 5.8 years and a 1 hour outage occurring once in 346 years. Reliability in 2020-2021 was 99.999966% and 99.999974% in 2019-2020. Operation of the SBGs is therefore likely to be limited to testing and maintenance for approx. 2 hours / generator / month or 24 hours / gen / year. Flues for the existing 6 no. SBGs terminate horizontally above the parapet at approx.15m and are unimpeded by cowls/caps. Flues for the 3 new internal SBGs terminate vertically above the parapet at approx.15m and are unimpeded by cowls/caps. Flues for the 4no new external SBGs terminate vertically out the top of the generator container at approx. 7m and are unimpeded by cowls/caps. Where possible the operator will seek to minimise the frequency of generator runs and to stagger tests where possible. Testing occurs midweek with existing generators and new generators tested separately. In the event a complaint is raised against the operation of the generators, the complaints procedure should be followed.	Low – maintenance and testing Very low – grid failure	Emissions to air can have an adverse impact to human health and ecological receptors in surrounding areas.	Low – maintenance and testing Low – grid failure

Hazard	Receptors	Pathway	Controls / Mitigation / Risk management	Probability of exposure	Consequence of exposure	Overall risk
			A draft Air Quality Management Plan (AQMP) has been submitted with the application and will be finalised once the expansion works are complete and the Data Centre is fully operational. The aim of the AQMP is to seek to reduce AQ impacts during prolonged grid failure events and associated generator operation. The AQMP is based on air dispersion model findings and seeks to determine likely AQ impacts through observations of current weather conditions, time of day, cumulative impacts, and anticipated outage durations. Actions include limiting the operation of the generators as far as possible and notifying sensitive receptors / the EA in the event of a prolonged grid outage.			

5.2 Accidents

Hazard	Receptors	Pathway	Controls / Mitigation / Risk management	Probability of exposure	Consequence of exposure	Overall risk
Accidents relating to fuel storage e.g., Spills, overfilling during refuelling / disposal / transfers, failure in secondary containment, pipe ruptures, valve failure, user error, collision.	Groundwater, surface water, sewer system, soils.	Land/ water	There are 9no SBGs located internal to the main building and 4no SBGs located externally in the rear receiving yard. There are 2 no. existing above ground bulk fuel tanks located externally under the mezzanine along the Eastern side of the building. These 2 no. bulk tanks feed the existing 6 no. day tanks servicing the 6 no. existing SBGs internal to the main building. The 3 no. new internal SBGs have dedicated belly tanks that sit underneath the engine. These are filled via direct fill points located within the generator room. The 4 no. new external SBGs will also have dedicated belly tanks that will sit underneath the engine. These tanks are capable of being filled directly from the fuel tanker. Tanks are double skinned, bunded to 110% and fitted with leak detection and are situated either internally or externally over good quality hardstanding. All tanks have high- and low-level alarms to help prevent overfilling. Alarms and tank levels are linked to the sites building management system (BMS) for remote monitoring. Tanks are filled either directly or remotely via tank fill points which are located inside locked cabinets. Drip trays are present inside the cabinets to capture minor spillages during refuelling. These cabinets will be locked when not in use.	Very low – bulk tanks Low – refuelling	Leaks of fuel or other substances associated with Data Centres operations into the surrounding environment can cause adverse impacts to the ground water course as well as adjacent water courses.	Very low – bulk tanks Medium – refuelling

Hazard	Receptors	Pathway	Controls / Mitigation / Risk management	Probability of exposure	Consequence of exposure	Overall risk
			All generators are designed to prevent over pressurisation of diesel supplied from the belly tanks. To help reduce the risk of corrosion, all pipework is either painted or constructed of corrosion resistant material. Spill kits are located adjacent to the generator enclosures / within generator rooms / fuel tanks and fill points. Drain covers are colour coded to identify foul (red) and surface water pathways (blue). Fuel deliveries are rare events (~0-2 deliveries pa) given the standby nature of the plant means they operate infrequently (~<50hours pa). Fuel delivery, emergency preparedness and spill response procedures are in place to minimise the risk of accidents during refuelling. Fuel suppliers are to adhere to applicable procedures when attending site. Deliveries are to be carried out by competent individual(s) and supervised by site staff. Surface run off from the external yard / generator area will drain to a hydrodynamic vortex separator prior to discharging to the local sewer network. The interceptor will be fitted with an automatic shut off valve which will activate when fuel is detected. This valve can also be closed manually in the event of a fuel spillage or in order to contain fire water. The site's Planned Preventative Maintenance (PPM) regime includes visual checks for leaks / spills. Hazardous waste is disposed of by a licenced carrier with duty of care information retained as evidence following uplift.			

Hazard	Receptors	Pathway	Controls / Mitigation / Risk management	Probability of exposure	Consequence of exposure	Overall risk
Flooding of drainage network and generators.	Groundwater, surface water, sewer system	Floodwater, surface waters, drainage system etc	The site is located within a Flood Zone 1 which is defined as an area with a low risk of flooding (less than 1 in 1000 annual probability of flooding from surface water). There is moderate potential for groundwater flooding on and within 50m of site, caused by groundwater levels rising above the water table. This is based on a 1 in 100-year event. Kao Data operational team are currently responsibly for maintenance of the drainage network at the location of the Data Centre. Routine maintenance of the onsite drainage system should allow surface water drains to remain unobstructed. Emergency procedures (amongst others) are in place and would be enacted in the event of flooding.	Very low	Flooding / water damage to the generators could impact resiliency for operations.	Very low
Fire	Emissions to Air / Water	Air & Water	All 13 no. SBGs are fitted with fire detection systems that utilise automatic shut off valves that will close in the event of a fire shutting off the fuel supply to the generator(s). The fire suppression systems for the 6 no. internal SBGs rely on water mist system served from tanked water to extinguish fires. In the unlikely event of a fire, there is potential for fire water from either site suppression systems / emergency services to enter the environment and cause harm. Emergency preparedness and response plans are in place to help mitigate this risk.	Very low	Fire damage to generators could impact resiliency for operations. Fire would also cause emissions to air, having an adverse impact to local environment and receptors. Firewater could infiltrate local water courses, adversely impacting the local environment.	Very low

Hazard	Receptors	Pathway	Controls / Mitigation / Risk management	Probability of exposure	Consequence of exposure	Overall risk
Vandalism	Land / Surface Water / Ground Water / Air	Drainage systems, air, surface	The site is manned 365 days a year with monitoring by security staff from a security office using an extensive CCTV system. Entry and exit to the site will be tightly controlled via a security gate and turnstiles. The 3m palisade security fence should act as an impenetrable perimeter to prevent unauthorised access to the Data Centre.	Very low	Damage arising from vandalism to the generators / storage tanks could impact emergency back-up potential and/or lead to fugitive emissions	Very low

5.3 Odour

Hazard	Receptors	Pathway	Controls / Mitigation / Risk management	Probability of exposure	Consequence of exposure	Overall risk
Odour from storage and combustion of fuel	Employees & residents	Airborne	Fuel is stored externally in double skinned bulk tanks and internally in belly tanks for the new 3no internal SBGs and in 6no day tanks for the existing 6no SBGs. Emissions are not expected to be significant, and an odour Management Plan is not expected to be required. The complaints procedure should be followed in the event the site receives an odour complaint relating to the permitted activities.	Very low	Nuisance to on site staff and local human receptors. Could lead to complaints.	Very low

5.4 Noise and Vibration

Hazard	Receptors	Pathway	Controls / Mitigation / Risk management	Probability of exposure	Consequence of exposure	Overall risk
Noise and Vibration from start-up and operation of generators	Employees, residents, and adjacent premises / pedestrians / road users immediately surrounding the installation.	Air	A noise impact assessment has been completed and submitted as part of the permit application ('Noise Impact Assessment v1'). This report concluded that "the predicted noise levels indicate compliance with the adopted criteria". The accompanying technical note also identifies that the various forms of mitigation mean compliance with the adopted criteria can be achieved which is not exceeding the existing background noise climate at the nearest residential properties.Please refer to these reports for further details. The internal generators have been designed to achieve a Sound pressure level of 75 dBA at 1m per unit. The external generators have been designed to achieve a Sound pressure level of 65 dBA at 1m per unit. Significant noise breakout is not expected as the SBGs operate infrequently as they are emergency standby plant designed to provide power in the event of grid failure. This is a highly rare event given grid reliability. As such, annual operation is likely to be limited to testing and maintenance for approx. 2 hours /month/generator. Generators are to be maintained in accordance with manufacturer guidelines as part of a planned preventative maintenance (PPM) regime. The complaints procedure should be followed in the event the site receives a noise complaint relating to the generators.	Low – maintenance and testing Very low – grid failure	Complaints from local residences. Potential harm to human health due to elevated noise levels.	Low – maintenance and testing low – grid failure
Noise from site traffic e.g., fuel deliveries	Employees, residents, and adjacent premises / pedestrians / road users immediately surrounding the installation.	Air	The Data Centre is located within the Slough Industrial Estate. There are some residences to the South and East of the site, located away from the SBGs. Noise associated with site traffic and general operation may be buffered by the Data Centre building. The generators are emergency standby plant operated infrequently as discussed above. As such fuel consumption is low meaning fuel deliveries are infrequent. The Data Centre may have no deliveries in a year therefore noise from associated traffic is not expected to be significant.	Low	Complaints from local receptors. Potential harm to human health due to elevated noise levels.	Very low

5.5 Fugitive Emissions (from uncontrolled sources)

Hazard	Receptors	Pathway	Controls / Mitigation / Risk management	Probability of exposure	Consequence of exposure	Overall risk
Fuel spills during refuelling / leaks / accidents e.g., damaged tanks / pipework.	Groundwater, surface water, sewer system, soils.	Surface run off / surface waters via drainage or vertical leaching.	See Section 5.2.	Very low – bulk tanks Low – refuelling	Pollution and / or harm to environmental and / or human health	Very low – bulk tanks low – refuelling
VOCs / fumes from storage / delivery of fuel	Industrial, commercial, and residential receptors	Air	Fuel tanks are containerised in double skinned sealed tanks, which will minimise the likelihood of release to the environment. Refuelling activities are carried out by approved suppliers with trained competent individuals that operate in accordance with the sites refuelling procedures which will be developed as part of the sites Environmental Management System (EMS). Deliveries are rare and best practices are to be adhered to in order to limit durations which fumes could escape into the environment.	Very low	Emissions to air have an adverse impact to human health and ecological receptors in surrounding areas.	Very low

5.6 Visible emissions

Hazard	Receptors	Pathway	Controls / Mitigation / Risk management	Probability of exposure	Consequence of exposure	Overall risk
Visible Emissions from generator stacks	Industrial, commercial, and residential receptors	Visual	Smoke may be visible during the first 10-15s of generator operation. After this time visible plumes are not anticipated due to high due to exhaust temperatures (approx. 450°C). In the unlikely event that visible emissions after still present, these are to be investigated as part of SBG maintenance. Plumes may not be visible due to line of sight, weather conditions, and the timing of generator operation (testing out with working hours on Saturdays). They may also be infrequent therefore are not considered to be likely / significant. The complaints procedure should be followed in the event the site receives complaints relating to the visible emissions from the generators.	Low	Potential visual impacts, particularly during generator start-ups.	Very low

5.7 Global warming potential

Hazard	Receptors	Pathway	Controls / Mitigation / Risk management	Probability of exposure	Consequence of exposure	Overall risk
Global Warming Potential from combustion of fuel by generators	Global population	Airborne	The generators are emergency standby plant designed to provide power in the event of grid failure. This is a highly rare event given grid reliability (See 'BAT Assessment v1'). As such, annual operation and fuel consumption is likely to be limited to testing and maintenance for approx. 2 hours / generator / month. This level of operation is not considered to provide a significant global warming impact.	Very low	Contribute to climate change, due to increase in greenhouse. gases present in the atmosphere.	Very low

5.8 Waste

Hazard	Receptors	Pathway	Controls / Mitigation / Risk management	Probability of exposure	Consequence of exposure	Overall risk
Waste associated with generators e.g., waste fuels, oil sorbents and rags, lubricants & hydraulic fuels, solid wastes (air filters, packaging, and spare parts) and end of life plant.	Ground, soil, ground water, surface water, sewer system.	Land/ water	Small quantities of wastes may be generated from routine generator maintenance activities or in the event of a spillage/leakage. This is likely to be low given the standby nature of the generators and procedures in place to reduce the risk of spills and leaks spillage/leaks. Procedures for licenced and responsible collection of waste oils and other hazardous wastes are in place, with Duty of Care evidence retained upon uplift. Contractors are responsible for waste disposal that arises during maintenance activities.	Very low	Potential to contaminate water/ land.	Very low

6.0 CONCLUSION

This ERA has identified and assessed the potential risks and hazards associated with the operation of the facility and from accidents.

Various measures have been taken to help reduce to mitigate against these as far as reasonably practicable and to a level considered to be acceptable for a Data Centre of this size, nature, and location.

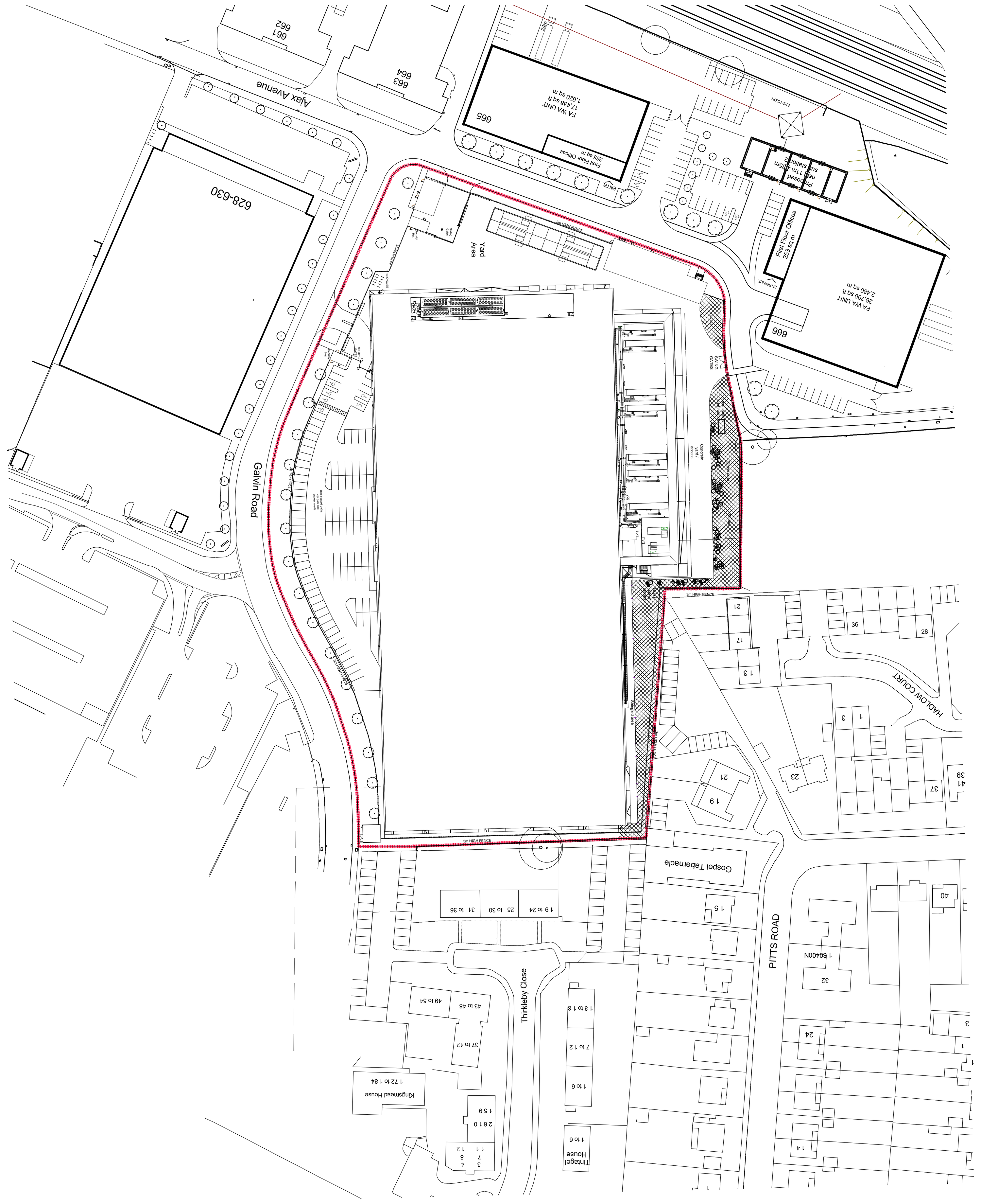
Appendix A.

Surrounding Area

A0

KEY:

SITE BOUNDARY



Site Location Plan - GEN

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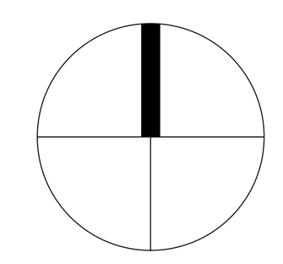

DO NOT Scale This Drawing
Dimensions to be checked on Site.

Notes:

Issue	Date	Description	By
A1	09/01/2023	Gens & DAC Planning Application	RM

PLANNING

Client:

KAO DATA

Nicholas WebbArchitects plc
The Old Dairy
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Project: **KLON06**

Drawing Name: 03 - Planning Site Location Plan - GEN

Status Code: S3

Project No.: 0507	First Issue Date: 20/12/2022	Scale: As indicated @ A0
Drawn By: DL	Approved By: JS	Rev: A1

Drawing No: **KLON06-NWA-00-XX-DR-A-0360**

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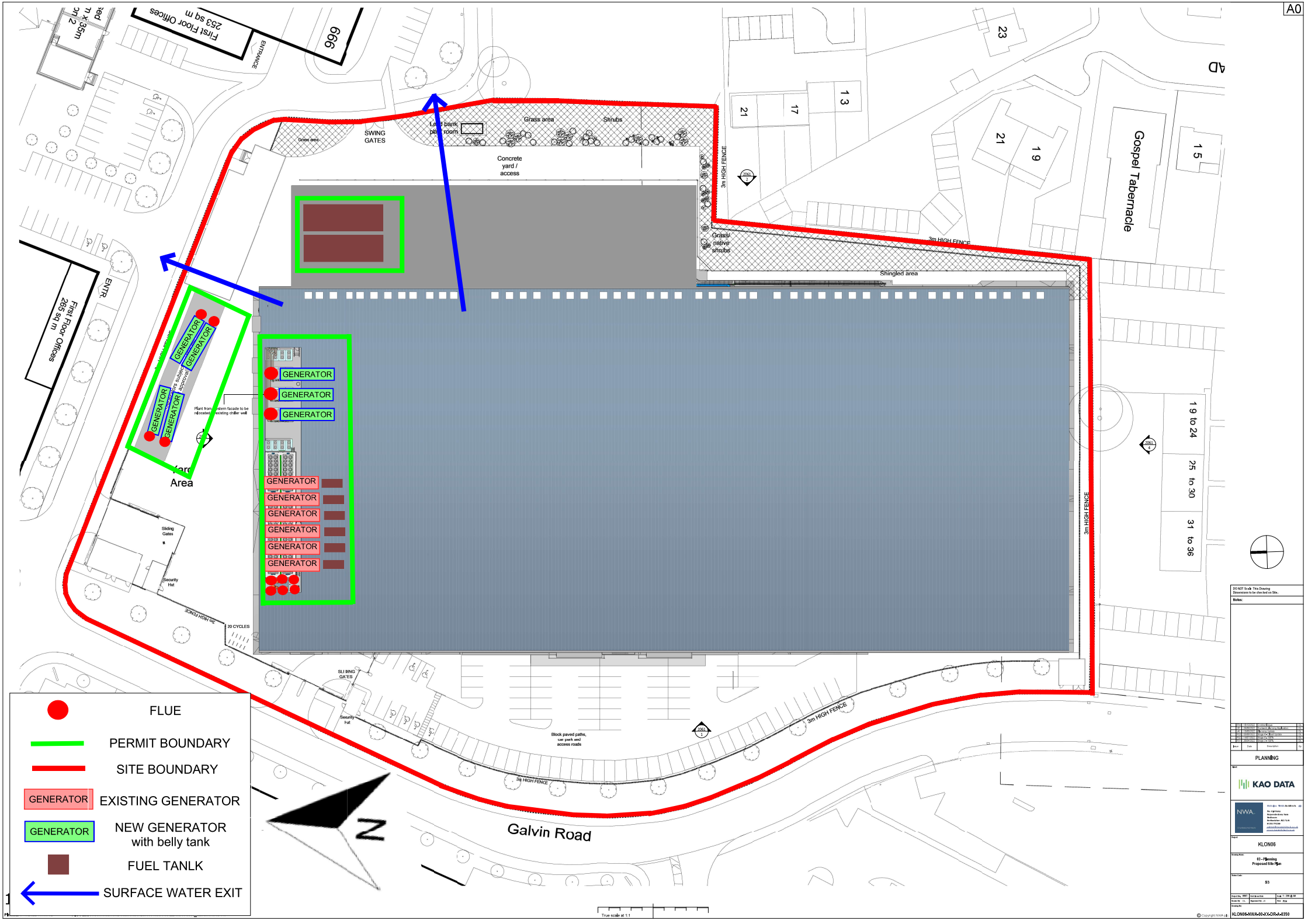
True scale at 1:1

Appendix B.

Site Plan


A0
FLUE
PERMIT BOUNDARY
SITE BOUNDARY
GENERATOR EXISTING GENERATOR
GENERATOR NEW GENERATOR with belly tank
FUEL TANLK
SURFACE WATER EXIT
GENERATOR
Concrete yard / access
SWING GATES
Grass area
Shrubs
3m HIGH FENCE
Grass/ native shrubs
Shingled area
Gospel Tabernacle
Galvin Road
Block paved paths, car park and access roads
20 CYCLES
Security Hut
Sliding Gates
First Floor Offices 253 sq m
First Floor Offices 365 sq m
Yard Area
1 9 to 24
25 to 30
31 to 36
PLANNING
KAO DATA
KLON06
KLON06-NWA-00-XX-DRA-0350

Appendix C.

