

Tealing Substation

May 2022

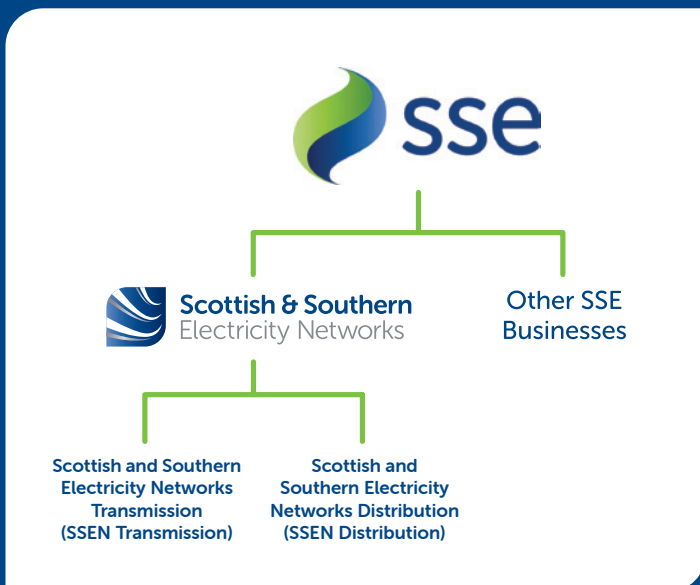


Scottish & Southern
Electricity Networks

TRANSMISSION

Who we are

We are Scottish and Southern Electricity Networks Transmission (SSEN Transmission), operating under licence as Scottish Hydro Electric Transmission Plc (SHE Transmission) for the transmission of electricity in the north of Scotland.



In total we maintain about 5,000km of overhead lines and underground cables – easily enough to stretch across the Atlantic from John O’Groats all the way to Boston in the USA.

Our network crosses some of the UK’s most challenging terrain – including circuits that are buried under the seabed, are located over 750m above sea level and up to 250km long.

The landscape and environment that contribute to the challenges we face also give the area a rich resource for renewable energy generation. There is a high demand to connect from new wind, hydro and marine generators which rely on Scottish and Southern Electricity Networks to provide a physical link between the new sources of power and electricity users. Scottish and Southern Electricity Networks is delivering a major programme of investment to ensure that the network is ready to meet the needs of our customers in the future.

Our responsibilities

We have a licence for the transmission of electricity in the north of Scotland and we are closely regulated by the energy regulator Ofgem.

Our licence stipulates that we must develop and maintain an efficient, co-ordinated and economical system of electricity transmission.

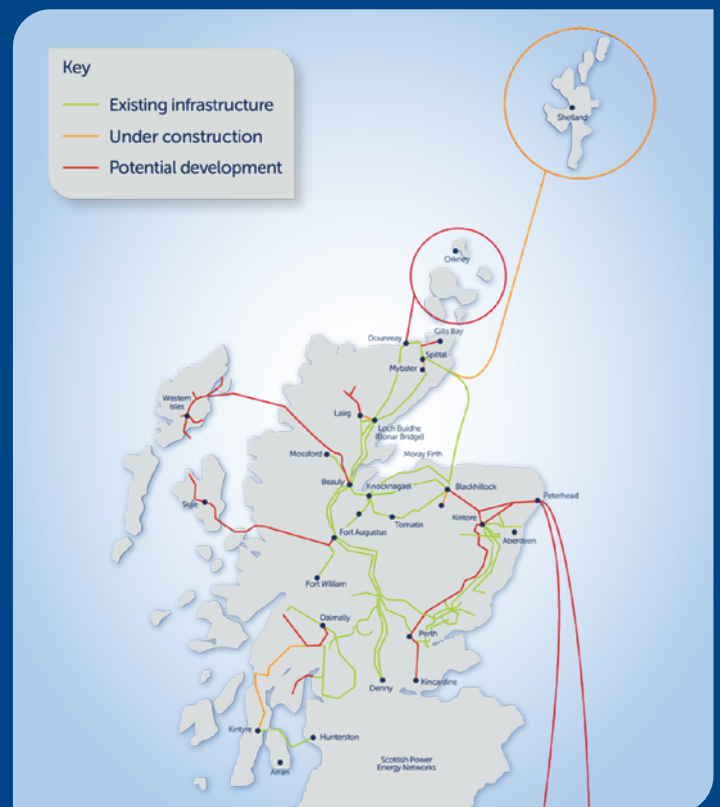
What is the difference between transmission and distribution?