Nature And Heritage Conservation Screening Report

Nature and Heritage Conservation

Screening Report: Bespoke Installation

Reference	**EPR/JP3647JU/A001**
NGR	**SU 96112 80576**
Date report produced	**07/10/2022**
Number of maps enclosed	**6**

The nature conservation sites identified in the table below must be considered in your application.

Nature and heritage conservation sites	Screening distance (km)	Further information
Special Areas of Conservation (cSAC or SAC)	10	Joint Nature Conservation Committee
Burnham Beeches		
Windsor Forest & Great Park		
Special Protection Area (pSPA or SPA)	10	Joint Nature Conservation Committee
South West London Waterbodies		
Ramsar	10	Joint Nature Conservation Committee
South West London Waterbodies		
Local Nature Reserve (LNR)	2	Natural England
Haymill Valley		
Local Wildlife Sites (LWS)	2	Appropriate Local Record Centre (LRC)
Railway Triangle (off Stranraer Gardens)		Appropriate Wildlife Trust
Jubilee River and Dorney Wetlands		
Haymill Valley		

Protected Species	Screening distance (m)	Further Information
Bullhead	up to 500m	Appropriate Local Record Centre (LRC) Environment Agency. Dial 03708 506 506 for your local Fisheries and Biodiversity team

Where protected species are present, a licence may be required from Natural England or the Welsh Government to handle the species or undertake the proposed works.

The relevant Local Records Centre must be contacted for information on the features within local wildlife sites. A small administration charge may also be incurred for this service

Please note we have screened this application for protected and priority sites, habitats and species for which we have information. It is however your responsibility to comply with all environmental and planning legislation, this information does not imply that no other checks or permissions will be required.

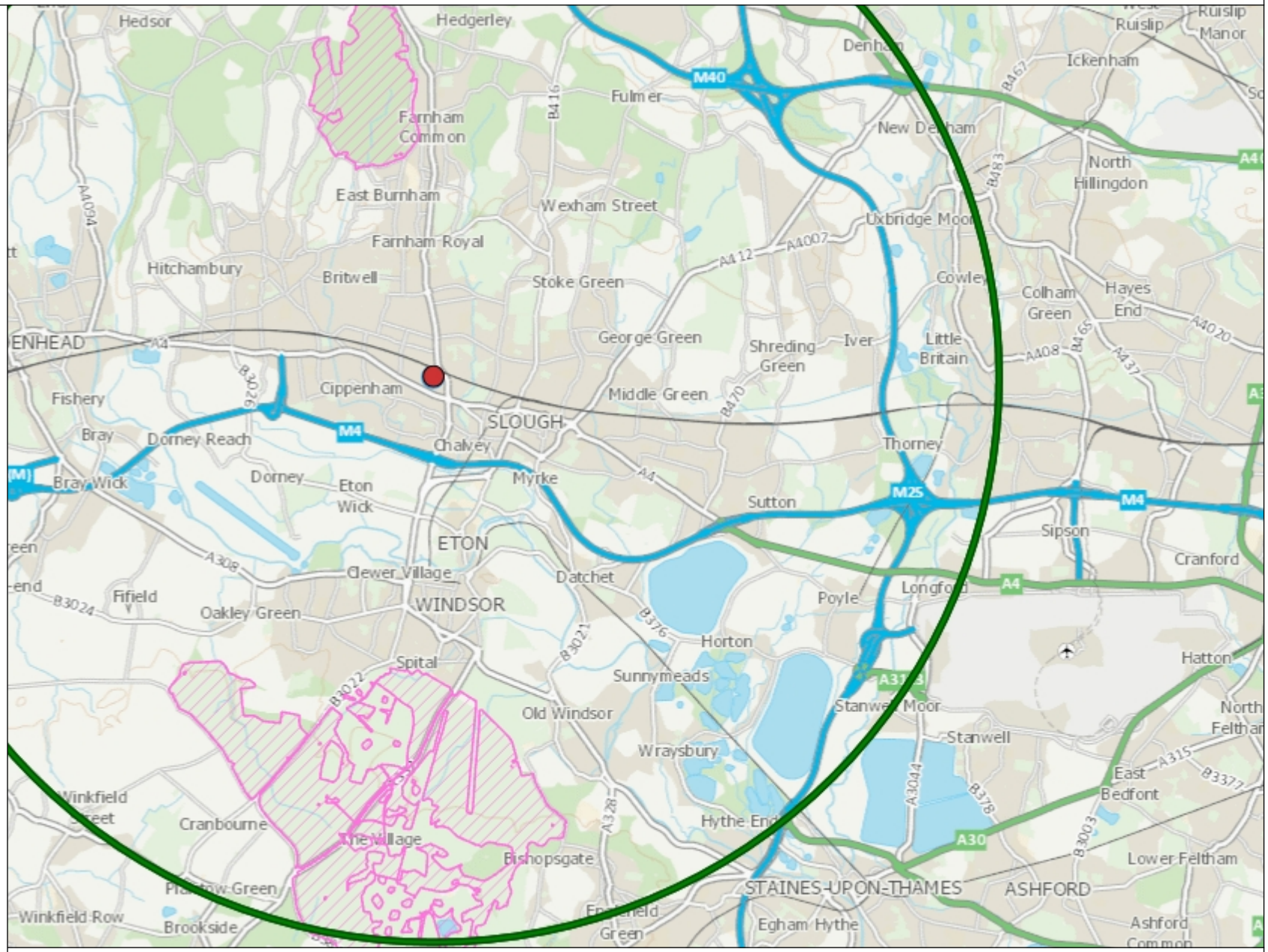
Please note the nature and heritage screening we have conducted as part of this report is subject to change as it is based on data we hold at the time it is generated. We cannot guarantee there will be no changes to our screening data between the date of this report and the submission of the permit application, which could result in the return of an application or requesting further information.

Special Areas of Conservation

Environment Agency

Legend

SAC (England)



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0 2,500

Metres

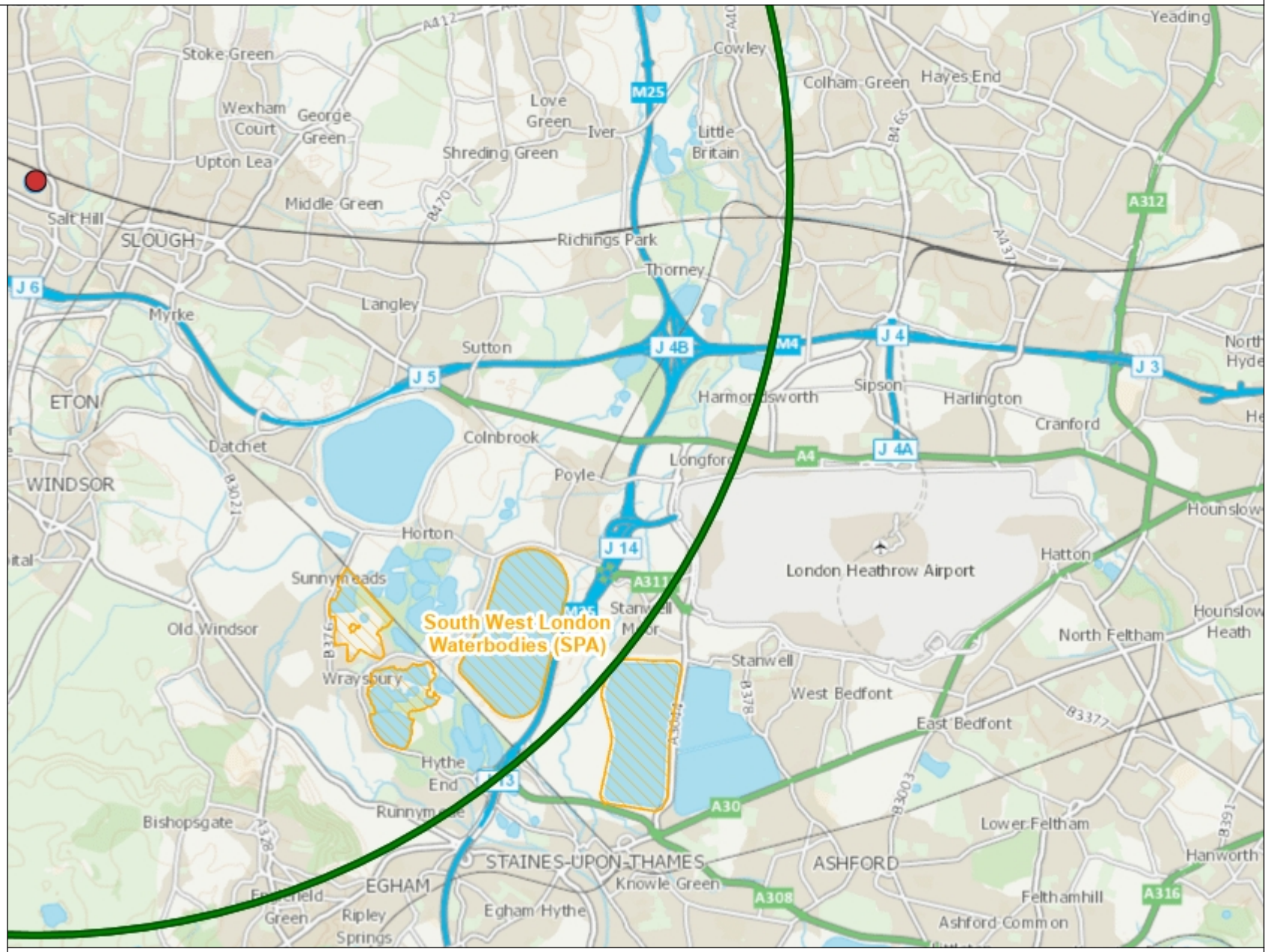
N W E S

Special Protection Areas

Environment Agency

Legend

SPA (England)



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Metres

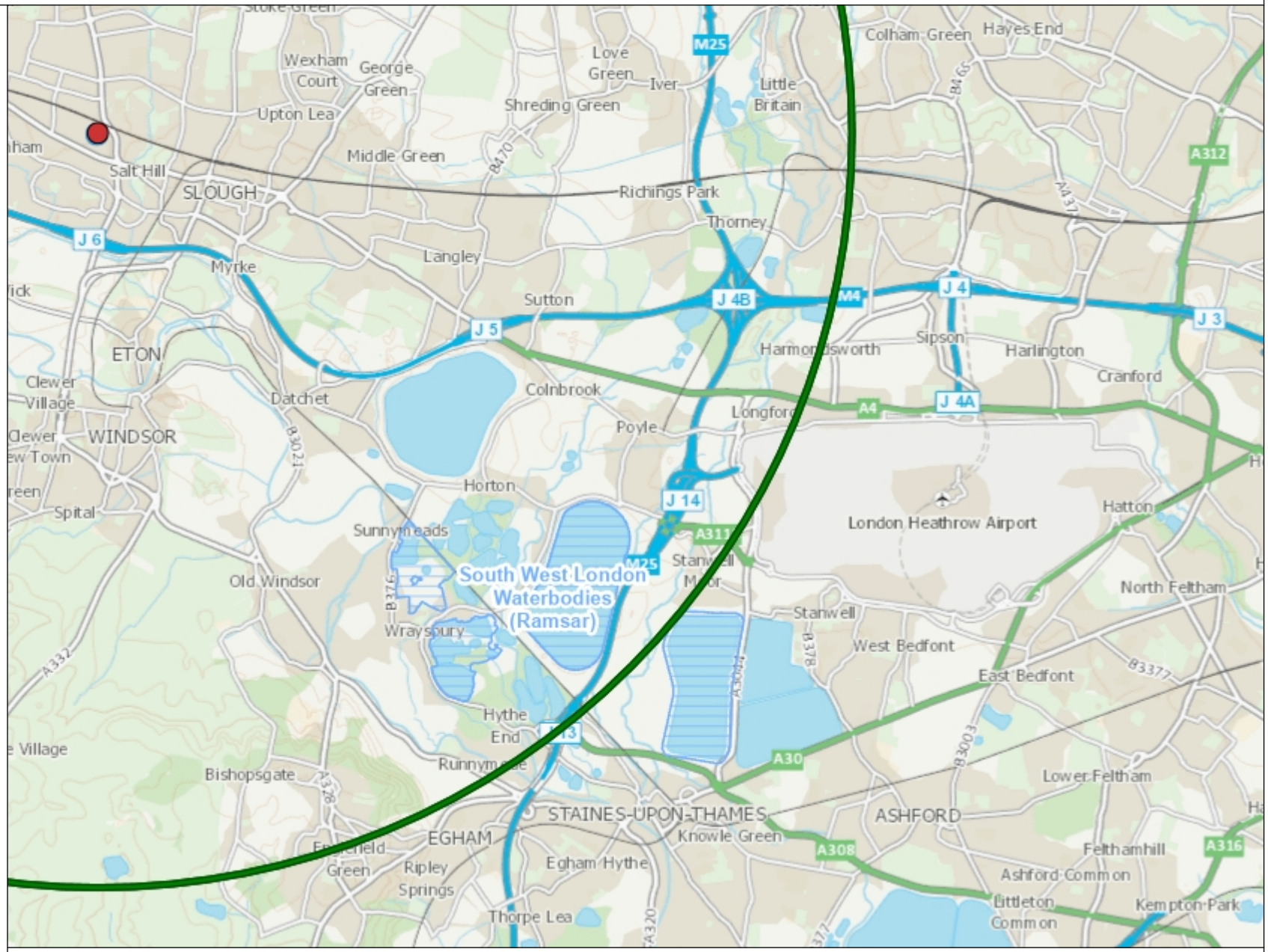
N W E S

Ramsar Sites

Environment Agency

Legend

Ramsar (England)



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0 1,875

Metres

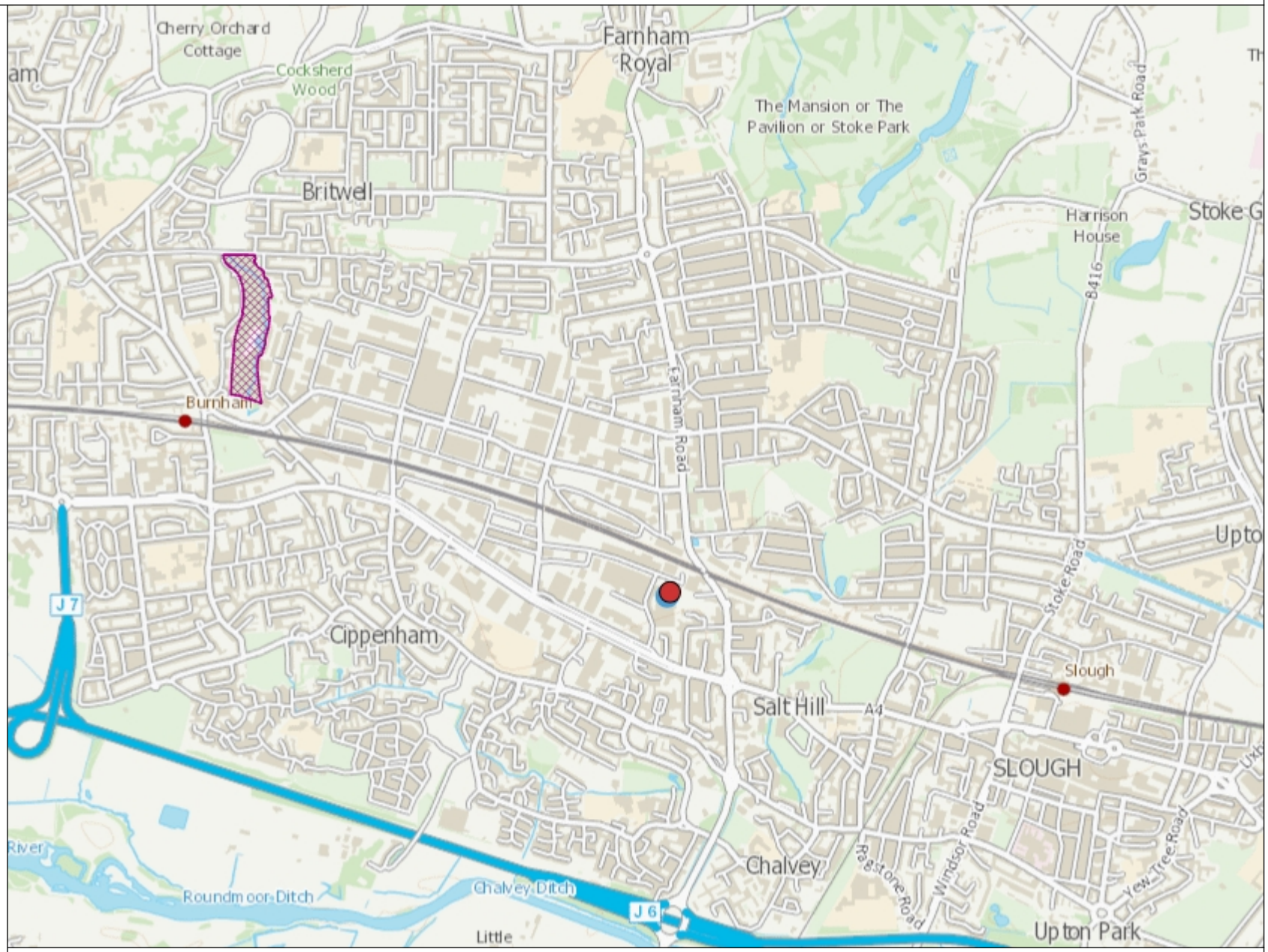
N W E S

Local Nature Reserves

Environment Agency

Legend

LNR (England)



1: 25,000

0 625

Metres

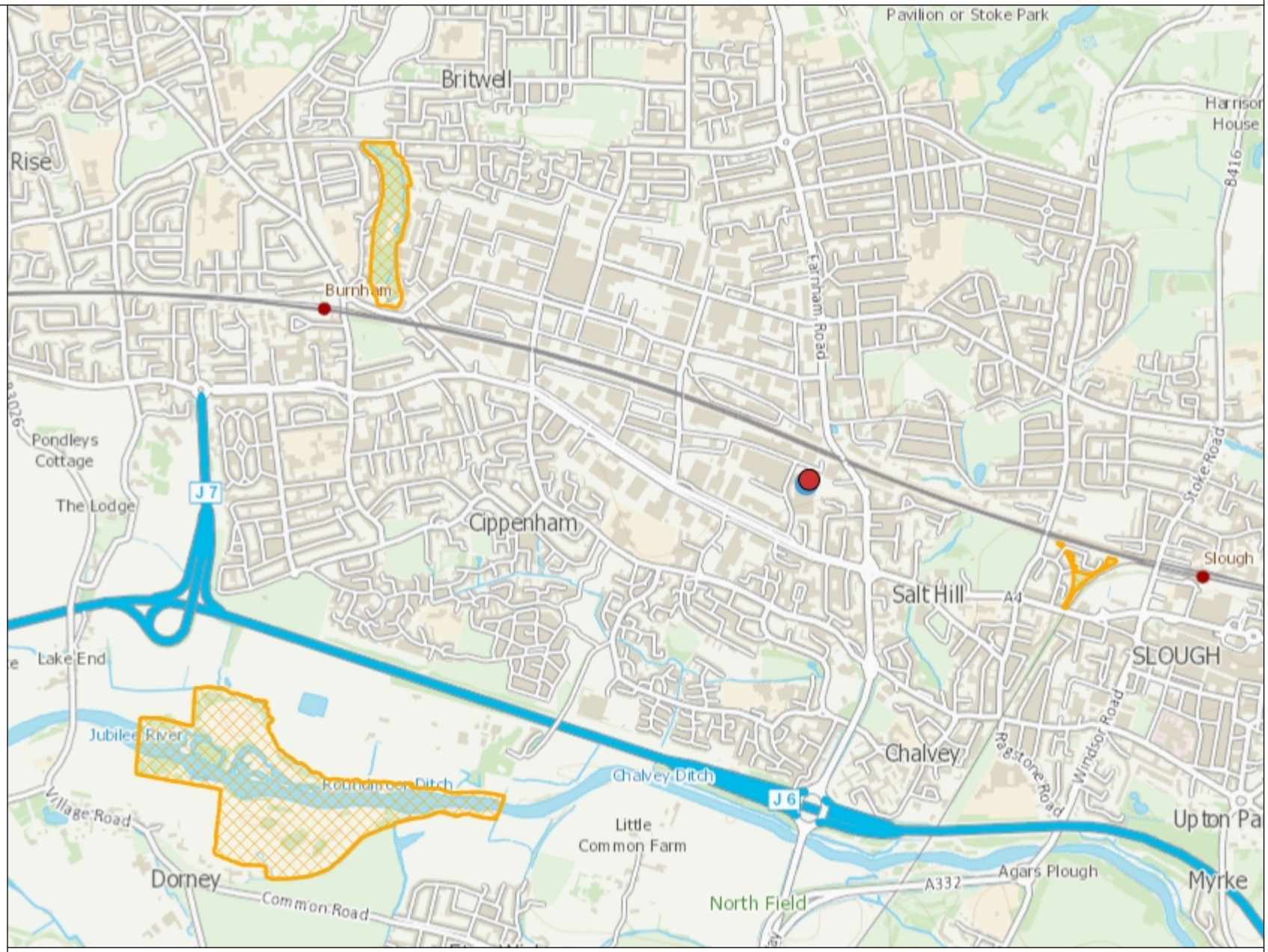
N W E S

Local Wildlife Sites

Environment Agency

Legend

Local Wildlife Sites



1: 25,000

0 625

Metres

N W E S

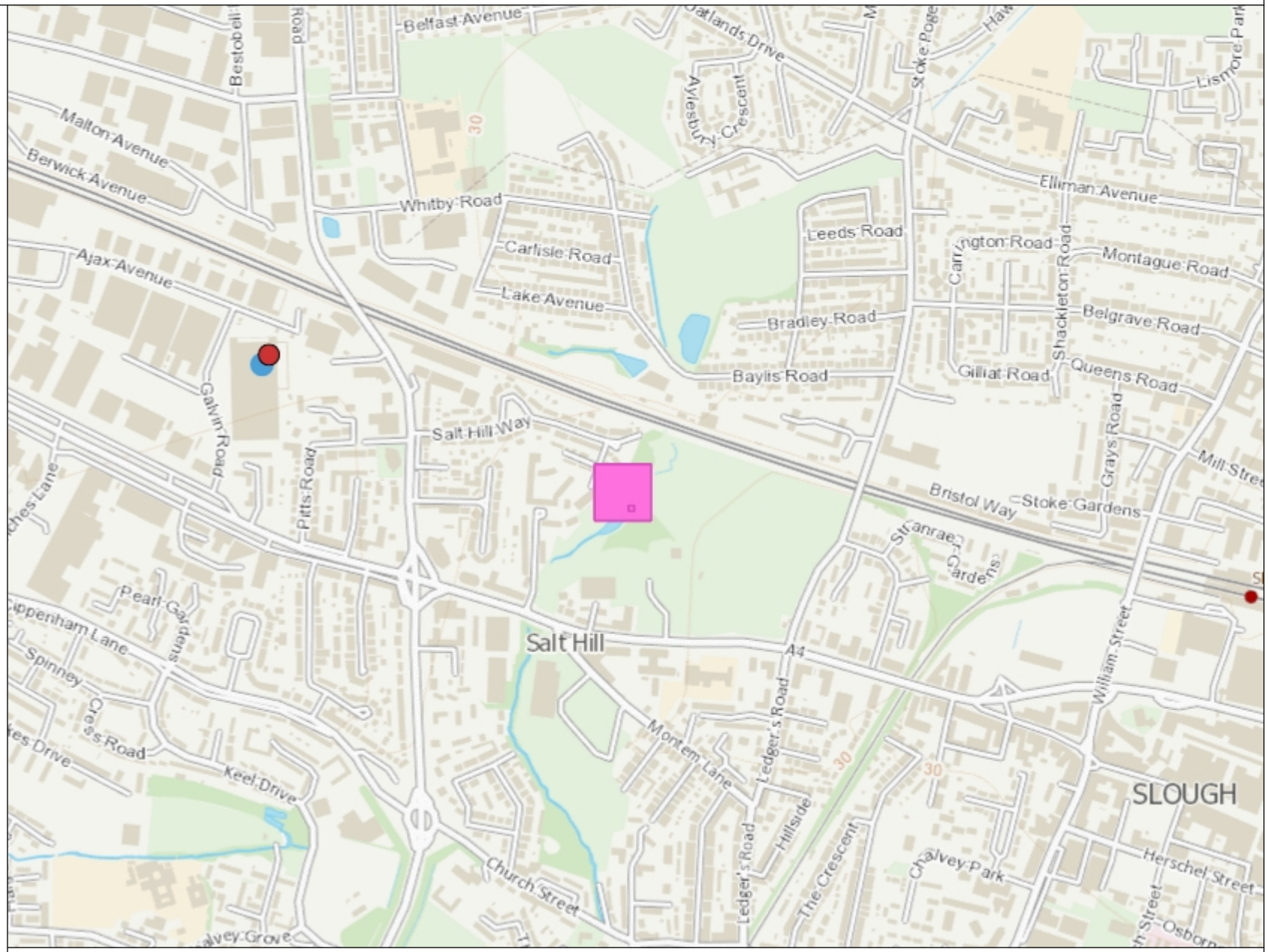
Protected Species

Environment Agency

Legend

Protected species screened for Env Permits - complete set

- Protected species, non fish
- Protected fish
- Protected fish migratory route



1: 10,000

0 250

Metres

N W E S

Appendix D.

National Grid Electricity Transmission System Performance Report

National Electricity Transmission System Performance Report

Report to the Office of Gas and Electricity Markets (Ofgem)

2021 – 22

nationalgridESO

Introduction

This report details the performance of the National Electricity Transmission System in Great Britain for 2021-22, as required by Transmission Licence Standard Condition C17: Transmission System Security Standard and Quality of Service.

The National Electricity Transmission System (NETS) in Great Britain is comprised of both onshore and offshore transmission networks.

The onshore transmission networks are owned by National Grid Electricity Transmission plc (NGET) in England and Wales, SP Transmission plc (SPT) in south and central Scotland and Scottish Hydro Electric Transmission plc (SHE Transmission) in the north of Scotland. There is also a 2250MW HVDC undersea link between Hunterston in Western Scotland and Flintshire Bridge in North Wales, that is jointly owned by SPT and NGET.

The offshore transmission networks are owned by Transmission Capital (TC), Blue Transmission Investments Ltd (BT), Greater Gabbard OFTO plc, Gwynt-Y-Mor OFTO plc, Thanet OFTO Ltd, Humber Gateway OFTO Ltd, West of Duddon Sands (WoDS) Transmission plc, Diamond Transmission Partners (DTP) BBE Ltd, DTP RB Ltd, DTP Galloper Ltd, DTP Walney Extension Ltd and DTP Hornsea One Ltd.

Following legal separation of the Electricity System Operator from NGET on 1st April 2019, National Grid Electricity System Operator Ltd became the National Electricity Transmission System Operator (NETSO) for the onshore and offshore transmission networks.

In accordance with Standard Licence Condition C17 (Transmission System Security Standard and Quality of Service) of the Transmission Licence, the NETSO is required by The Office of Gas and Electricity Markets, to report on the annual performance of the National Electricity Transmission System in terms of availability, system security and quality of service.

The onshore and offshore transmission system broadly comprises circuits operating at 400, 275 and 132kV. The formal definition of the National Electricity Transmission System is contained in the NETS Grid Code and NETS Security and Quality of Supply Standard (NETS SQSS).

The fully interconnected transmission system provides a consistently high quality of supply and allows for the efficient bulk transfer of power from remote generation to demand centres.

Information relating to NG Electricity Transmission plc, SP Transmission plc, SHE Transmission plc, TC Robin Rigg OFTO Ltd, TC Barrow OFTO Ltd, TC Gunfleet Sands OFTO Ltd, TC Ormonde OFTO Ltd, TC Lincs OFTO Ltd, TC Westermost Rough OFTO Ltd, TC Dudgeon OFTO plc, TC Beatrice OFTO Ltd, TC Rampion OFTO Ltd, BT Walney 1 Ltd, BT Walney 2 Ltd, BT Sheringham Shoal Ltd, BT London Array Ltd, Greater Gabbard OFTO plc, Gwynt-Y-Mor OFTO plc, Thanet OFTO Ltd, Humber Gateway OFTO Ltd, WoDS Transmission plc, DTP BBE Ltd, DTP RB Ltd, DTP Galloper Ltd, DTP Walney Extension Ltd and DTP Hornsea One Ltd have been provided by the Transmission Owners in accordance with Licence Condition D3 (Transmission System Security Standard and Quality of Service) of their Transmission Licences.

When considering the performance of the transmission networks it should be recognised that this can be influenced by both the Transmission Owners and the NETSO.

The National Electricity Transmission System is connected via interconnectors to transmission systems in Northern Ireland, Republic of Ireland, France, the Netherlands, Belgium and Norway.

The interconnectors with Northern Ireland and the Republic of Ireland fall outside the scope of this report, as they are regulated by the Northern Ireland Authority for Utility Regulation (NIAUR) and the Commission for Regulation of Utilities (CRU) respectively.

Information relating to interconnectors with France (Interconnexion France–Angleterre IFA and IFA2), the Netherlands (BritNed), Belgium (Nemo Link) and Norway (North Sea Link) has been provided by National Grid Ventures.

National Electricity Transmission System (GB Network)

Availability

The definitions and criteria for system availability can be found in the Glossary of terms at the end of this report.

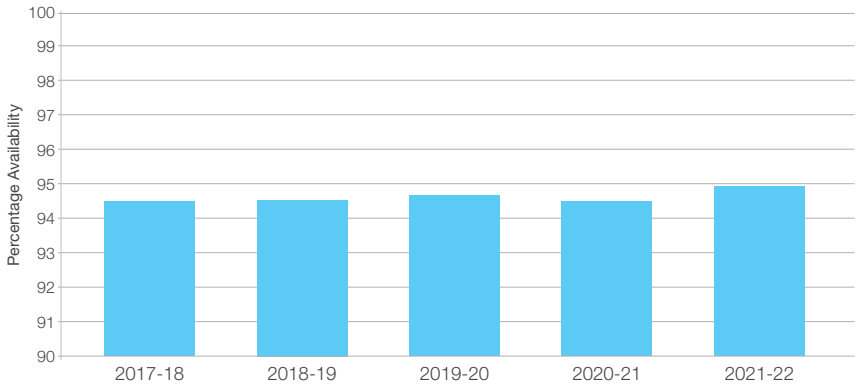
National Electricity Transmission System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability.

Annual System Availability

Annual System Availability of the National Electricity Transmission System for 2021–22 was: 94.99%

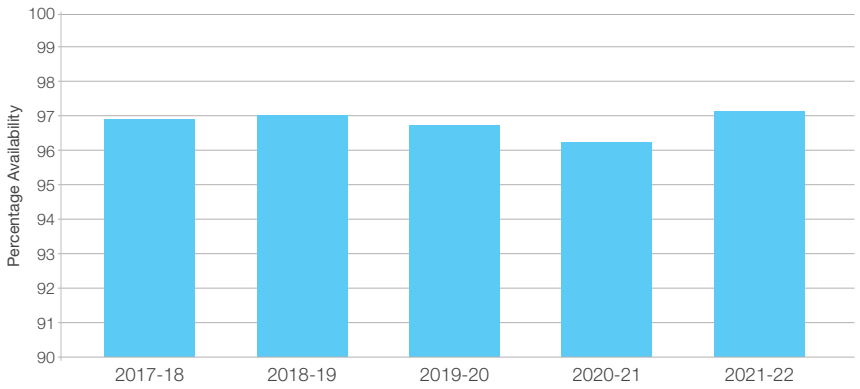
% Annual System Availability

GB % Annual System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
94.44	94.55	94.69	94.50	94.99

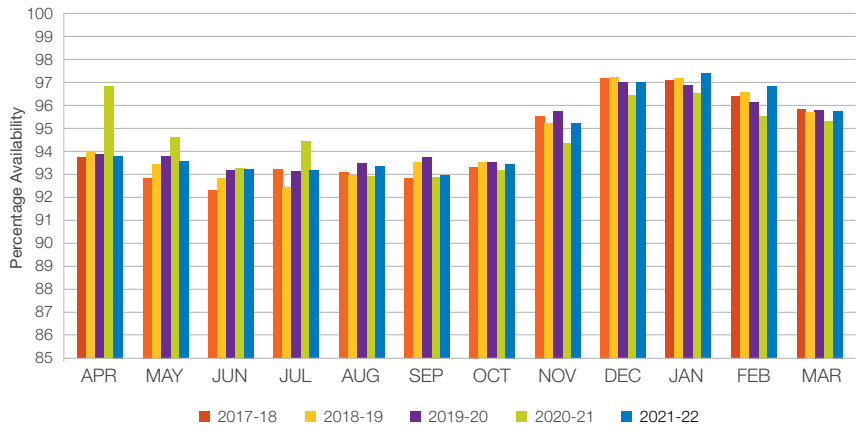


% Winter Peak System Availability

GB % Winter Peak System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
96.92	97.05	96.72	96.22	97.19



% Monthly System Availability



GB % Monthly System Availability					
	2017-18	2018-19	2019-20	2020-21	2021-22
Apr	93.77	94.00	93.88	96.84	93.83
May	92.78	93.39	93.77	94.68	93.55
Jun	92.35	92.80	93.16	93.24	93.22
Jul	93.27	92.39	93.11	94.43	93.16
Aug	93.16	92.97	93.51	92.92	93.31
Sep	92.83	93.55	93.71	92.90	92.96
Oct	93.35	93.52	93.52	93.10	93.40
Nov	95.55	95.26	95.70	94.32	95.21
Dec	97.23	97.24	97.05	96.45	97.01
Jan	97.14	97.29	96.89	96.58	97.39
Feb	96.37	96.58	96.17	95.57	96.78
Mar	95.82	95.74	95.80	95.30	95.73

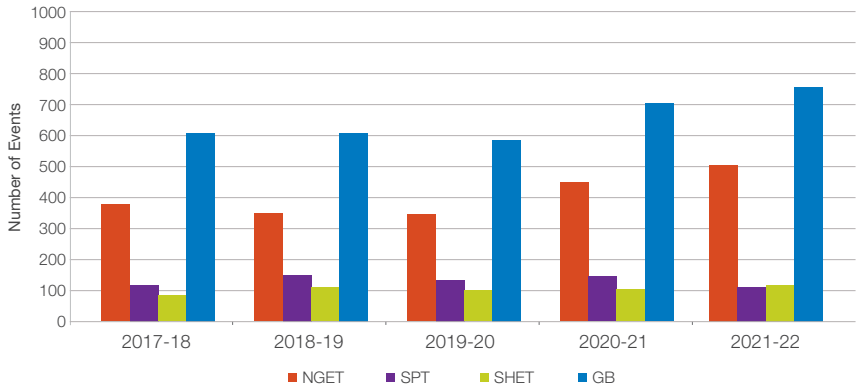
Security

The definitions and criteria for system security can be found in the Glossary of terms at the end of this report.

System performance is monitored by the Estimated Unsupplied Energy from the National Electricity Transmission System for each incident.

During 2021-22 there were 751 NETS events where transmission circuits were disconnected either automatically or by urgent manual switching. The vast majority of these events had no impact on electricity users with 18 resulting in loss of supplies to customers.

GB System Events

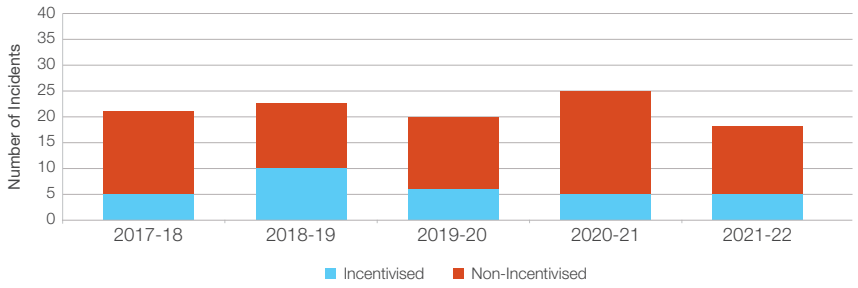


GB System Events					
	2017-18	2018-19	2019-20	2020-21	2021-22
NGET	398	347	355	455	517
SPT	124	157	131	138	115
SHET	85	108	100	113	119
GB	607	612	586	706	751

Number of Loss of Supply Incidents

The chart shows the annual comparison of the number of Loss of Supply Incidents that occurred within the National Electricity Transmission System.

GB System – Number of Incidents					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	5	10	6	5	5
Non-Incentivised	16	12	14	20	13

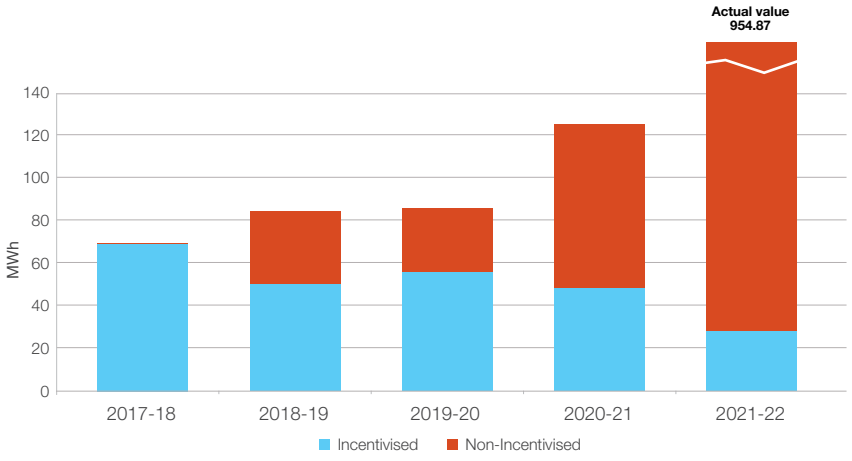


Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the National Electricity Transmission System during 2021-22 was: **954.87 MWh**

The chart shows the annual comparison of the Estimated Unsupplied Energy for Loss of Supply Incidents that occurs within the National Electricity Transmission System.

GB System – Estimated Unsupplied Energy (MWh)					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	67.07	51.14	57.59	47.98	26.84
Non-Incentivised	0.23	34.31	26.10	76.85	928.03



Reliability of Supply

The Overall Reliability of Supply for the National Electricity Transmission System during 2021-22 was: **99.999612%**

compared with 99.999948% in 2020-21 and 99.999967% in 2019-20.

Quality of Service

Quality of service is measured with reference to system Voltage and Frequency. The criteria for reportable Voltage and Frequency Excursions can be found in the Glossary of terms at the end of this report.

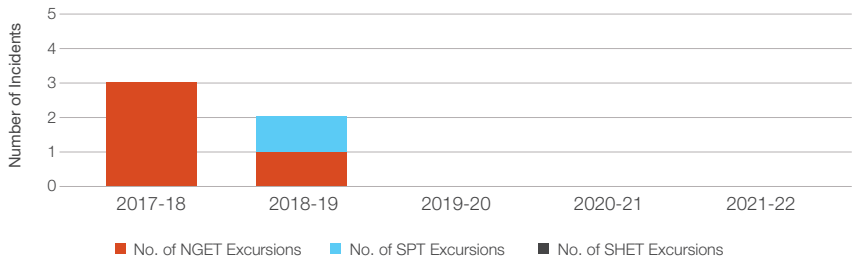
Voltage Excursions

During 2021-22 there were no reportable Voltage Excursions within the National Electricity Transmission System.

The chart below summarises the reportable Voltage Excursions that have occurred on the National Electricity Transmission System.

GB System Voltage Excursions

GB System – Voltage Excursons					
	2017-18	2018-19	2019-20	2020-21	2021-22
Number of NGET Excursions	3	1	0	0	0
Number of SPT Excursions	0	1	0	0	0
Number of SHET Excursions	0	0	0	0	0



GB System Voltage Excursion

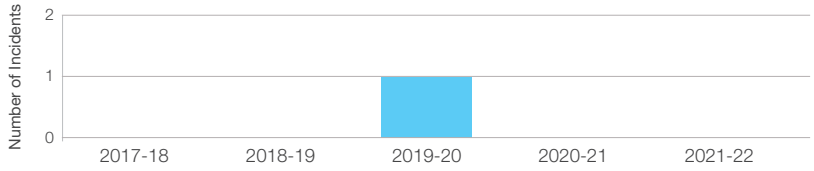
Incident Date, Time and Location	Nominal Voltage	Max Voltage	Duration
None			

Frequency Excursions

During 2021-22, there were no reportable Frequency Excursion within the National Electricity Transmission System. The previous Frequency Excursions were in the 2019-20 and 2008-09 reporting periods.

GB System Frequency Excursions

GB System – Frequency Excursons					
	2017-18	2018-19	2019-20	2020-21	2021-22
Number of Excursions	0	0	1	0	0



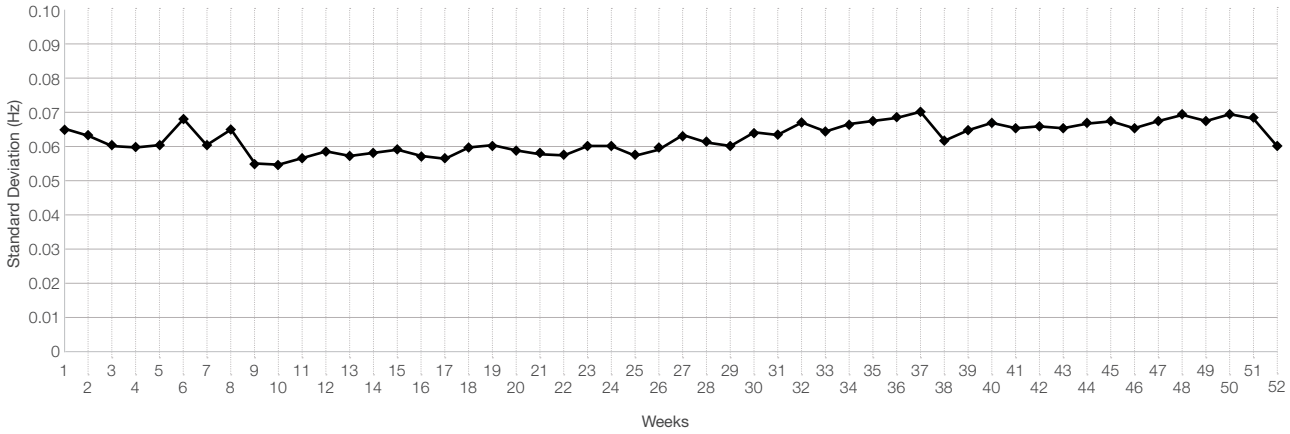
GB System Frequency Excursion

Incident Date & Time	Statutory Limits	Frequency	Duration
None	49.5 – 50.5Hz	N/A	0 seconds

Frequency Standard Deviation

The chart below displays the recorded Frequency Standard Deviation from 50Hz on a weekly basis for the year 2021-22.

GB System – Frequency Standard Deviation



National Grid Electricity Transmission System

System Description

The National Grid Electricity Transmission System operates at 400, 275 and 132kV supplying electricity to England and Wales.

The system covers an area of approximately 151,000 square kilometres and consists of over 14,000 circuit kilometres of overhead line and over 650 kilometres of underground transmission cable routes interconnecting over 300 substations.

It is connected to the SP Transmission System to the north and through five HVDC interconnectors to the Republic of Ireland, France, the Netherlands, Belgium and Norway.

There are 54 large power stations totalling 55GW of generation capacity connected to the England and Wales transmission system. The NGET system supplies 12 distribution networks via over 129GVA of installed transformer capacity and a small number of directly connected customers such as steelworks and traction supplies.