Electricity transmission is the transportation of electricity from generating plants to where it is required at centres of demand. The electricity transmission network, or grid, transports electricity at very high voltages through overhead lines, underground cables and subsea cables.

Our transmission network connects large scale generation, primarily renewables, to central and southern Scotland and the rest of Great Britain. It also helps secure supply by providing reliable connection to the wider network of generation plants.

The electricity distribution network is connected into the transmission network but the voltage is lowered by transformers at electricity substations, and the power is then distributed to homes and businesses through overhead lines or underground cables.

Overview of transmission projects



Tealing substation background

SSEN Transmission's (SSENT) Tealing substation was first built in 1960 for 132kV operation. In 1968 the substation was extended to also accommodate 275kV voltages.

Tealing substation is key node within the SSEN Transmission network on the east coast of Scotland. It facilitates the flow of power from renewable generation in the north of Scotland towards the demand centres in the south. Tealing is connected to Kintore and Fetteresso (outside Aberdeen) in the north and Westfield and Kincardine substations within Scottish Power Networks area in the south of Scotland. Tealing is also the connection point for the 1075MW Seagreen Offshore Windfarm. Tealing substation supplies the local area of Dundee, Arbroath and Angus via it's 132kV network.

Over the years, a number of upgrades and additions have taken place to meet the demands of the network in the area. These include installation of a third Super Grid Transformer (SGT), upgrade of 275kV Circuit Breakers between 2005-2008, a rebuild of the 132kV area of the site in 2009 and addition of further reactive power components, which help to stabilize the transmission network.

More recently, the substation was highlighted as an asset at risk of flooding; SSENT assessed the options for how to manage this, looking at various options for more natural flood management, moving away from flood bunds, walls and hard engineering.

We opted for a two-stage channel, which is a more sustainable approach, utilising the channel and natural river process to manage flood flows. The key was ensuring the work done did not have an adverse impact downstream. The flood mitigation scheme works completed in 2017.

The scheme won a Green Apple Energy Award for Environmental Best Practice in 2018.

Also in 2018, works were undertaken to install a 132kV reactor as the mix of generation plant in the north of Scotland had changed in recent years, with increasing wind generation and decreasing conventional generation at Peterhead, Longannet and Cockenzie. This changed the characteristics of system operation in Scotland and in the north east of England, particularly during the summer and as such highlighted the need for voltage regulation. Between 2017-2019 works were carried out to replace both the 132kV busbars within the substation and to replace SGT 1 which had been manufactured in 1968



Works to date

The recent suite of works at Tealing substation commenced in October 2019 and was driven by a request for a new energy connection by Seagreen Wind Energy Limited (SWEL).

To facilitate this new connection, significant upgrade and extension was required to Tealing substation. The extension works consisted of the installation of over 4000m of new busbars, 19000m of cabling, 950m of new trough routes and 595 changes of plant and equipment including new civil bases and a new modular control room.

When planning approval was granted on 21 January 2020, works to extend the site commenced along with civil works within the existing Tealing substation to prepare for the new modular control building arriving in February 2020.

Works progressed through 2020 to partially demolish the 275kV substation, build the extension and then start the installation of the new plant and equipment with the commissioning and energisation of the first phase of the works completed in November 2020. Due to the complexity of the substation and existing assets, the second phase of the works was split into 4 further shorter construction phases commencing in December 2020 and running through to December 2021. This saw the final energisation of the new fully upgraded busbar ready for the SWEL connection.

The main element of works concluded in March 2022, returning the network to its original position. The project is yet to facilitate the SWEL connection, this is planned for completion later this year.