In 2021-22 the maximum recorded demand on the network was 42.46GW.

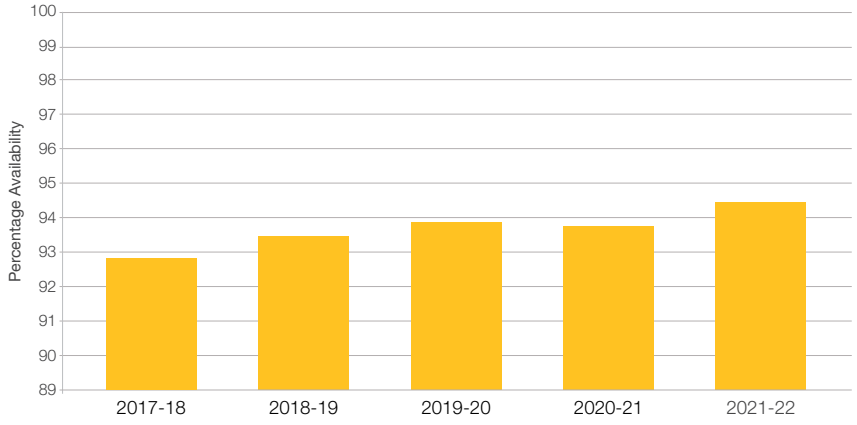
Availability

The definitions and criteria for system availability can be found in the Glossary of terms at the end of this report.

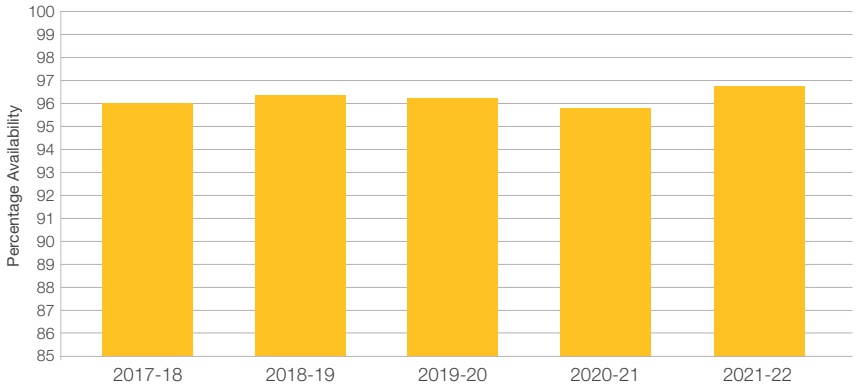
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

NGET % Annual System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
92.89	93.45	93.88	93.76	94.38

% Annual System Availability

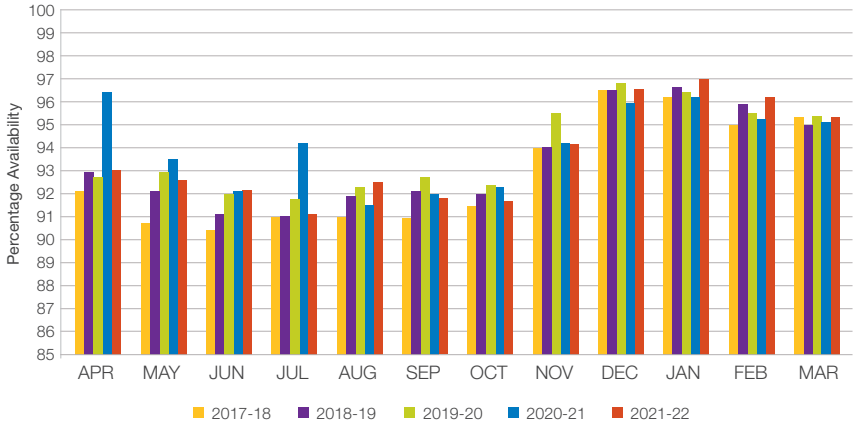


% Winter Peak System Availability



NGET % Winter Peak System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
96.02	96.37	96.26	95.84	96.86

% Monthly System Availability

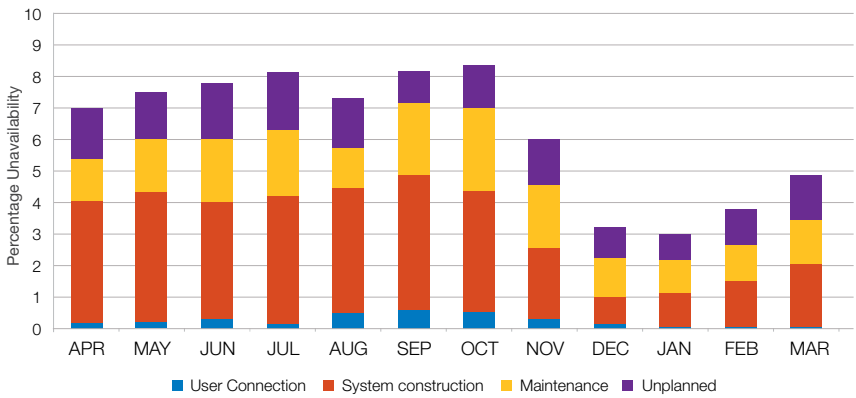


NGET % Monthly System Availability					
	2017-18	2018-19	2019-20	2020-21	2021-22
Apr	92.18	92.91	92.73	96.41	93.04
May	90.75	92.19	92.92	93.49	92.56
Jun	90.36	91.16	92.08	92.25	92.25
Jul	91.03	91.09	91.78	94.24	91.91
Aug	91.05	91.88	92.25	91.56	92.58
Sep	90.95	92.17	92.74	92.08	91.85
Oct	91.54	92.07	92.39	92.26	91.68
Nov	94.07	94.08	95.60	94.19	94.11
Dec	96.57	96.57	96.84	95.95	96.65
Jan	96.22	96.63	96.38	96.21	97.05
Feb	95.20	95.85	95.51	95.31	96.22
Mar	95.33	95.00	95.38	95.12	95.32

Planned and Unplanned System Unavailability

The table and the chart show the monthly variation in Planned and Unplanned System Unavailability.

Unavailability is defined as (100 – Availability) %



Planned and Unplanned Unavailability (%) for NGET Transmission System					
	User Connection	System Construction	Maintenance	Unplanned	Total
Apr	0.10	3.87	1.39	1.60	6.96
May	0.13	4.27	1.59	1.46	7.44
Jun	0.19	3.80	1.96	1.81	7.75
Jul	0.17	4.12	1.99	1.81	8.09
Aug	0.48	3.98	1.19	1.77	7.42
Sep	0.55	4.26	2.38	0.95	8.15
Oct	0.46	3.97	2.59	1.30	8.32
Nov	0.39	2.22	1.92	1.36	5.89
Dec	0.12	0.81	1.29	1.13	3.35
Jan	0.00	1.06	1.19	0.70	2.95
Feb	0.00	1.51	1.13	1.14	3.78
Mar	0.03	2.05	1.33	1.26	4.68

Security

The definitions and criteria for system security can be found in the Glossary of terms at the end of this report.

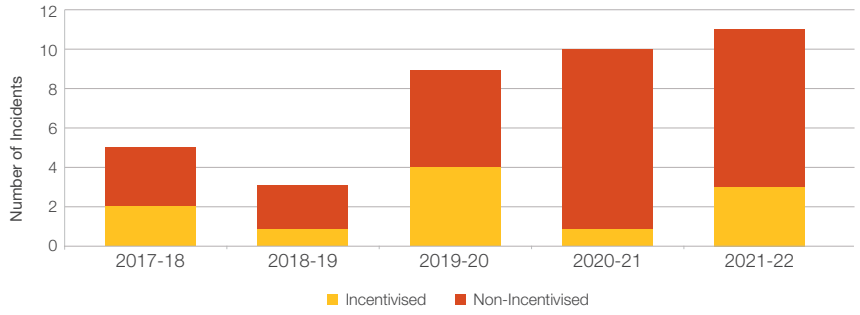
System performance is monitored by the Estimated Unsupplied Energy from the NGET Transmission System for each incident.

During 2021-22 there were 517 NGET system events where transmission circuits were disconnected either automatically or by urgent manual switching. The vast majority of these events had no impact on electricity users with 11 resulting in loss of supplies to customers.

Number of Loss of Supply Incidents

The chart shows the annual comparison of the number of Loss of Supply Incidents that occurred within the NGET Transmission System.

NGET System – Number of incidents					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	2	1	4	1	3
Non-Incentivised	3	2	5	9	8

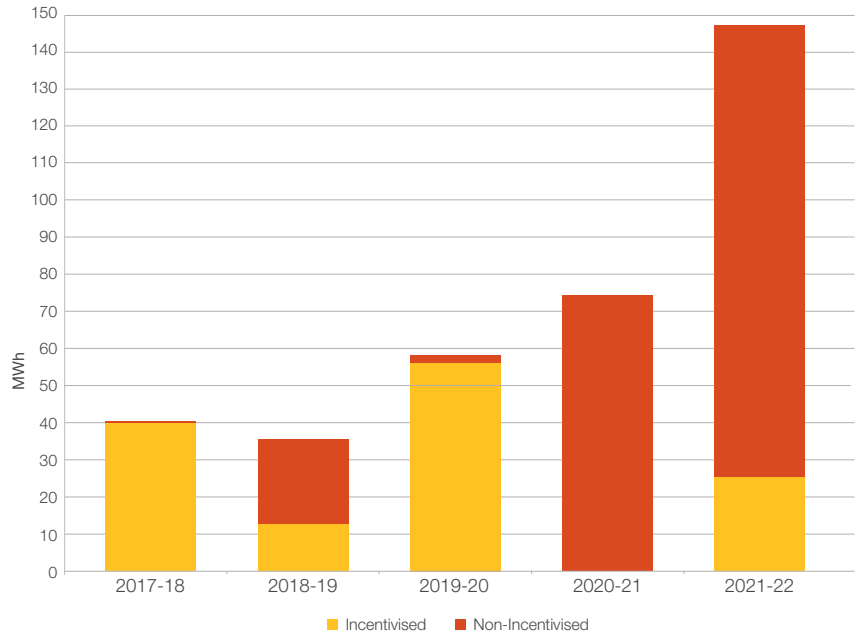


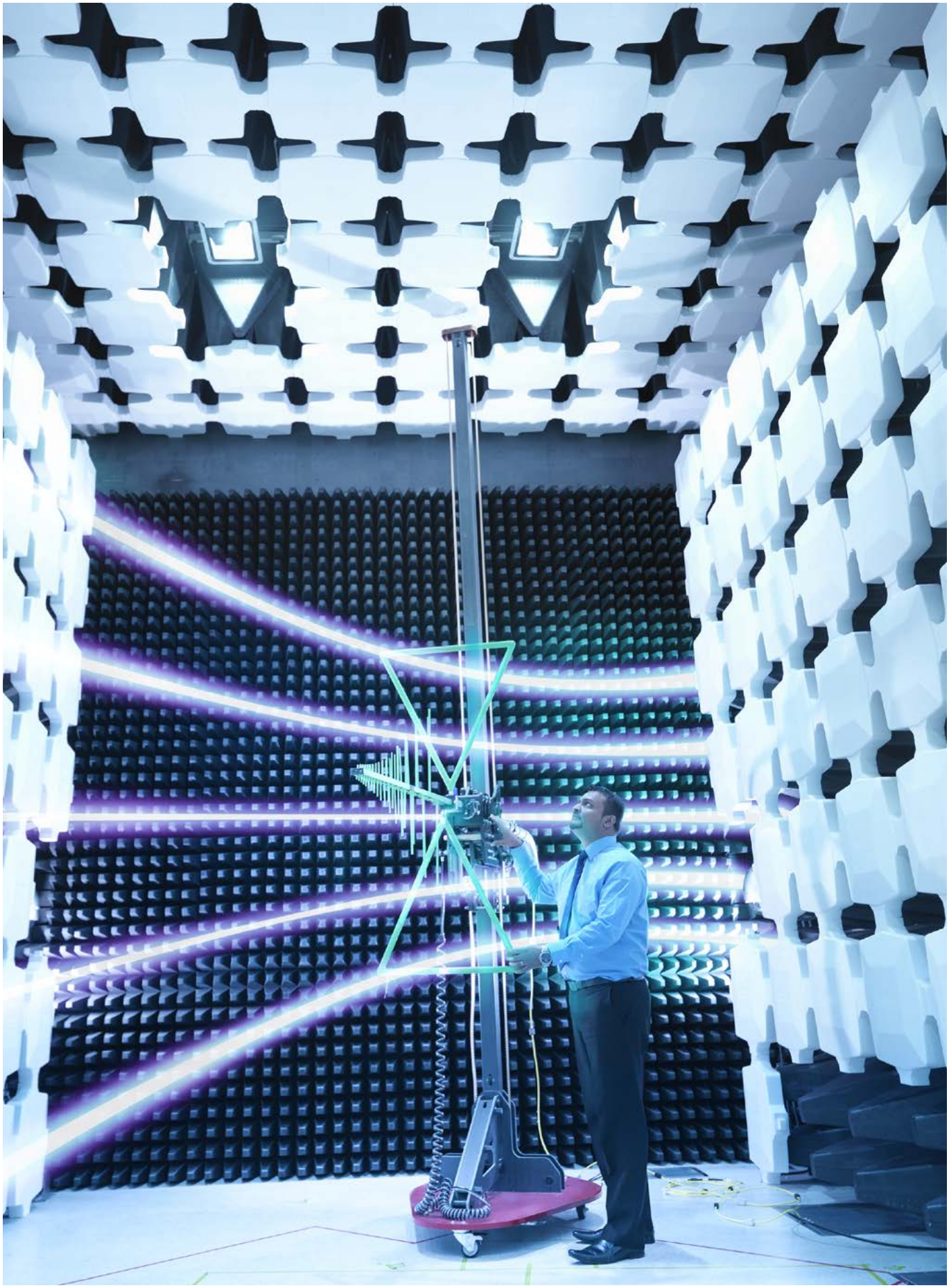
Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the NGET Transmission System during 2021-22 was: **143.40 MWh**

The chart shows the annual comparison of the Estimated Unsupplied Energy for Loss of Supply Incidents that occurs within the NGET Transmission System.

NGET System – Estimated Unsupplied Energy (MWh)					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	39.70	12.06	54.45	0.00	26.70
Non-Incentivised	0.23	25.16	4.98	74.36	116.70





Reliability of Supply

The Overall Reliability of Supply for the NGET Transmission System during 2021-22 was: **99.999936%**

compared with 99.999966% in 2020-21 and 99.999974% in 2019-20.

Loss of Supply Incident Details

NGET Loss of Supply Incidents – Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
13 February 2022 18:02 at Elstree 275/132kV Substation Protection operated on SGT3A at Elstree 275kV substation and tripped the transformer feeder circuit to Stanmore. Due to reconfiguration works ongoing at Elstree 132kV substation, this was the only circuit supplying Stanmore demand at the time. All demand was restored via UKPN lower voltage networks. A portion of demand was restored within 3 minutes and therefore 0.5MWh relating to this incident is not incentivised.	49.7	300*	25.7
28 February 2022 18:09 at Imperial Park 400/25kV Substation Planned switching was being undertaken to release the Cilfynydd - Imperial Park 400kV circuit from service, when circuit breaker X605 at Cilfynydd failed to operate. Whilst attempting to open X605, tripping of Mesh Corner 2 at Imperial Park was inadvertently initiated, causing SGT2B to trip and supply to Network Rail (NR) at St Brides was lost. Demand was restored by switching on the NR network.	4.0	10	0.70
17 March 2022 11:51 at Ryhall 400/25kV Substation A transient trip of the Cottam - Ryhall/Ryhall SGT1 circuit was caused by a contractor working on the OHL route. Although the circuit returned to service automatically there is no automatic reclose equipment which would restore Ryhall SGT1 to service. At the time of the fault Ryhall SGT2 was out of service. Network Rail carried out switching on their network to restore the demand.	4.0	5	0.30
Total			**26.70**

NGET Loss of Supply Incidents – Non-Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
22 July 2021 14:58 at Hutton 400/25kV Substation At Heysham 400kV substation, a Current Transformer failure caused a busbar fault which was cleared by busbar protection correctly on one side only. Circuits that were selected to the uncleared side (including the Heysham - Hutton 400kV circuit) were disconnected via the operation of back up protection. Due to the mesh configuration of the equipment at Hutton 400kV substation, this also tripped SGT 3A and 3B, disconnecting supplies to Network Rail, this is a customer choice connection site.	2.0	3	0.10
09 August 2021 12:03 at Rugeley 400/25kV Substation One of the 25kV cables supplying Network Rail at Brereton was damaged by a contractor clearing debris from the old power station site, causing Rugeley SGT3 circuit to trip and disconnect some demand until Network Rail switched on their network. SGT4 circuit was available to supply demand at all times without the need for further action to be taken by NGET, this is a customer choice connection site.	18.7	1	0.30
27 September 2021 06:38 at Culham Jet 400kV Substation The failure of a post insulator at Walham 400kV substation resulted in a mesh corner fault which tripped the Rassau - Walham 400kV circuit. Coincident with this Culham Jet SGT1C residual overvoltage protection operated and sent an intertrip to Culham Jet 400kV circuit breaker X110 which opened to disconnect the UK Atomic Energy Authority (UKAEA) facility (who were not taking load at the time) from the system. The operation of the UKAEA protection is unexplained.	0.0	321	0.00
31 October 2021 18:07 at Tremorfa 275/33kV Substation During storm conditions, substation building cladding came loose and fell onto the HV connections of SGT3 at Whitson 275kV substation. SGT3 HV connections protection did not operate in expected timescales and backup protection was initiated to clear the fault, which tripped a number of circuits connected to Whitson 27kV substation. At Tremorfa 275kV substation, the distance protection operated on the Whitson - Uskmouth - Tremorfa circuit and also sent a cascade trip signal to the Aberthaw - Tremorfa protection due to the configuration at Tremorfa substation. The tripping of these two circuits disconnected Celsa Steel who were taking 85.7MW at the time. The circuits and Tremorfa SGT1 returned to service automatically by DAR because Whitson SGT3 protection had operated. Celsa Steel demand was lost for a total of 26 seconds. This is a customer choice connection site.	85.7	0	0.60
02 November 2021 18:31 at Culham Jet 400kV Substation The Cowley - Culham Jet - Didcot 400kV circuit tripped and did not automatically return to service. When the circuit tripped, UKAEA (who were not taking load at the time) were disconnected from the system. Upon investigation it was found that a power unit associated with the distance protection at Cowley 400kV substation had failed.	0.0	292	0.00
06 January 2022 08:23 at Oldbury 275/132kV Substation A member of the public (MOP) accessed Oldbury 275kV substation and climbed onto one of the concrete structures associated with the Kitwell - Oldbury 275kV circuit. Due to the risk to life, the circuit and associated mesh corners and SGTs were switched out of service as soon as possible. Oldbury SGT2 was already out of service for maintenance, therefore switching out SGT1 resulted in a loss of demand to WPD. WPD were able to restore some of their customers by switching on their 11kV network, but the remainder were restored when the circuit and SGTs were returned to service after the MOP had been removed from proximity of NGET equipment.	80.6	20	25.30
13 February 2022 18:02 at Elstree 275/132kV Substation Protection operated on SGT3A at Elstree 275kV substation and tripped the transformer feeder circuit to Stanmore. Due to reconfiguration works ongoing at Elstree 132kV substation, this was the only circuit supplying Stanmore demand at the time. All demand was restored via UKPN lower voltage networks. This figure relates to the MWh restored during the first 3 minutes of the incident which is not incentivised.	-	-	0.50
20 February 2022 18:07 at Culham Jet 400kV Substation A fault on Cowley SGT2 caused it to trip and coincident with this, circuit breaker X110 at Culham Jet 400kV substation received a persistant intertrip and opened to disconnect the UK Atomic Energy Authority (UKAEA) facility (who were not taking load at the time) from the system. The operation of the UKAEA protection is unexplained.	0.0	143	0.00
24 March 2022 18:41 at Elstree 275/132kV Substation The failure of circuit breaker W20 at Elstree 275kV substation caused two 275kV busbars and all associated circuits to trip. All demand should have been picked up from other Grid Supply points via interconnections, but the two 132kV UKPN owned interconnecting circuits to Rye House also tripped unexpectedly. 76.9MW was lost and UKPN restored demand in stages via the 33kV network prior to Elstree SGT3B being made available for reconnection.	76.9	104*	89.90
Total			**116.70**

*Minutes quoted is the overall time following staged restoration to customers.

Scottish Power Transmission System

System Description

The SPTL Transmission System comprises approximately 4,000 circuit kilometres of overhead line and cable and 157 substations operating at 400, 275 and 132kV supplying approximately 2 million customers and covering an area of 22,951 square kilometres. It is connected to the SHE Transmission System to the north, the NGET Transmission System to the south and the Northern Ireland Transmission System via an HVDC interconnector.

There are 9 major demand customers supplied directly from the SP Transmission System with the majority of the load being taken by approximately 2 million customers connected to the SP Distribution System via 14.8GVA of installed transformer capacity. There is approximately 5.8GW of directly connected and Large Embedded generation capacity connected in the SP Transmission area, including 42 power stations directly connected to the SP Transmission system. In 2021-22 the maximum recorded demand on the network was 3.3GW.

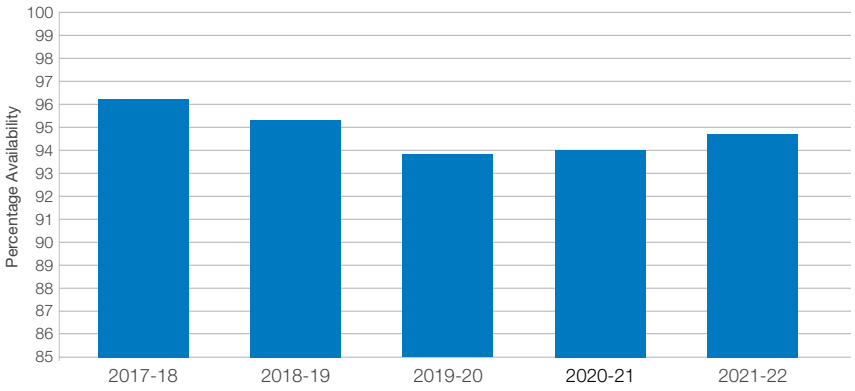
Availability

The definitions and criteria for system availability can be found in the Glossary of terms at the end of this report.

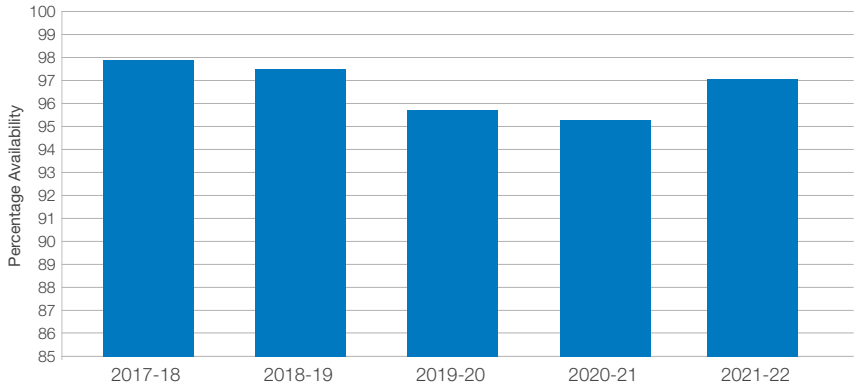
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

% Annual System Availability

SPT % Annual System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
96.29	95.31	93.90	94.00	94.67

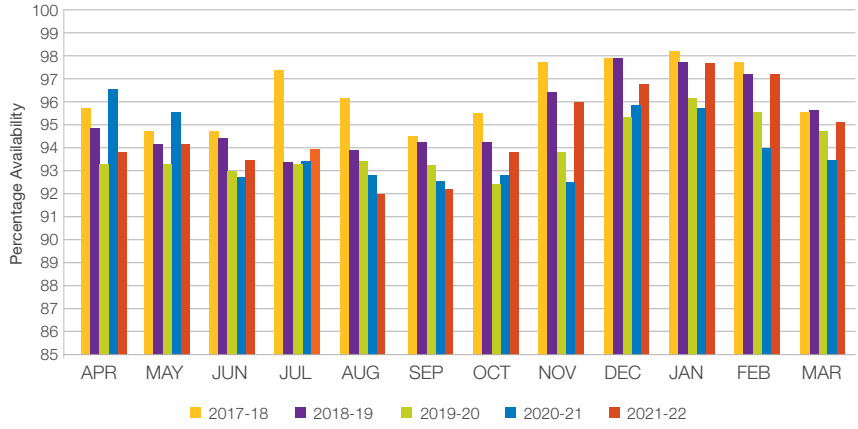


% Winter Peak System Availability



SPT % Winter Peak System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
97.88	97.55	95.64	95.24	97.11

% Monthly System Availability

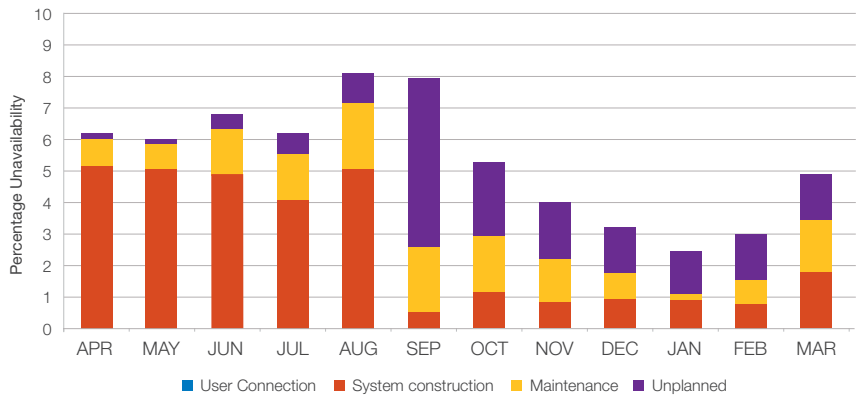


SPT % Monthly System Availability					
	2017-18	2018-19	2019-20	2020-21	2021-22
Apr	95.64	94.80	93.21	96.61	93.81
May	94.63	94.16	93.29	95.61	94.06
Jun	94.73	94.35	93.01	92.82	93.31
Jul	97.38	93.24	93.15	93.27	93.81
Aug	96.09	93.79	93.43	92.81	91.95
Sep	94.65	94.41	93.12	92.51	92.07
Oct	95.55	94.27	92.40	92.81	94.68
Nov	97.59	96.36	93.56	92.53	96.04
Dec	97.87	97.87	95.39	95.75	96.67
Jan	98.14	97.58	96.08	95.77	97.57
Feb	97.78	97.17	95.44	94.09	97.08
Mar	95.65	95.69	94.69	93.39	95.11

Planned and Unplanned System Unavailability

The table and the chart show the monthly variation in Planned and Unplanned System Unavailability.

Unavailability is defined as (100 – Availability) %



Planned and Unplanned Unavailability (%) for SP Transmission System					
	User Connection	System Construction	Maintenance	Unplanned	Total
Apr	0.00	5.24	0.75	0.20	6.19
May	0.00	5.07	0.61	0.26	5.94
Jun	0.00	4.78	1.53	0.37	6.69
Jul	0.00	4.18	1.31	0.71	6.19
Aug	0.00	4.95	2.16	0.94	8.05
Sep	0.00	0.50	2.06	5.37	7.93
Oct	0.00	1.21	1.62	2.49	5.32
Nov	0.00	0.64	1.57	1.75	3.96
Dec	0.00	0.85	0.86	1.63	3.33
Jan	0.00	0.85	0.27	1.30	2.43
Feb	0.00	0.77	0.74	1.41	2.92
Mar	0.00	1.73	1.85	1.31	4.89

Security

The definitions and criteria for system security can be found in the Glossary of terms at the end of this report.

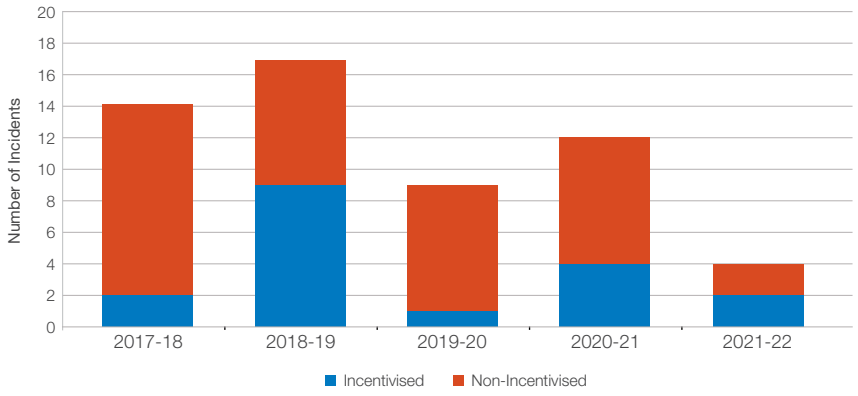
System performance is monitored by the estimated unsupplied energy from the SP Transmission System for each incident.

During 2021-22 there were 115 SPT system events where transmission circuits were disconnected either automatically or by urgent manual switching. The vast majority of these events had no impact on electricity users with 4 resulting in loss of supply to customers.

Number of Loss of Supply Incidents

The chart shows the annual comparison of the number of Loss of Supply Incidents that occurred within the SP Transmission System.

SPT System – Number of incidents					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	2	9	1	4	2
Non-Incentivised	12	8	8	8	2

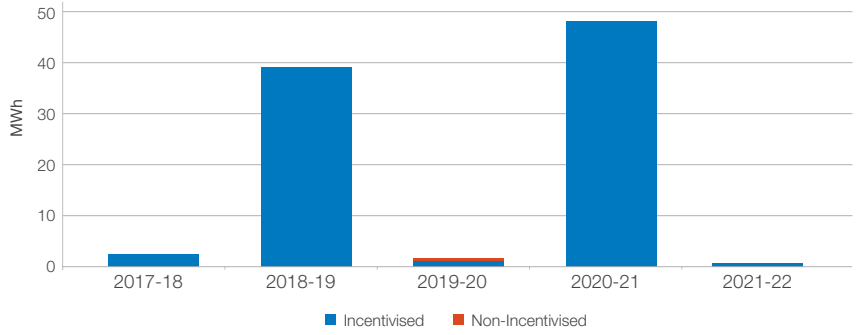


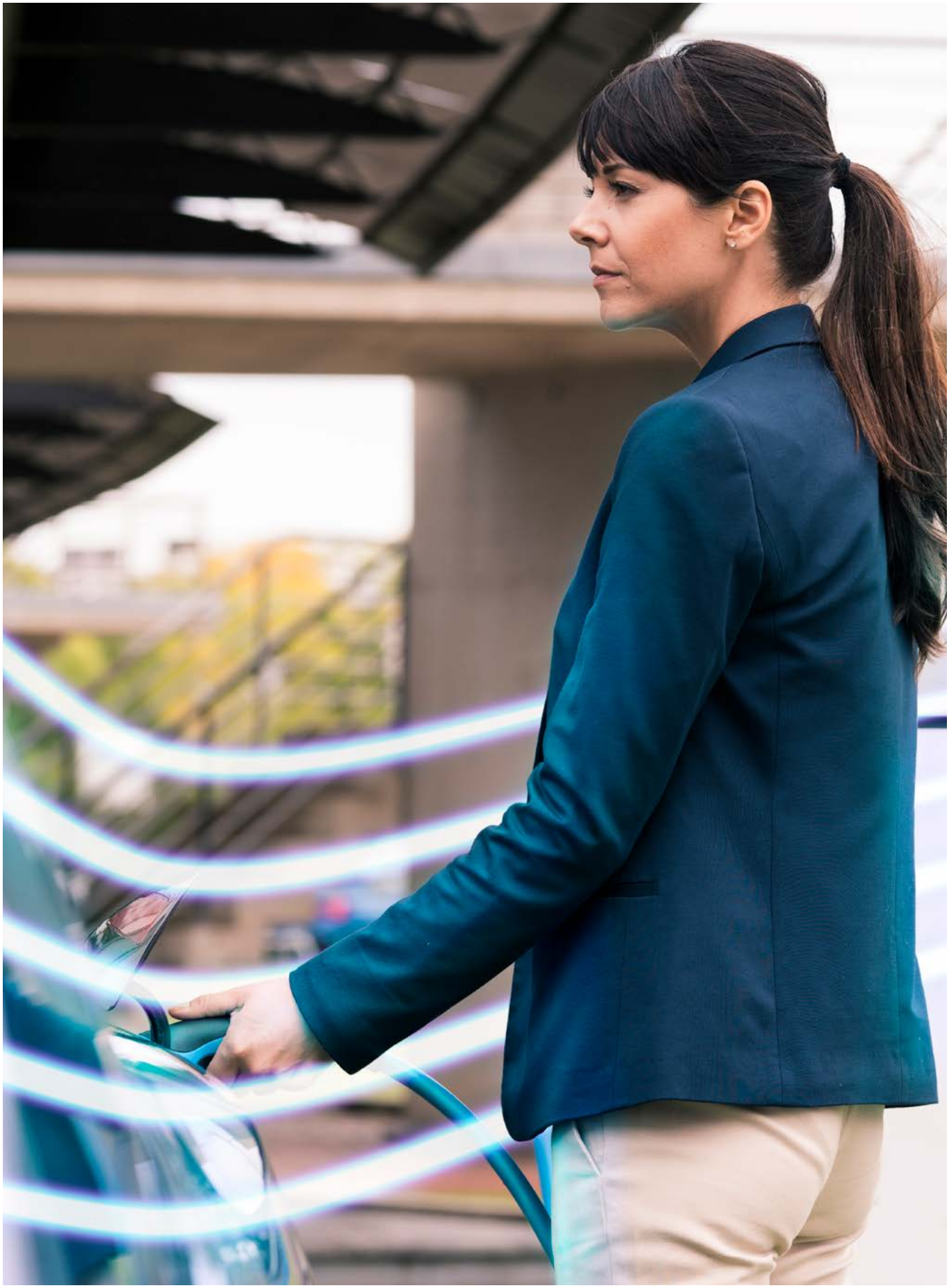
Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the SP Transmission System during 2021-22 was: **0.14 MWh**

The chart shows the annual comparison of the Estimated Unsupplied Energy, incentivised, for Loss of Supply Incidents that occur within the SP Transmission System.

SPT System – Estimated Unsupplied Energy (MWh)					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	3.04	39.08	1.99	47.98	0.14
Non-Incentivised	0.00	0.35	1.22	0.00	0.00





Reliability of Supply

The Overall Reliability of Supply for the SP Transmission System during 2021-22 was: **99.999999%**

compared with 99.999688% in 2020-21 and 99.999981% in 2019-20.

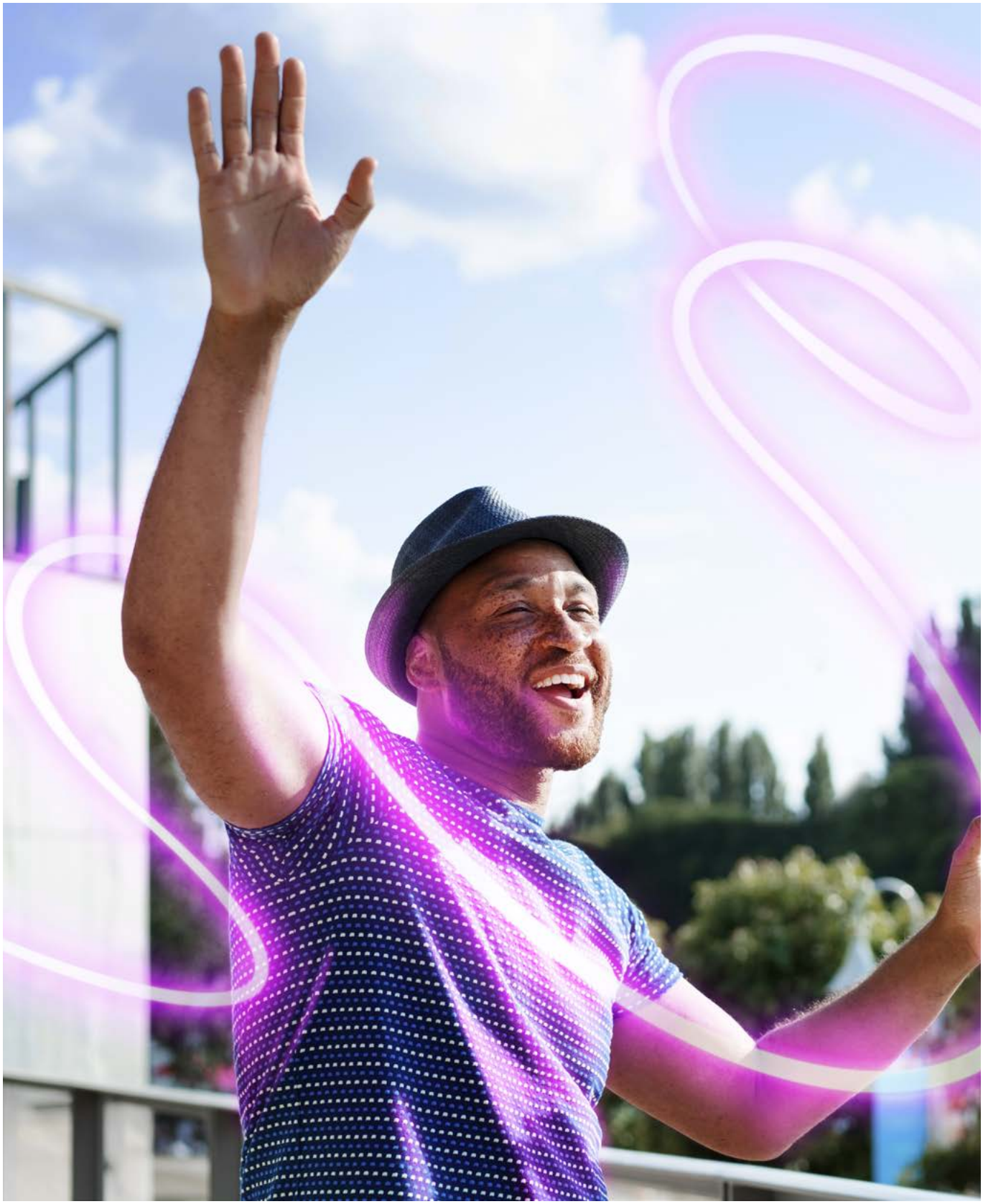
Loss of Supply Incident Details

SPT Loss of Supply Incidents – Incentivised

SPT Loss of Supply Incidents – Incentivised	MW Lost	Mins	MWh Unsupplied
02 September 2021 21:15 at Dunoon, Sloy, Whistlefield and Windyhill Trip and partial reclose on the Windyhill-Whistlefield-Dunoon-Sloy W2 cct. Whistlefield 132kV Circuit Breaker 205 did not auto reclose. 2 customers affected and restored after 3 minutes.	1.00	3	0.05
28 October 2021 13:12 at Glenluce, Glenlee & Newton Stewart 132kV Substation Main Protection operated, Circuit trip and auto-reclosed. Glenlee T1 loaded via telecontrol after agreement with National Grid. Glenlee circuit ratio set incorrectly. 1,069 customers affected and restored after 5 minutes.	1.00	5	0.09
Total			**0.14**

SPT Loss of Supply Incidents – Non-Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
12 April 2021 13:08 at Glenluce, Glenlee & Newton Stewart 132kV Substation Trip and Auto-Reclose on the Glenluce, Glenlee & Newton Stewart Number 1 circuit affecting 16,862 customers. Circuit was made available again in under a minute to restore supplies but SPD delayed restoration to 7,007 customers, but as SPT only affected for 1 minute, not incentivised.	2.81	1	0.00
28 April 2021 05:09 at Glenluce 132kV Substation Crow on Grid T1 at Glenluce caused the operation of duobias and bus zone protection, affecting 20,943 customers. The customers were restored in groups with the final customers being restored after 14 minutes. Net transfer of -12.57MW from Glenlee / Newton Stewart / Glenluce at time of fault, not incentivised.	-12.57	14	0.00
Total			**0.00**



Scottish Hydro Electric Transmission System

System Description

The SHE Transmission system comprises of over 199km of 400kV, 1805km of 275kV and 2778km of 132kV overhead line and approximately 941km of AC high voltage underground transmission cables, interconnecting 149 substations. There is also an HVDC link with 163km of cable connecting Caithness to the Moray Coast. The system covers an area of approximately 55,000 square kilometres or 24% of the Great Britain land mass. It is connected to the SP Transmission system to the South and the Beatrice Offshore Windfarm operator in the Highlands.

In 2021-22 the maximum recorded demand on the network was 1.37GW (provisional). Mostly the demand is taken by approximately 0.78 million customers connected to the Scottish Hydro Electric Power Distribution network via more than 12GVA of installed transformer capacity, with 1 other major customer also supplied directly from the SHE Transmission system. There are a growing number of large generators, with over 45 directly connected to the SHE Transmission system and many smaller units combining to produce more that 9GW capacity, of which 7.8GW is renewable.

The unreliability of supply figure can be distorted when compared against other systems at 275kV and 400kV due to the higher proportion of 132kV Transmission network and the consequent reduced power flows, however unreliability remains low in our network across all voltages.

80% of these transmission assets form the main interconnected transmission system whilst the remaining 20% radially supply the more remote areas of the territory including the outlying islands. Some connections, mainly in the more remote areas, can involve non-standard connection or running arrangements chosen by the customer and as such might experience greater risk of disruption, but on the whole reliability of the network has been very high.

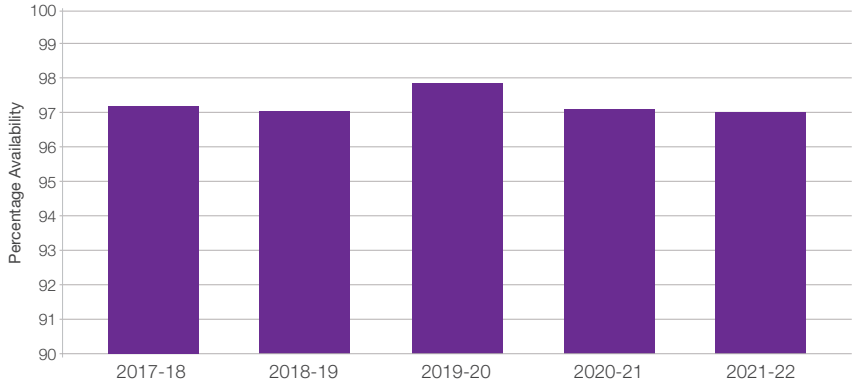
Availability

The definitions and criteria for system availability can be found in the Glossary of terms at the end of this report.