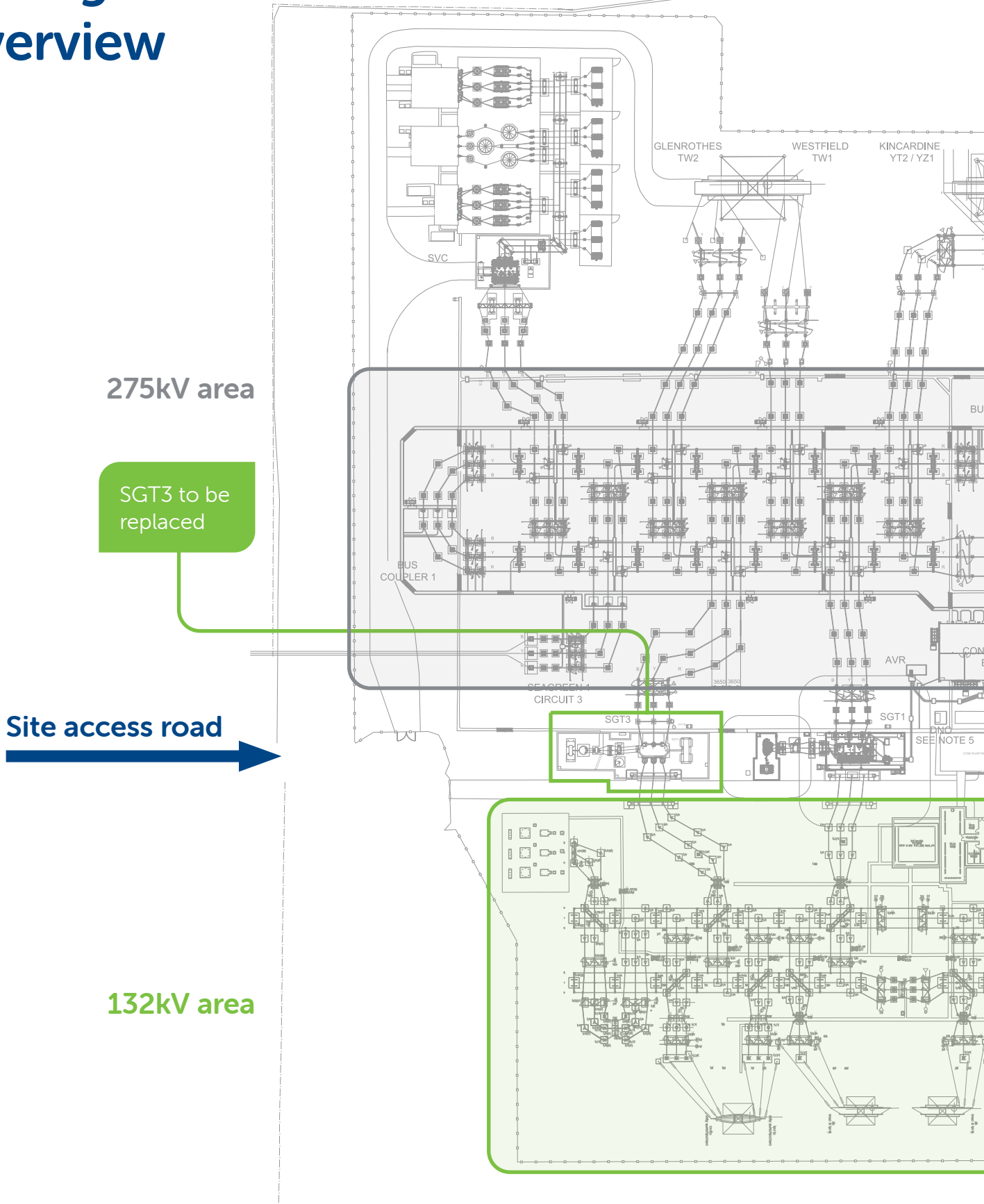
Planning application

To facilitate the Seagreen Wind Energy Limited (SWEL) connection, and for SSEN Transmission's (SSENT) substation at Tealing to be extended SWEL submitted a planning application to Angus Council on the 5th of July 2019 under reference 19/00534/MSC. As SSENT's extension was required for the Seagreen development, an agreement with Angus Council was reached whereby consent for SSENT's extension was incorporated as part of Seagreen's planning application for the detail of their site. That planning application was approved by Angus Council on 21st January 2020.