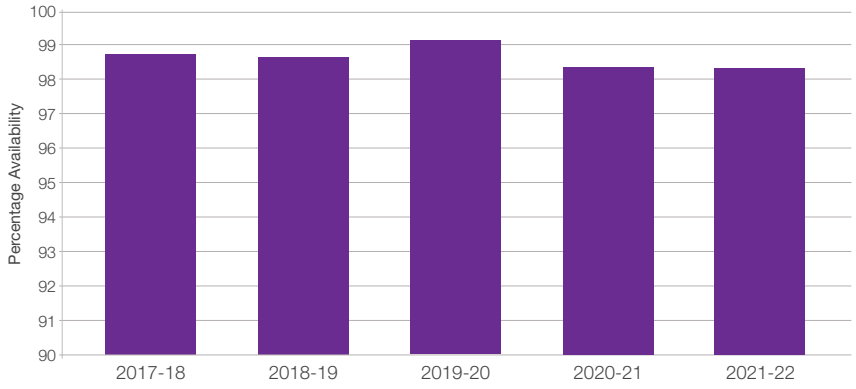
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

SHE Transmission % Annual System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
97.29	97.09	97.83	97.17	97.07

% Annual System Availability

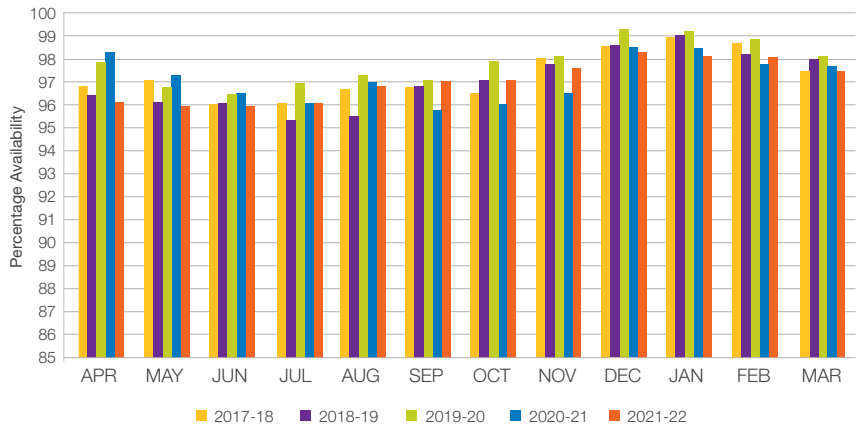


% Winter Peak System Availability



SHE Transmission % Winter Peak System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
98.68	98.61	99.10	98.30	98.22

% Monthly System Availability

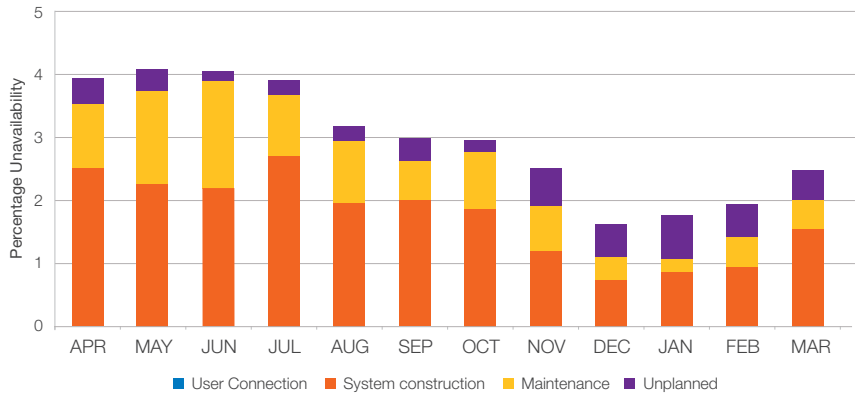


SHE Transmission % Monthly System Availability					
	2017-18	2018-19	2019-20	2020-21	2021-22
Apr	96.73	96.48	97.87	98.35	96.10
May	97.06	96.19	96.72	97.33	95.90
Jun	96.01	96.14	96.48	96.56	95.93
Jul	96.03	95.39	96.95	96.13	96.12
Aug	96.67	95.42	97.28	97.04	96.78
Sep	96.69	96.81	97.10	95.72	97.05
Oct	96.61	97.07	97.94	95.88	97.09
Nov	98.04	97.72	98.07	96.44	97.55
Dec	98.58	98.62	99.29	98.58	98.37
Jan	98.93	98.99	99.18	98.48	98.22
Feb	98.53	98.17	98.82	97.80	98.07
Mar	97.44	97.99	98.13	97.69	97.51

Planned and Unplanned System Unavailability

The table and the chart show the monthly variation in Planned and Unplanned System Unavailability.

Unavailability is defined as (100 – Availability) %



Planned and Unplanned Unavailability (%) for SHE Transmission System for 2018-19					
	User Connection	System Construction	Maintenance	Unplanned	Total
Apr	0.00	2.58	0.94	0.39	3.90
May	0.00	2.33	1.43	0.33	4.10
Jun	0.00	3.05	0.84	0.19	4.07
Jul	0.00	2.65	0.98	0.25	3.88
Aug	0.00	1.94	1.01	0.27	3.22
Sep	0.00	1.99	0.59	0.38	2.96
Oct	0.00	2.18	0.51	0.22	2.91
Nov	0.00	1.21	0.66	0.58	2.45
Dec	0.00	0.74	0.37	0.52	1.63
Jan	0.00	0.84	0.26	0.68	1.78
Feb	0.00	0.92	0.50	0.50	1.93
Mar	0.02	1.53	0.47	0.47	2.49

Security

The definitions and criteria for system security can be found in the Glossary of terms at the end of this report.

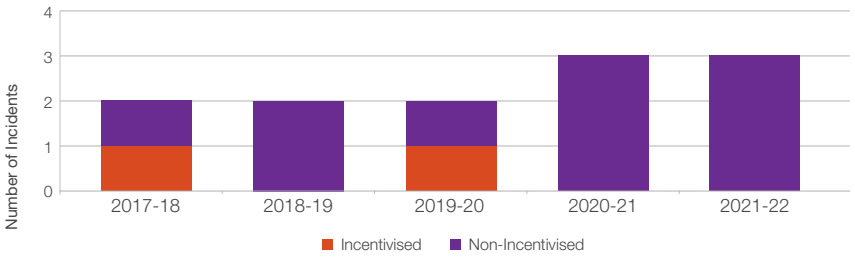
System performance is monitored by the Estimated Unsupplied Energy from the SHE Transmission System for each incident.

During 2021-22 there were 119 SHE Transmission system events where transmission circuits were disconnected either automatically or by urgent manual switching. The vast majority of these events had no impact on electricity users with 3 resulting in loss of supplies to customers.

Number of Loss of Supply Incidents

The chart shows the annual comparison of the number of Loss of Supply Incidents that occurred within the SHE Transmission System

SHE Transmission System – Number of Incidents					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	1	0	1	0	0
Non-Incentivised	1	2	1	3	3

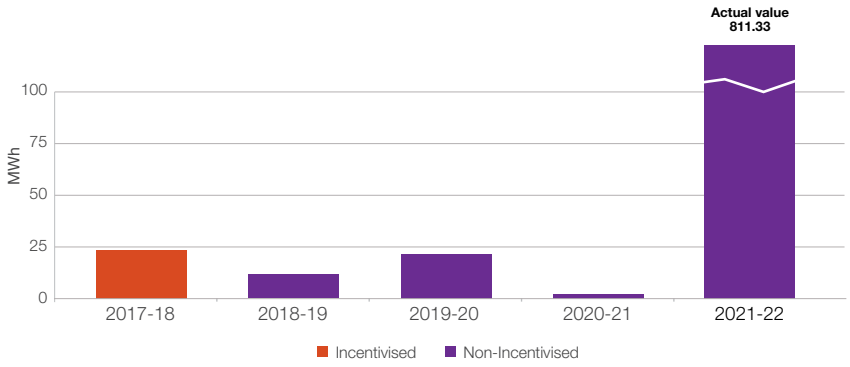


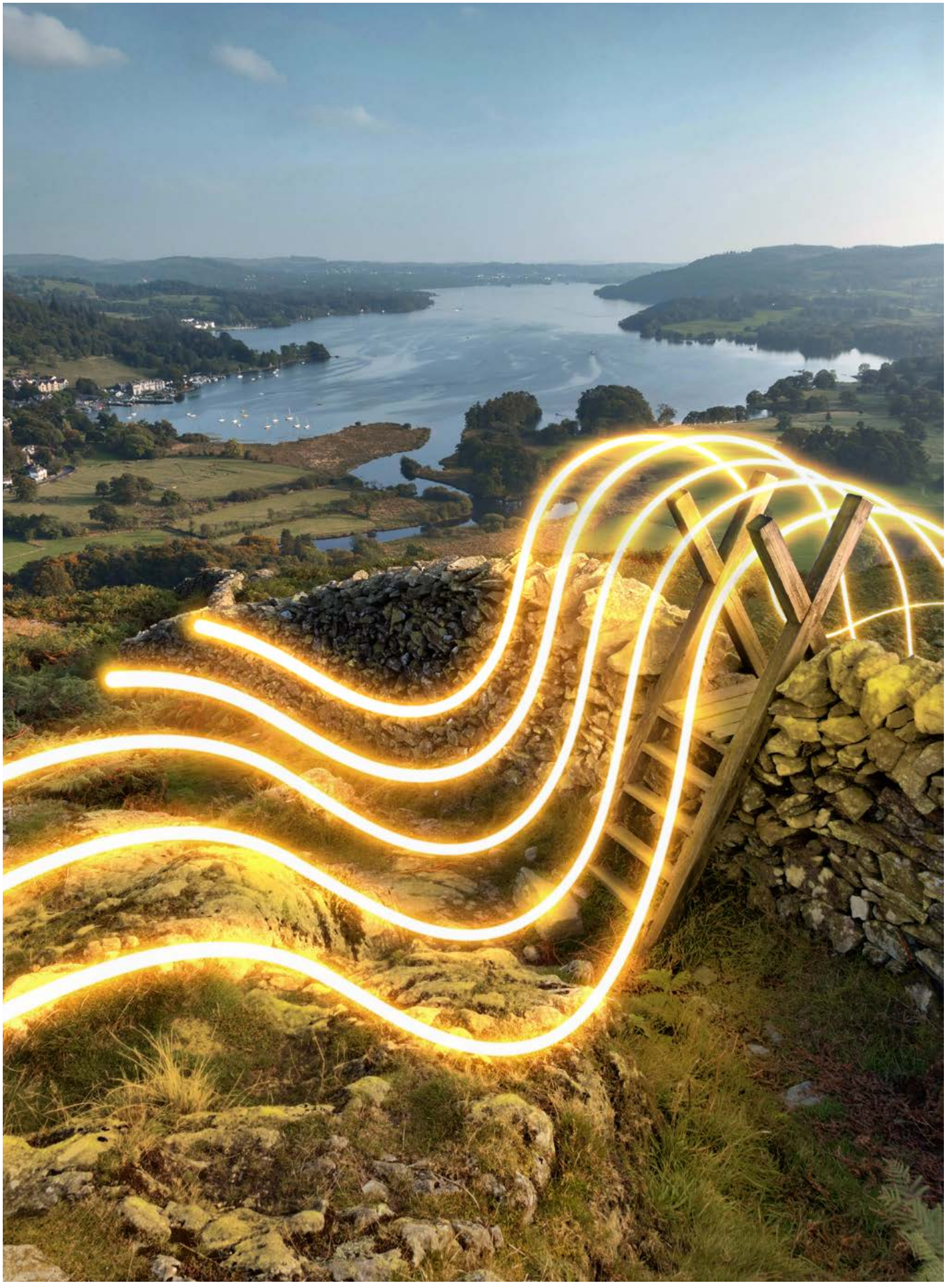
Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the SHE Transmission System during 2021-22 was: **811.33 MWh**

The chart shows the annual comparison of the Estimated Unsupplied Energy for Loss of Supply Incidents that occur within the SHE Transmission System.

SHE Transmission System – Estimated Unsupplied Energy (MWh)					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	24.33	0.00	1.15	0.00	0.00
Non-Incentivised	0.00	8.80	19.90	2.49	811.33





Reliability of Supply

The Overall Reliability of Supply for the SHE Transmission System during 2021-22 was: **99.983546%**

compared with 99.999948% in 2020-21 and 99.999612% in 2019-20.

Loss of Supply Incident Details

SHE Transmission Loss of Supply Incidents – Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
None	0.0	0	0.00
Total			**0.00**

SHE Transmission Loss of Supply Incidents – Non-Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
29 November 2021 - Tarland During Storm Arwen - a period of severe winds and snow caused damage on overhead lines near Tarland 132/33kV S/S at multiple locations. Fault repairs were hampered by the exceptional weather conditions and difficulties in gaining safe access due to extensive damage across the region. This was deemed as an Exceptional Event.	11	4630	689.81
30 January 2022 - Tarland During Storm Corrie - a period of severe winds & gales - several trees were uprooted and found in contact with overhead lines near Tarland 132/33kV S/S causing multiple areas of damage. Fault repairs were hampered by the exceptional weather conditions and difficulties in gaining safe access due to extensive damage across the region. This was deemed as an Exceptional Event.	4.1	1061	71.69
30 January 2022 - Fiddes During Storm Corrie - a period of severe winds & gales - several trees were uprooted and found in contact with overhead lines near Fiddes132/33kV S/S causing multiple areas of damage. Fault repairs were hampered by the exceptional weather conditions and difficulties in gaining safe access due to extensive damage across the region. This was deemed as an Exceptional Event.	3.1	1035	49.83
Total			**811.33**

Note - these were Exceptional Events and therefore excluded from Incentivised values.

Interconnectors

England – France Interconnector

System Description

The NGET transmission system is interconnected with France between Sellindge and Les Mandarins, via a 70km cross-channel HVDC link owned and operated jointly by National Grid and Réseau de Transport d'Electricité (RTE); the French transmission system owner since 1986 and is called IFA.

The total capability of the Interconnector is 2000MW. This is made up of four 'circuits', each of 500MW. There is no redundancy of the major components making up each circuit, hence all outages affect real time capability.

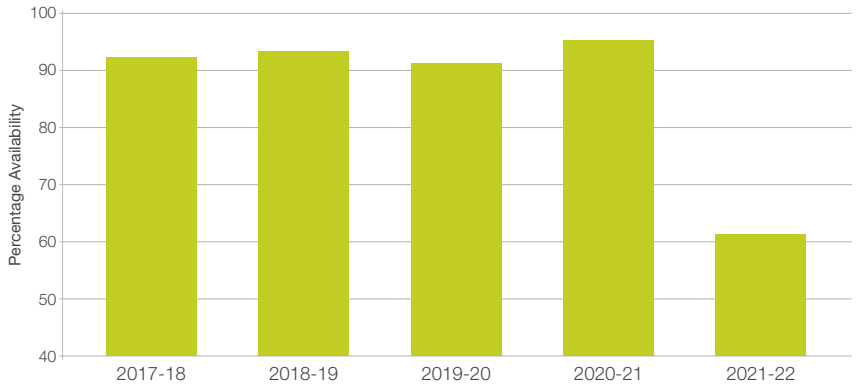
Annual Availability

Annual Availability of England – France Interconnector: **61.22%**

The chart below shows the annual comparison of availability of the England – France Interconnector.

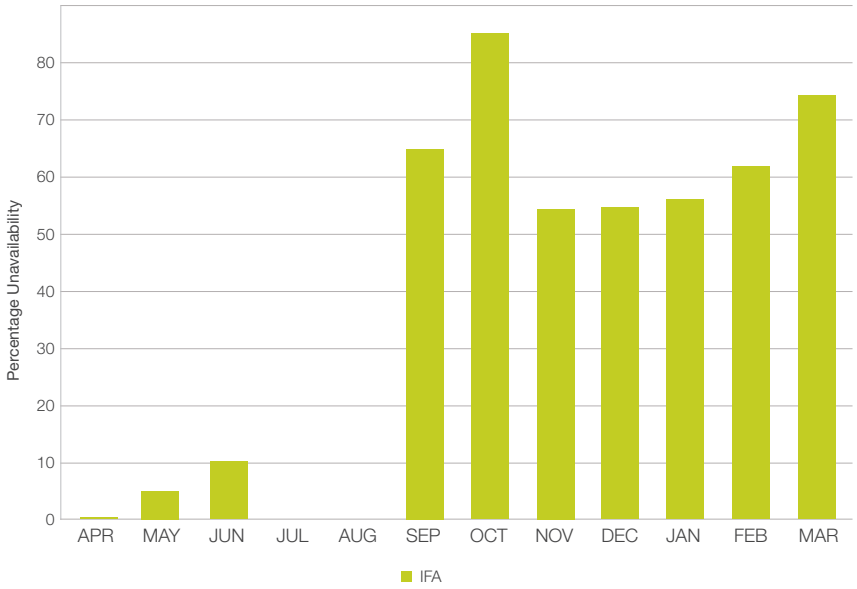
England – France Interconnector % Annual Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
92.61	93.86	91.45	95.40	61.22

% Annual System Availability



Monthly Unavailability

% England – France Interconnector Monthly Unavailability

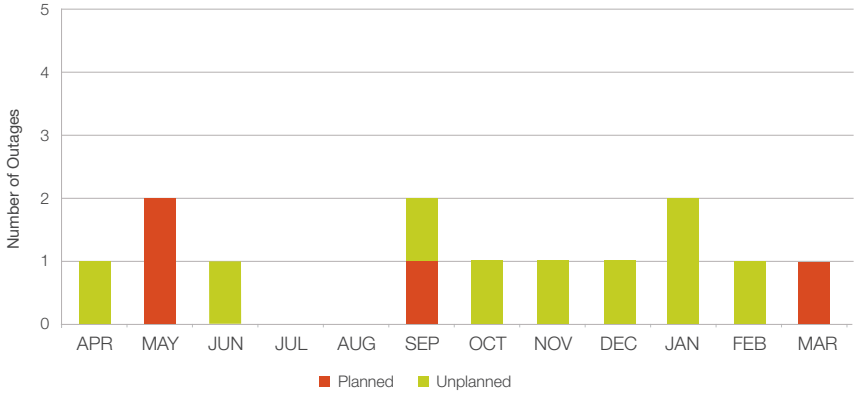


England – France Interconnector % Monthly Unavailability	
	IFA
April	0.13
May	4.02
June	10.31
July	0
August	0
September	64.58
October	86.31
November	53.62
December	53.77
January	57.54
February	61.52
March	73.51
Average	38.78

Outages 2021–22 (April–March)

The chart refers to Planned and Unplanned Outages. In this context Planned are notified prior to Day Ahead and Unplanned are notified at Day Ahead or within the Contract Day.

The chart below shows the number of Interconnector Planned and Unplanned Outages on a per month basis.



Interconnector Planned and Unplanned Outages		
	Planned	Unplanned
April	0	1
May	2	0
June	0	1
July	0	0
August	0	0
September	1	1
October	0	1
November	0	1
December	0	1
January	0	2
February	0	1
March	1	0
Total	4	9

England – Netherlands Interconnector

System Description

The NGET transmission system is interconnected with The Netherlands between Isle of Grain and Maasvlakte, via a 260km subsea cable owned and operated by BritNed Development Limited ("BritNed") since 2011. The total capability of BritNed is 1000MW and is made up of two 'poles', 500MW each.

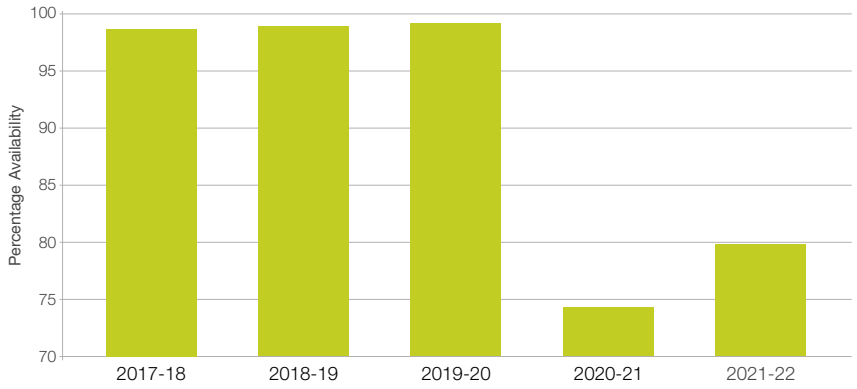
Annual Availability

Annual Availability of England – Netherlands Interconnector: **79.91%**

The chart below shows the availability of the England – Netherlands Interconnector.

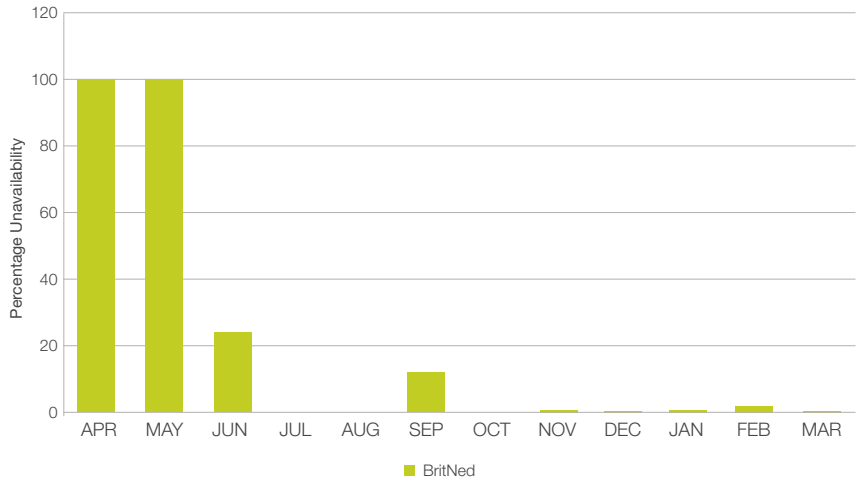
England – Netherlands Interconnector % Annual Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
97.78	98.22	98.52	74.48	79.91

% Annual System Availability



Monthly Unavailability

% England – Netherlands Interconnector Monthly Unavailability

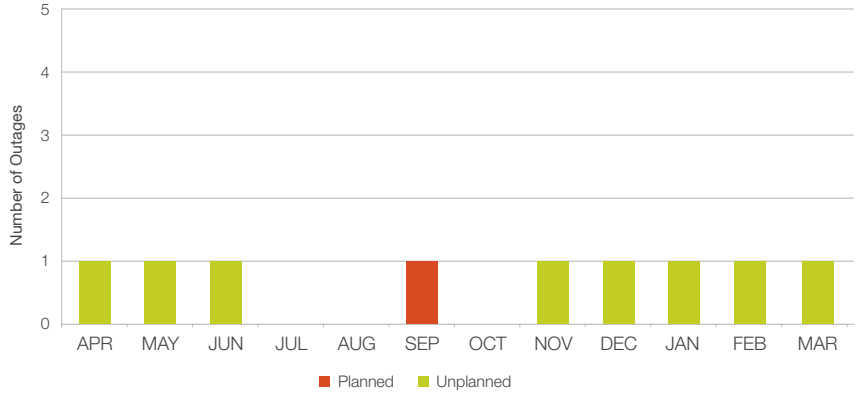


England – Netherlands Interconnector % Monthly Unavailability	
	BritNed
April	100
May	100
June	24.29
July	0
August	0
September	12.50
October	0
November	0.39
December	0.27
January	0.40
February	3.03
March	0.38
Average	20.09

Outages 2021–22 (April–March)

The chart refers to Planned and Unplanned Outages. In this context Planned are notified prior to Day Ahead and Unplanned are notified at Day Ahead or within the Contract Day.

The chart below shows the number of Interconnector Planned and Unplanned Outages on a per month basis.



Interconnector Planned and Unplanned Outages		
	Planned	Unplanned
April	0	1
May	0	1
June	0	1
July	0	0
August	0	0
September	1	0
October	0	0
November	0	1
December	0	1
January	0	1
February	0	1
March	0	1
Total	1	8

England – Belgium Interconnector

System Description

The NGET transmission system is interconnected with Belgium between Richborough and Zeebrugge, via a 140km subsea cable owned and operated by Nemo Link Limited ("Nemo Link") since January 2019. The total capability of the link is 1000MW and is a single 1000MW monopole design.

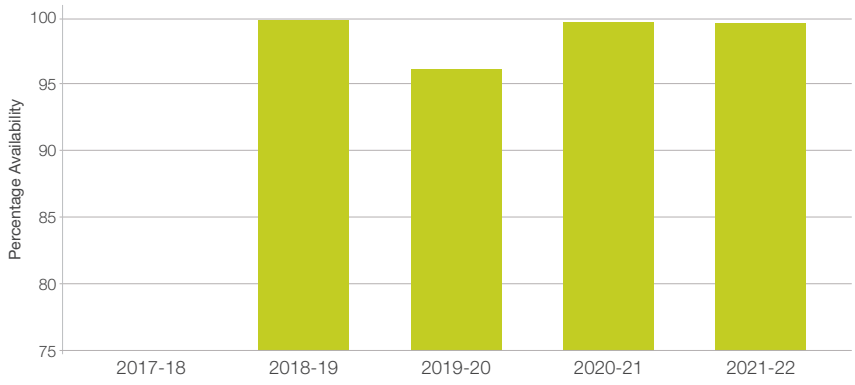
Annual Availability

Annual Availability of England – Belgium Interconnector: **99.00%**

The chart below shows the availability of the England – Belgium Interconnector.

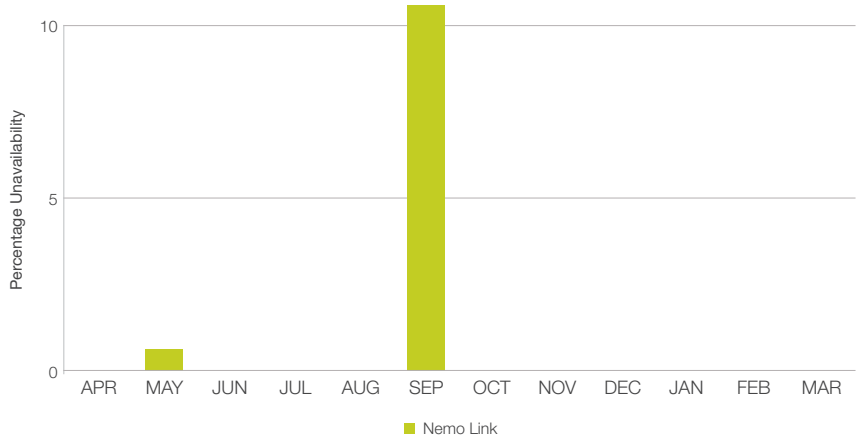
England – Belgium Interconnector % Annual Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
N/A	99.86	96.14	99.22	99.00

% Annual System Availability



Monthly Unavailability

% England – Belgium Interconnector Monthly Unavailability

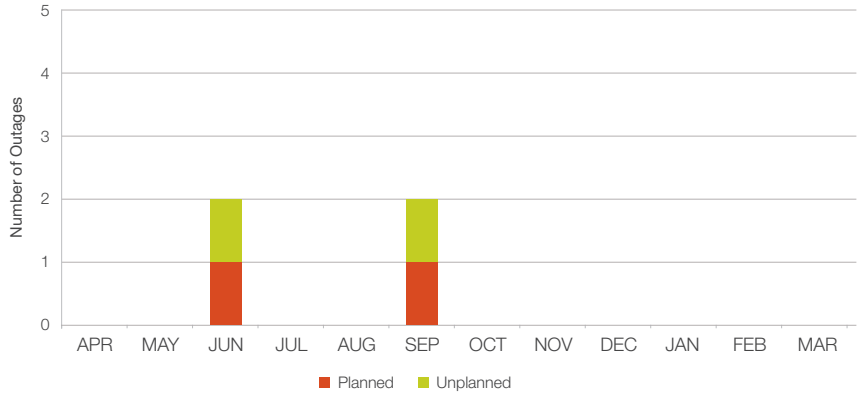


England – Belgium Interconnector % Monthly Unavailability	
	Nemo Link
April	0
May	0.69
June	0
July	0
August	0
September	11.46
October	0
November	0
December	0
January	0
February	0
March	0
Average	1.00

Outages 2021–22 (April–March)

The chart refers to Planned and Unplanned Outages. In this context Planned are notified prior to Day Ahead and Unplanned are notified at Day Ahead or within the Contract Day.

The chart below shows the number of Interconnector Planned and Unplanned Outages on a per month basis.



Interconnector Planned and Unplanned Outages		
	Planned	Unplanned
April	0	0
May	0	0
June	1	1
July	0	0
August	0	0
September	1	1
October	0	0
November	0	0
December	0	0
January	0	0
February	0	0
March	0	0
Total	2	2

England – France Interconnector 2

System Description

The NGET transmission system is interconnected with France between Lee-on-the-Solent and Tourbe, via a 240km HVDC link owned and operated jointly by National Grid and Réseau de Transport d'Electricité (RTE); the French transmission system owner since January 2021 and is called IFA2.

The total capability of the Interconnector is 1000MW and is of a single 1000MW monopole design.

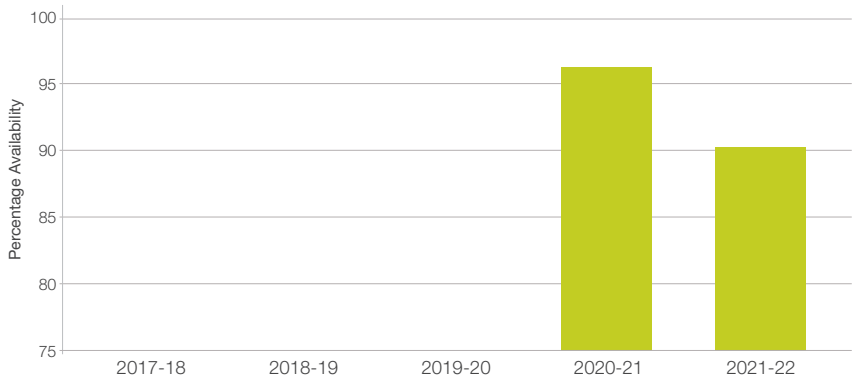
Annual Availability

Annual Availability of England – France Interconnector 2: **90.34%**

The chart below shows the annual comparison of availability of the England – France Interconnector 2.

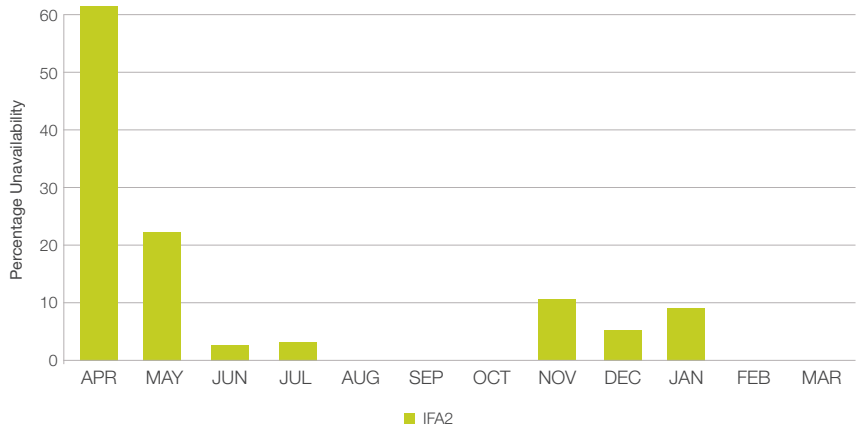
England – France Interconnector 2 % Annual Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
N/A	N/A	N/A	96.55	90.34

% Annual System Availability



Monthly Unavailability

% England – France Interconnector 2 Monthly Unavailability

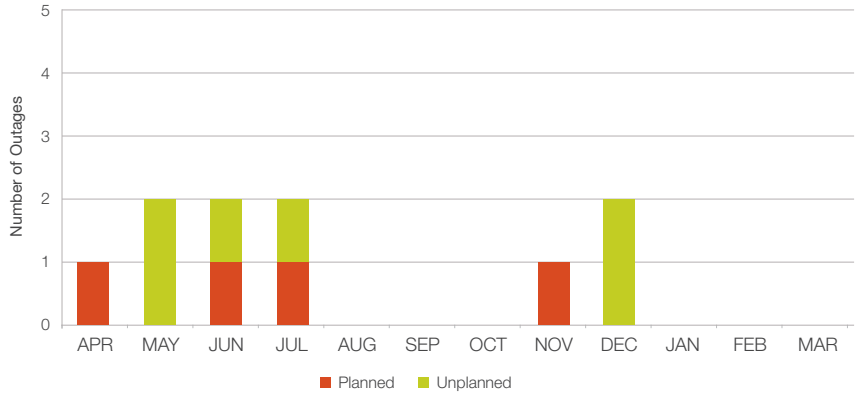


England – France Interconnector 2 % Monthly Unavailability	
	IFA2
April	62.50
May	22.67
June	2.36
July	2.65
August	0
September	0
October	0
November	11.25
December	5.91
January	8.63
February	0
March	0
Average	9.66

Outages 2021–22 (April–March)

The chart refers to Planned and Unplanned Outages. In this context Planned are notified prior to Day Ahead and Unplanned are notified at Day Ahead or within the Contract Day.

The chart below shows the number of Interconnector Planned and Unplanned Outages on a per month basis.



Interconnector Planned and Unplanned Outages		
	Planned	Unplanned
April	1	0
May	0	2
June	1	1
July	1	1
August	0	0
September	0	0
October	0	0
November	1	0
December	0	2
January	0	0
February	0	0
March	0	0
Total	4	6

England – Norway Interconnector

System Description

The NGET transmission system is interconnected with Norway between Blyth, Northumberland and Kvilldal, Rogland via a 720km HVDC link owned and operated jointly by National Grid Ventures and Statnett, the Norwegian transmission system owner.

The interconnector is called Northsealink and is a bipole design with a total capacity of 1400MW.

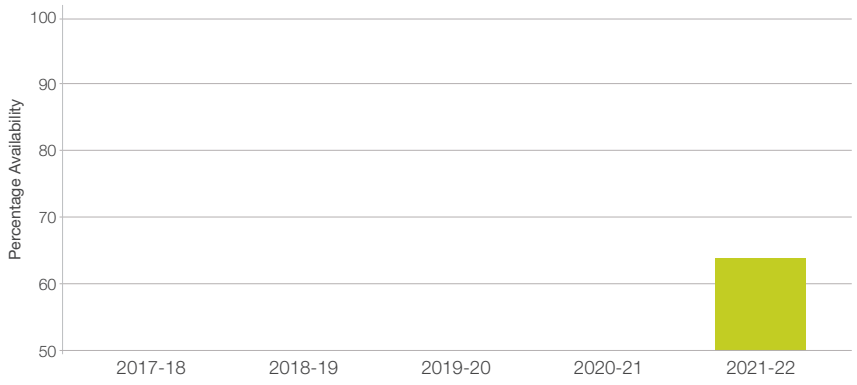
Annual Availability

Annual Availability of England – Norway: **63.61%**

The chart below shows the annual comparison of availability of the England – Norway Interconnector

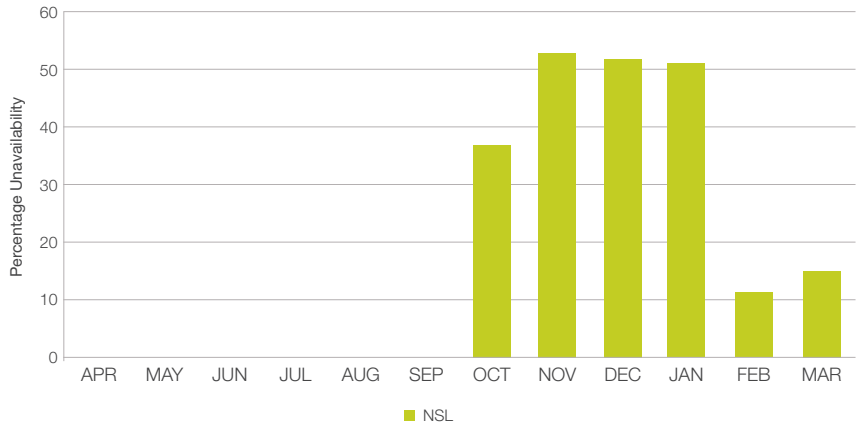
England - Norway Interconnector % Annual Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
N/A	N/A	N/A	N/A	63.61

% Annual System Availability



Monthly Unavailability

% England – Norway Interconnector Monthly Unavailability

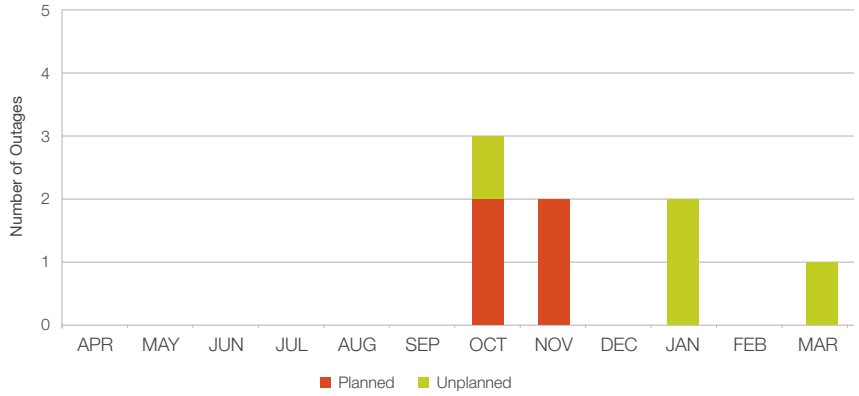


England - Norway Interconnector % Monthly Unavailability	
	NSL
April	N/A
May	N/A
June	N/A
July	N/A
August	N/A
September	N/A
October	37.33
November	52.30
December	51.14
January	50.61
February	11.83
March	15.10
Average	36.39

Outages 2021–22 (April–March)

The chart refers to Planned and Unplanned Outages. In this context Planned are notified prior to Day Ahead and Unplanned are notified at Day Ahead or within the Contract Day.

The chart below shows the number of Interconnector Planned and Unplanned Outages on a per month basis.



Interconnector Planned and Unplanned Outages		
	Planned	Unplanned
April	-	-
May	-	-
June	-	-
July	-	-
August	-	-
September	-	-
October	2	1
November	2	0
December	0	0
January	0	2
February	0	0
March	0	1
Total	4	4

Offshore Systems

System Description

The following section contains details of the currently connected offshore networks; Robin Rigg OFTO (TC), Gunfleet Sands OFTO (TC), Barrow OFTO (TC), Ormonde OFTO (TC), Lincs OFTO (TC), Westermost Rough OFTO (TC), Dudgeon OFTO (TC), Beatrice OFTO (TC), Rampion OFTO (TC), Walney 1 OFTO (BT), Walney 2 OFTO (BT), Sheringham Shoal OFTO (BT), London Array OFTO (BT), Greater Gabbard OFTO (EQ), Gwynt-Y-Mor OFTO (BBE), Thanet OFTO (BBE), Humber Gateway OFTO (BBE), West of Duddon Sands OFTO (WoDS), Burbo Bank Extension OFTO (DTP), Race Bank OFTO (DTP), Galloper OFTO (DTP), Walney Extension OFTO (DTP) and Hornsea One OFTO (DTP). The offshore network consists of 2554 kilometres of circuit, connecting to 23 offshore substations totalling over 8.7GW of generating capacity.

Offshore Transmission Networks

Offshore Transmission Networks						
	Go Live	Number of Circuits	Circuit Length km	Generating Capacity MW	Connection Voltage	Interfacing Party
TC Robin Rigg	02/03/2011	2	28.8	178	132kV	DNO
TC Gunfleet Sands	19/07/2011	1	12.76	163.9	132kV	DNO
TC Barrow	27/09/2011	1	30.1	90	132kV	DNO
TC Ormonde	10/07/2012	1	44.3	150	132kV	DNO
TC Lincs	11/11/2014	2	122.6	256	400kV	Transmission
TC Westermost Rough	11/02/2016	1	26.16	206.5	275kV	Transmission
TC Dudgeon	13/11/2018	2	178	400	400kV	Transmission
TC Beatrice	04/08/2021	2	181	588	400kV	Transmission
TC Rampion	17/11/2021	2	86	400	400kV	Transmission
BT Walney 1	31/10/2011	1	48	182	132kV	Transmission
BT Walney 2	04/10/2012	1	49	182	132kV	DNO
BT Sheringham Shoal	05/07/2013	2	88	315	132kV	DNO
BT London Array	18/09/2013	4	216	630	400kV	Transmission
EQ Greater Gabbard	29/11/2013	3	135	500	132kV	Transmission
BBE Gwynt Y Mor	17/02/2015	4	126.8	576	132kV	Transmission
BBE Thanet	17/12/2014	2	58.8	300	132kV	DNO
BBE Humber Gateway	15/09/2016	2	78	219	275kV	Transmission
West of Duddon Sands	25/08/2015	2	84.6	382	400kV	Transmission
DTP Burbo Bank Extension	27/04/2018	1	35.3	258	400kV	Transmission
DTP Race Bank	10/11/2019	2	164.7	573	400kV	Transmission
DTP Galloper	27/02/2020	2	88.3	353	132kV	Transmission
DTP Walney Extension	04/06/2020	2	139	659	400kV	Transmission
DTP Hornsea One	12/03/2021	2	533	1134	400kV	Transmission

TC: Transmission Capital
BT: Blue Transmission Investments Limited
EQ: Equitix
BBE: Balfour Beatty & Equitix Consortium
DTP: Diamond Transmission Partners

Availability

Offshore Transmission Systems are radial and only connect offshore generation to the wider NETS. The regulatory incentivisation of OFTO performance is different to that of onshore TOs and is based on their system availability rather than loss of supply. The OFTOs provide information for outages that originate on their system or outages that have impacted their system, for example, a generator, DNO or TO system. The system availability performance for each OFTO is then calculated after categorising the outages as either OFTO or Non-OFTO.

System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability. The Annual System Availability of Offshore Networks for 2021-22 was **98.99%**

% Annual System Availability

Offshore Transmission Networks % Annual System Availability

	2017-18	2018-19	2019-20	2020-21	2021-22
TC Robin Rigg	100	100	99.87	99.95	100
TC Gunfleet Sands	99.81	99.97	100	99.66	100
TC Barrow	99.99	100	100	100	100
TC Ormonde	100	100	100	100	99.93
TC Lincs	99.78	100	99.56	99.44	99.98
TC Westermost Rough	100	99.73	100	100	99.93
TC Dudgeon	N/A	100	99.31	99.83	99.92
TC Beatrice	N/A	N/A	N/A	N/A	99.16
TC Rampion	N/A	N/A	N/A	N/A	100
BT Walney 1	99.70	100	99.95	100	98.90
BT Walney 2	100	91.42	100	100	100
BT Sheringham Shoal	99.23	99.40	100	100	99.69
BT London Array	99.86*	99.94	99.95*	99.77	99.82
EQ Greater Gabbard	99.61	99.82	99.78	99.78	99.98
BBE Gwynt Y Mor	100	99.93*	96.10	86.31	87.62
BBE Thanet	100	100	100	99.84	100
BBE Humber Gateway	100*	100	99.83	99.76	98.73
West of Duddon Sands	99.45	100	100*	99.50	99.19
DTP Burbo Bank Extension	N/A	98.15	99.67	99.99	100
DTP Race Bank	N/A	N/A	100	99.26	100
DTP Galloper	N/A	N/A	100	99.95	100
DTP Walney Extension	N/A	N/A	N/A	99.97	100
DTP Hornsea One	N/A	N/A	N/A	100	99.93

* Figure has been updated as an exceptional event with agreement from Ofgem.

% Winter Peak System Availability

Offshore Transmission Networks % Winter Peak System Availability					
	2017-18	2018-19	2019-20	2020-21	2021-22
TC Robin Rigg	100	100	100	100	100
TC Gunfleet Sands	100	100	100	100	100
TC Barrow	100	100	100	100	100
TC Ormonde	100	100	100	100	100
TC Lincs	99.87	100	100	100	100
TC Westermost Rough	100	100	100	100	100
TC Dudgeon	N/A	100	100	100	99.88
TC Beatrice	N/A	N/A	N/A	N/A	100
TC Rampion	N/A	N/A	N/A	N/A	100
BT Walney 1	100	100	100	100	99.07
BT Walney 2	100	100	100	100	100
BT Sheringham Shoal	99.99	100	100	100	100
BT London Array	100	99.99	99.89	100	99.64
EQ Greater Gabbard	99.79	99.68	100	100	100
BBE Gwynt Y Mor	100	99.61	100	72.84	88.02
BBE Thanet	100	100	100	100	100
BBE Humber Gateway	100*	100	99.82	100	99.17
West of Duddon Sands	100	100	100	100	100
DTP Burbo Bank Extension	N/A	100	100	100	100
DTP Race Bank	N/A	N/A	100	100	100
DTP Galloper	N/A	N/A	100	100	100
DTP Walney Extension	N/A	N/A	N/A	99.91	100
DTP Hornsea One	N/A	N/A	N/A	100	99.92

* Figure has been updated as an exceptional event with agreement from Ofgem.