Tealing Site Overview



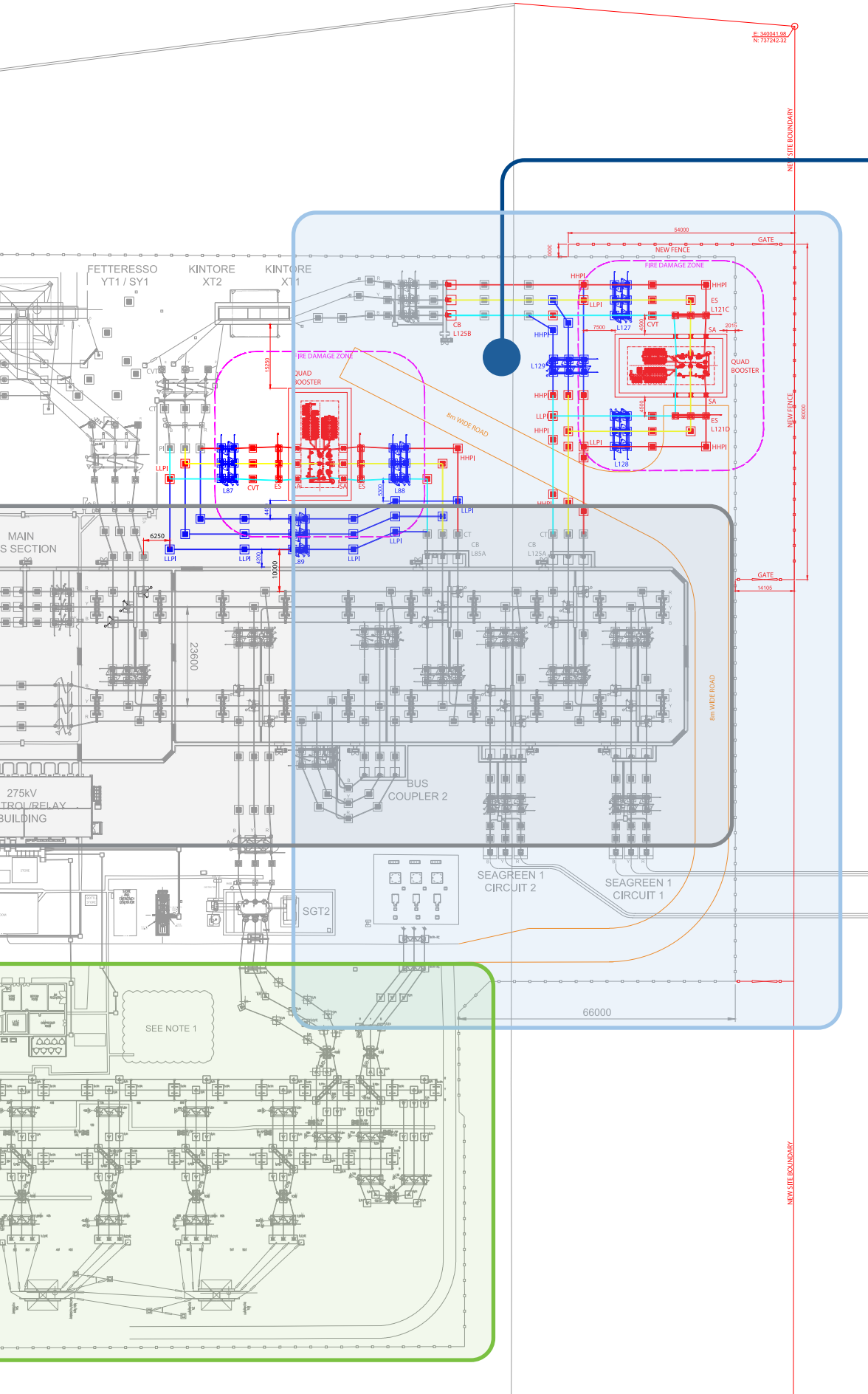
275kV area

SGT3 to be replaced

Site access road

132kV area

2 Phase Shifting Transformers to be installed



Extension

Upcoming works

The works at Tealing substation are part of the wider East Coast onshore 275kV upgrade reinforcement which includes the construction of a new 275kV substation near Alyth, Perthshire.

The driver for the reinforcement proposed by the East Coast onshore 275kV upgrade scheme is an increase in background generation across the North East, East Coast and wider North of Scotland regions. The reinforcement will increase the north to south power transfer capability of the network.

The East Coast onshore 275kV upgrade scheme predominantly utilises the existing overhead line assets between Kintore to Kincardine and Tealing to Glenrothes/Westfield along with the construction of a new substation at Alyth.

To balance flows on the system and alleviate limitations observed on the North to South power transfer, two new Phase Shifting Transformers (PSTs) are to be installed at Tealing substation.

The PSTs will help to manage the load being transferred on the circuits that run between Tealing and Kintore. The PSTs play an important part in allowing the wider East Coast scheme to deliver the overall required power transfer capacity.