% Monthly System Availability

Offshore Transmission Networks % Monthly System Availability												
	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
TC Robin Rigg	100	100	100	100	100	100	100	100	100	100	100	100
TC Gunfleet Sands	100	100	100	100	100	100	100	100	100	100	100	100
TC Barrow	100	100	100	100	100	100	100	100	100	100	100	100
TC Ormonde	99.18	100	100	100	100	100	100	100	100	100	100	100
TC Lincs	99.74	100	100	100	100	100	100	100	100	100	100	100
TC Westermost Rough	100	100	100	99.13	100	100	100	100	100	100	100	100
TC Dudgeon	99.40	100	100	100	100	100	100	100	100	100	99.62	100
TC Beatrice	100	100	100	100	100	91.31	100	99.06	100	100	100	99.46
TC Rampion	100	100	100	100	100	100	100	100	100	100	100	100
BT Walney 1	100	100	92.29	100	100	100	100	100	94.56	100	100	100
BT Walney 2	100	100	100	100	100	100	100	100	100	100	100	100
BT Sheringham Shoal	100	100	96.20	100	100	100	100	100	100	100	100	100
BT London Array	100	100	100	100	100	100	100	100	100	100	97.65	100
EQ Greater Gabbard	100	100	100	100	99.73	100	100	100	100	100	100	100
BBE Gwynt Y Mor	84.05	88.20	88.20	88.20	85.89	88.20	88.20	88.20	88.20	88.20	87.66	88.20
BBE Thanet	100	100	100	100	100	100	100	100	100	100	100	100
BBE Humber Gateway	100	87.80	100	99.40	100	100	100	100	100	100	97.50	100
West of Duddon Sands	99.52	99.83	99.71	91.40	100	100	100	100	100	100	100	100
DTP Burbo Bank Extension	100	100	100	100	100	100	100	100	100	100	100	100
DTP Race Bank	100	100	100	100	100	100	100	100	100	100	100	100
DTP Galloper	100	100	100	100	100	100	100	100	100	100	100	100
DTP Walney Extension	100	100	100	100	100	100	100	100	100	100	100	100
DTP Hornsea One	100	100	100	100	99.70	99.72	100	100	100	99.76	100	100

% Monthly Planned and Unplanned Unavailability

The table shows the monthly variation in Planned and Unplanned System Unavailability for the Offshore Transmission Networks.

The unavailability has been classified by network responsibility i.e. OFTO or Non-OFTO (e.g. Generator)

		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
TC Robin Rigg	**OFTO Planned**	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0.47	1.95	1.04	0	0	0	0.35	0	0	0	0
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
TC Gunfleet Sands	**OFTO Planned**	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0.30	0	0	0	0	0	0
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
TC Barrow	**OFTO Planned**	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0.28
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
TC Ormonde	**OFTO Planned**	0.82	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0.66	0	0.20	0	0	27.10	0	0	0	0	0
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
TC Lincs	**OFTO Planned**	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0.26	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
TC Westermost Rough	**OFTO Planned**	0	0	0	0.87	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
TC Dudgeon	**OFTO Planned**	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0.60	0	0	0	0	0	0	0	0	0	0.38	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
TC Beatrice	**OFTO Planned**	0	0	0	0	0	8.69	0	0	0	0	0	0.54
	OFTO Unplanned	0	0	0	0	0	0	0	0.94	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	1.40	0	0	3.94	2.56
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
TC Rampion	**OFTO Planned**	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
BT Walney 1	**OFTO Planned**	0	0	7.71	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	5.44	0	0	0
	Non-OFTO	0	0	0	0.71	0	0	0	0	0	0	0	0
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
BT Walney 2	**OFTO Planned**	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	7.88	0	0	0.83	0	0	0	0	0	0	0	0

% Monthly Planned and Unplanned Unavailability

		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
BT Sheringham Shoal	OFTO Planned	0	0	3.80	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
BT London Array	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	2.35	0
	Non-OFTO	0	0	2.51	0	3.63	5.09	16.83	0.60	0	0	0	0.61
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
EQ Greater Gabbard	OFTO Planned	0	0	0	0	0.27	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
BBE Gwynt Y Mor	OFTO Planned	15.95	11.80	11.80	11.80	12.67	11.80	11.80	11.80	11.80	11.80	11.80	11.80
	OFTO Unplanned	0	0	0	0	1.44	0	0	0	0	0	0.54	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
BBE Thanet	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	2.38	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
BBE Humber Gateway	OFTO Planned	0	12.20	0	0.60	0	0	0	0	0	0	2.50	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
West of Duddon Sands	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0.48	0.17	0.29	8.60	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	1.70	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
DTP Burbo Bank Extension	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
DTP Race Bank	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
DTP Galloper	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
DTP Walney Extension	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
DTP Hornsea One	OFTO Planned	0	0	0	0	0.30	0.28	0	0	0	0.24	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0

Outage Details

Offshore system outages are calculated using MW of offshore transmission capacity unavailable not generation lost.

TC Robin Rigg

Outage Date and Time	Reason	Days, Hours and Mins	MWh
19 May 2021 08:01 Robin Rigg West 132kV. ENW outage on Hark-Stainburn 2 – Sellafield - Seaton.	Non-OFTO	6h 43m	618
06 June 2021 09:11 Robin Rigg East 132kV. ENW outage on Harker - Sellafield – Siddick 1 132kV circuit.	Non-OFTO	6h 40m	573
07 June 2021 08:11 Robin Rigg West 132kV. RWE planned outage for Offshore Substation 132kV maintenance and protection testing.	Non-OFTO	10h 36m	975
17 June 2021 07:58 Robin Rigg East 132kV. RWE planned outage for Offshore Substation 132kV maintenance and protection testing.	Non-OFTO	9h 11m	790
18 June 2021 14:15 Robin Rigg East 132kV. ENW outage to reconfigure network on completion of OHL works on Harker - Sellafield – Siddick 1 132kV circuit.	Non-OFTO	1h 53m	162
14 July 2021 08:52 Robin Rigg West 132kV. ENW outage to conduct OHL maintenance on Harker – Robin Rigg West – Sellafield – Stainburn 2 132kV circuit.	Non-OFTO	6h 52m	632
30 July 2021 09:15 Robin Rigg West 132kV. ENW outage for restoration on completion of OHL maintenance on Harker – Robin Rigg West – Sellafield – Stainburn 2 132kV circuit.	Non-OFTO	8h 07m	747
08 November 2021 12:54 Robin Rigg West 132kV. ENW Emergency outage due to a fire at another location.	Non-OFTO	4h 52m	448
Total			**4944**

TC Gunfleet Sands

Outage Date and Time	Reason	Days, Hours and Mins	MWh
20 September 2021 22:46 Offshore transformer (T1) outage. Generator requested, due to depletion of Generator protection and control following network switch failure.	Non-OFTO	11h 47m	354
Total			**354**

TC Barrow

Outage Date and Time	Reason	Days, Hours and Mins	MWh
22 July 2021 14:57 As a result of a slow cleared 400kV fault at NGET Heysham 400kV substation, the Barrow offshore network tripped.	Non-OFTO	4h 20m	390
29 March 2022 22:45 Loss of offshore protection and control DC supplies. Emergency de-energisation or disconnection of User's equipment necessary to ensure compliance with the Electricity Safety, Quality and Continuity Regulations 2002.	Non-OFTO	18h 25m	1658
31 March 2022 15:05 Stuck circuit breakers on Users equipment. Emergency de-energisation or disconnection of a User's equipment necessary to ensure compliance with the Electricity Safety, Quality and Continuity Regulations 2002.	Non-OFTO	2h 05m	188
Total			**2235**

TC Ormonde

Outage Date and Time	Reason	Days, Hours and Mins	MWh
23 April 2021 10:07 Site outage to allow crane on site for SRB14 replacement.	OFTO	5h 53m	883
10 May 2021 13:55 Removal of crane used on SRB14 repair works.	Non-OFTO	4h 55m	738
22 July 2021 14:57 As a result of a slow cleared 400kV fault at NGET Heysham 400kV substation, offshore T2 tripped.	Non-OFTO	3h 18m	218
04 October 2021 09:18 Full site outage by ENW. OFTO maintenance activities aligned.	Non-OFTO	8d 9h 36m	30240
Total			**32078**

TC Lincs

Outage Date and Time	Reason	Days, Hours and Mins	MWh
20 April 2021 12:55 Bird strike on the Harmonic Filter 3 capacitor bank. Trip of 132kV export cable of circuit 1.	OFTO	4h 04m	491
Total			**491**

TC Westermost Rough

Outage Date and Time	Reason	Days, Hours and Mins	MWh
02 July 2021 10:12 Planned maintenance of offshore HV equipment and replacement of faulty offshore BB protection relay.	OFTO	6h 28m	1335
Total			**1335**

TC Dudgeon

Outage Date and Time	Reason	Days, Hours and Mins	MWh
05 April 2021 07:06 Removal of shunt reactor of circuit 2 for repair.	OFTO	8h 40m	1733
22 February 2022 10:15 Maintenance of Dudgeon export cable circuit 1.	OFTO	5h 05m	1017
Total			**2750**

TC Beatrice

Outage Date and Time	Reason	Days, Hours and Mins	MWh
03 September 2021 13:47 Snagging and maintenance works on OFTO network. Impacts on GT2, Interconnector, HTR2, SGT2, Beatrice Onshore- OTM2 220kV circuit.	OFTO	5d 5h 10m	36799
12 November 2021 08:19 Onshore TO maintenance on HTR2 circuit at Blackhillock.	Non-OFTO	6h 17m	1847
17 November 2021 08:12 Onshore TO maintenance on HTR1 circuit at Blackhillock 400kV substation.	Non-OFTO	4h 58m	1460
25 November 2021 08:16 Onshore TO maintenance on HTR2 circuit at Blackhillock 400kV substation.	Non-OFTO	8h 54m	2617
26 November 2021 16:53 A trip during storm Arwen. Outage of circuit 1	OFTO	6h 39m	1955
26 November 2021 16:53 A trip during storm Arwen. Outage of circuit 2.	OFTO	6h 53m	2024
18 February 2022 10:00 Circuit 2 restriction due to generator managed issue.	Non-OFTO	25d 23h 24m	15579
15 March 2022 10:15 Onshore TO maintenance on HTR1 circuit.	Non-OFTO	6h 55m	2034
16 March 2022 09:24 Maintenance works on OFTO network. GT2 oil top-up.	OFTO	8h 05m	2377
16 March 2022 17:29 Circuit 2 restriction due to generator managed issue.	Non-OFTO	8h 05m	9159
Total			**75850**

TC Rampion

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			0
Total			**0**

BT Walney 1

Outage Date and Time	Reason	Days, Hours and Mins	MWh
15 June 2021 08:30 6 yearly planned maintenance.	OFTO	2d 7h 31m	9327
22 July 2021 14:59 Trip caused by fault on National Grid system at Heysham	Non-OFTO	5h 15m	882
20 December 2021 07:52 Fibre optic cable repair.	OFTO	1d 16h 28m	6798
Total			**17007**

BT Walney 2

Outage Date and Time	Reason	Days, Hours and Mins	MWh
19 April 2021 08:45 Planned outage by DNO for maintenance of their equipment.	Non-OFTO	2d 8h 45m	9534
27 July 2021 09:26 Planned outage by DNO for asset investigation.	Non-OFTO	6h 09m	1033
Total			**10567**

BT Sheringham Shoal

Outage Date and Time	Reason	Days, Hours and Mins	MWh
09 June 2021 07:35 Maintenance of Salle onshore 2 and OS2 offshore circuits.	OFTO	2d 6h 47m	8628
Total			**8628**

BT London Array

Outage Date and Time	Reason	Days, Hours and Mins	MWh
08 June 2021 05:14 X190 Mechanism change outage (SGT1A/GT1 leg).	Non-OFTO	21h 23m	3079
08 June 2021 05:43 X190 Mechanism change outage (SGT1B/GT3 leg).	Non-OFTO	21h 04m	3034
15 June 2021 05:37 X290 Mechanism change outage (SGT2A/GT2 leg).	Non-OFTO	18h 17m	2633
15 June 2021 06:07 X290 Mechanism change outage (SGT2B/GT4 leg).	Non-OFTO	18h 14m	2626
19 August 2021 07:03 Generator park pilot replacement SGT1A.	Non-OFTO	1d 3h 33m	4339
19 August 2021 07:05 Generator park pilot replacement SGT2A.	Non-OFTO	1d 3h 32m	4336
19 August 2021 07:35 Generator park pilot replacement SGT1B.	Non-OFTO	1d 3h 05m	4266
19 August 2021 08:54 Generator park pilot replacement SGT2B.	Non-OFTO	1d 1h 47m	4061
24 September 2021 07:38 GT2 trip due to 33kV bus-duct failure inside the 33kV termination box.	Non-OFTO	29d 12h 22m	101990
03 November 2021 10:27 Post busduct fault GT2 bushing bleed.	Non-OFTO	4h 53m	703
23 November 2021 10:09 GT1 LV inspection.	Non-OFTO	4h 50m	696
24 November 2021 09:03 GT3 LV inspection.	Non-OFTO	5h 35m	804
24 November 2021 15:40 GT4 LV inspection.	Non-OFTO	3h 36m	518
18 February 2022 12:20 SGT2B circuit trip following National Grid disturbance.	OFTO	8h 29m	1220
18 February 2022 12:20 SGT2A circuit trip following National Grid disturbance.	OFTO	2d 11h 45m	8604
20 February 2022 23:09 SGT2B circuit trip following National Grid disturbance for post switching reconfiguration	OFTO	57m	135
16 March 2022 09:10 Generator requested outage for 33kV GT4 bus can inspection.	Non-OFTO	12h 11m	1754
18 March 2022 09:22 Generator requested outage for 33kV GT3 bus can inspection.	Non-OFTO	7h 47m	1121
Total			**145919**

Equitix Greater Gabbard

Outage Date and Time	Reason	Days, Hours and Mins	MWh
August 2021 Main protection testing.	OFTO	7h 11m	999
Total			**999**

BBE Gwynt-Y-Mor

Outage Date and Time	Reason	Days, Hours and Mins	MWh
01 April 2021 00:01 52.8% Export cap on SSEC3.	OFTO	365d	595400
21 April 2021 13:10 GT8 GIB repair.	OFTO	5d 3h 32m	17789
26 August 2021 09:04 SGT1 bladder repair.	OFTO	1d 5h 01m	8357
29 August 2021 00:01 PoW relay failure.	OFTO	1d 18h 59m	6190
26 February 2022 14:42 Voltage control relay failure.	OFTO	1d 3h 16m	3926
Total			**631661**

BBE Thanet

Outage Date and Time	Reason	Days, Hours and Mins	MWh
02 August 2021 14:02 UKPN outage of EC1**.**	Non-OFTO	8h 53m	1332
20 August 2021 09:28 UKPN outage of EC1.	Non-OFTO	1d 2h 32m	3830
23 February 2022 09:33 UKPN outage of EC2.	Non-OFTO	2d 9h 15m	8588
Total			**13750**

BBE Humber Gateway

Outage Date and Time	Reason	Days, Hours and Mins	MWh
10 May 2021 09:36 Circuit 1, 6 Year Maintenance.	OFTO	4d 7h 38m	11400
24 May 2021 08:42 Circuit 2, 6 Year Maintenance.	OFTO	3d 6h 24m	8624
14 July 2021 10:51 Circuit 2, LB6 investigation.	OFTO	6h 19m	695
08 February 2022 06:47 Circuit 2, CSE repair.	OFTO	1d 11h 23m	3892
Total			**24611**

West of Duddon Sands

Outage Date and Time	Reason	Days, Hours and Mins	MWh
09 April 2021 10:04 Investigation into Harmonic Filter 1 fault.	OFTO	7h 57m	1313
05 May 2021 11:08 Circuit 1 cable inspection	OFTO	2h 54m	479
14 June 2021 09:41 Reinstatement of Harmonic Filter 1.	OFTO	54m	149
17 June 2021 09:49 Harmonic Filter 2 investigation and repair.	OFTO	3h 56m	650
22 July 2021 14:57 Tripping as a result of 3rd party fault - excluded under E4-J12 para 8 (d).	Non-OFTO	1d 1hr 16m	4826
22 July 2021 14:57 Tripping as a result of protection maloperation following 3rd party fault - subject to EE claim.	OFTO	5d 23h 57m	24432
Total			**31849**

DTP Burbo Bank Extension

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			0
Total			**0**

DTP Race Bank

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			0
Total			**0**

DTP Galloper

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			0
Total			**0**

DTP Walney Extension

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			0
Total			**0**

DTP Hornsea One

Outage Date and Time	Reason	Days, Hours and Mins	MWh
31 August 2021 08:03 Transfer Agreement Orsted snagging works.	OFTO	9h 18m	2095
01 September 2021 08:21 Transfer Agreement Orsted snagging works.	OFTO	8h 23m	1888
25 January 2022 09:26 Protection relay replacement.	OFTO	7h 24m	1663
Total			**5646**

This glossary provides explanations and definitions for common terms used throughout this report.

System Availability

System availability is reduced whenever a circuit is taken out of operation for either planned purposes or following a fault.

Planned outages are required for system construction and new user connections in addition to the maintenance necessary to retain a high level of system reliability to ensure that licence standards of security are met.

System Availability is calculated by the formula:

$$\left(\frac{\text{The sum for all circuits of hours available}}{\text{(No. of circuits) x (No. of hours in period)}}\right) \text{x } 100\%$$

A circuit is defined as equipment on the transmission system, e.g. overhead line, transformer or cable which either connects two bussing points or connects two or more circuit breakers/disconnectors, excluding busbars.

Winter Peak Availability is defined as the average System Availability over the three months of December, January and February.

System Unavailability

System Unavailability is calculated by the formula:

(100 – Availability) %

Unavailability falls into 4 categories, 3 of which are planned and the other unplanned:

Maintenance Outages are planned outages required for maintenance;

System Construction Outages are planned outages required to construct or modify assets which are not provided for the exclusive benefit of specific users;

User Connection Outages are planned outages required to construct or modify assets which are provided to facilitate connection for the exclusive benefit of specific system users; and

Unplanned Unavailability is due to outages occurring as a result of plant or equipment failure, i.e. outages required and taken at less than 24 hours' notice.

Offshore System Availability

OFTO availability is calculated using the formula:

$$\left(\frac{\text{Total MWh system is capable of delivering – MWh unavailable}}{\text{Total MWh system is capable of delivering}}\right) \text{x } 100\%$$

NETS Grid Code and NETS Security and Quality of Supply Standard

The NETS Grid Code and NETS Security and Quality of Supply Standard (NETS SQSS) define the required security level to which the system is planned. The required security level at a substation increases with the amount of demand connected to the substation and so the planned level of demand security is normally higher for 400kV and 275kV transmission voltages than for 132kV. Additionally, the 132kV network is, in parts, less interconnected than the higher voltage systems and so losses of 132kV transmission circuits (for example due to weather related transient faults) are more likely to lead to temporary losses of supply.

Loss of Supply Incidents

A loss of supply incident is defined as any incident on the transmission system that results in an actual unsupplied energy incident to a customer or customers including pumped storage units operating in pump mode.

All transmission system incidents that resulted in a loss of supplies are reported individually giving the date, time and location of the event, duration, demand lost, an estimate of unsupplied energy and relevant factual information relating to the event.

Since 1st April 2013, loss of supply incidents is governed by the Energy Not Supplied (ENS) scheme. The scheme aims to incentivise the Transmission Licensees to minimise the impact of any loss of supply to their customers, that is, to restore supplies as soon as possible after an incident.

Loss of Supply Incidents – Incentivised

An Incentivised loss of supply event is an event on the Licensee's Transmission System that causes electricity not to be supplied to a customer, subject to the exclusions defined in the Special Conditions of the Transmission Licence.

Loss of Supply Incidents – Non Incentivised

The Non-Incentivised category covers loss of supply incidents that are less than 3 minutes in duration, the energy not supplied is calculated and recorded but not included in the incentivised energy not supplied figure and is reported separately. The Non-Incentivised category also applies to connection arrangements that are chosen by the customer and often have a level of design and operational security below that normally required to satisfy the NETS SQSS. This may be reflected in a reduced cost of the connection. In some cases, customers have also chosen to secure their supplies using their own generation to compensate for this reduced level of transmission security. Loss of supply initiated on a DNO network are not included within this category.

Overall Reliability of Supply

The Overall Reliability of Supply for a transmission system is calculated using the formula:

$$\left[1-\left(\frac{\text{Estimated Unsupplied Energy}}{\text{Total energy that would have been supplied by the transmission system)}}\right)\right] \times 100\%$$

Voltage Excursions

The Electricity Safety, Quality and Continuity Regulations 2002 permit variations of voltage not exceeding 10% above and below the nominal at voltages of 132kV and above and not exceeding 6% at lower voltages. Any voltage excursions in excess of 15 minutes will be reported.

The NETS Grid Code reflects these limits, and imposes a further constraint for the 400kV system in that voltages can only exceed +5% for a maximum of 15 minutes.

Consumers may expect the voltage to remain within these limits, except under abnormal conditions e.g. a system fault outside of the limits specified in the NETS SQSS.

Normal operational limits are agreed and monitored individually at connection points with customers to ensure that voltage limits are not exceeded following the specified credible fault events described in NETS SQSS.

Frequency Excursions

The Electricity Safety, Quality and Continuity Regulations 2002 permit variations in frequency not exceeding 1% above and below 50Hz: a range of 49.5 to 50.5Hz. Any frequency excursions outside these limits for 60 seconds or more will be reported.

The system is normally managed such that frequency is maintained within operational limits of 49.8 and 50.2Hz.

Frequency may, however, move outside these limits under fault conditions or when abnormal changes to operating conditions occur. Losses of generation between 1320 and 1800MW are considered abnormal and a maximum frequency change of 0.8Hz may occur, although operation is managed so that the frequency should return within the lower statutory limit of 49.5Hz within 60 seconds.

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