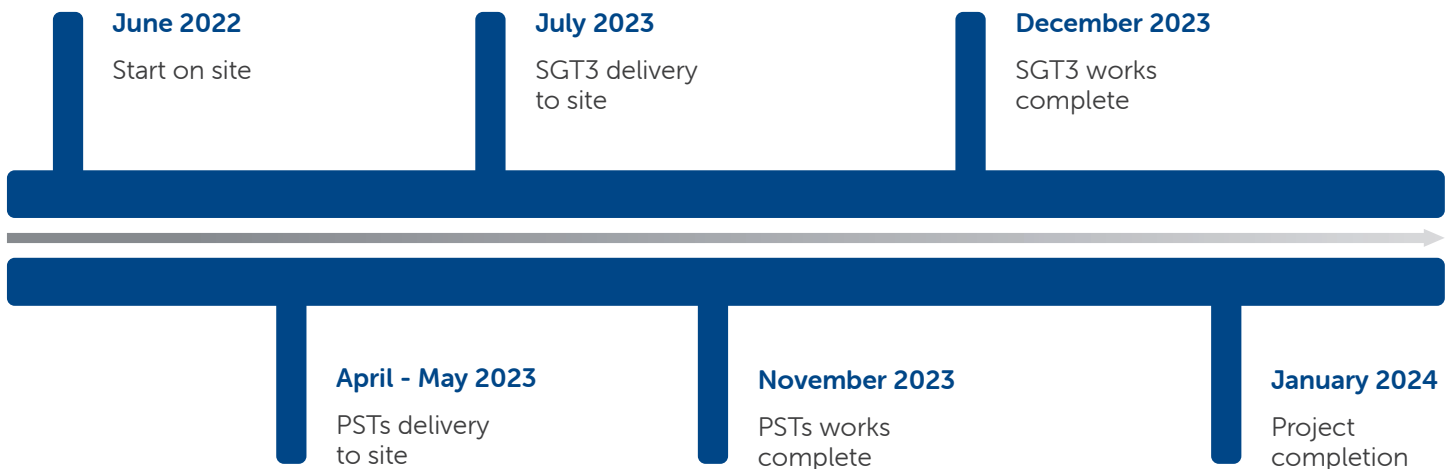
The PST project will start on site in June 2022. Initial works will be preparation of the plinth foundation and bund where the PSTs will be located. As the works are taking place in a live substation, they have been carefully phased to maintain power flow through the substation during the works. The PSTs are expected to be delivered to site in April and May 2023.



Overview of the upgrade works

Both units are being manufactured in Stafford, England and will be transported by barge to Dundee port. From there specialist transportation will be used to bring the PST to the Tealing site. Access will be via Moatmill Road and into the south side of the substation. Both PSTs will be housed in specially designed enclosures to ensure any noise is minimized and will not impact the local area.

Project timeline



Following a recent condition assessment of the existing assets on site it was determined that Super Grid Transformer (SGT) 3 which was installed in 1968 is reaching the end of its operational capabilities and therefore needs to be replaced.

To minimise the impact to local residents and the surrounding community, SSEN Transmission will undertake the works associated with the replacement of SGT3 at the same time as the works to install the new PSTs. By undertaking both projects as one, this will allow more efficient delivery of the next phase of necessary upgrades to the substation.

The works associated with the replacement of SGT3 include removal of the current SGT, which will be sent for recycling and replacement of the current bund and plinth foundation with a suitable version to accommodate the new SGT. The SGT is expected to be delivered to site in July 2023. Similar to the PSTs, specialist transportation vehicles will be used.



- 275kV area
- 132kV area (recently upgraded and extended)
- Seagreen site

Environment

The environmental aspects of the project have been grouped in categories below which have been informed by previous environmental assessments and site surveys.



Ecology/ornithology

A number of surveys have been undertaken by consultants working on behalf of the Seagreen offshore wind farm project for production of a detailed Environmental Statement. Pre-construction surveys did confirm that otters are still present within the area and that there is potential for badgers, bats, red squirrel and reptile species to be present. Areas of mature trees are present around the site, including an area of mixed plantation to the north.

This provides nesting opportunities for a variety of birds, and limited bat potential. The trees to the north of the existing substation are required to be retained for screening and potential habitat preservation purposes. Ahead of the proposed works further environmental surveys will be undertaken, to identify any possible constraints and mitigation adopted to prevent any possible impact. Ongoing monitoring will be undertaken by the appointed contractor and SSEN Transmission Environment Teams.



Water environment

The Fithie Burn runs near the west of Tealing substation, in addition to several nearby tributaries. The Fithie Burn has been subject to a flood prevention scheme adjacent to the site. Due to the proximity of these watercourses to the planned construction, works will be overseen by a watching brief and pollution prevention measures will be implemented to ensure compliance with SEPA General Binding Rules.



Landscape and visual amenity

The surrounding landscape is already influenced by transmission infrastructure including steel lattice towers and overhead lines, however, additional planting is being considered to form screening to enhance the visual and landscape amenity. This screening is in addition to that which has already been consented by Angus Council via the planning application submitted by Seagreen.

The trees to the north of the existing substation are to be retained and those that were removed at the west of the site to accommodate Seagreen's cable route will be replanted.



Construction environmental management

Balfour Beatty are SSENT's appointed contractor for the works and are producing a detailed site specific Construction Environmental Management Plan (CEMP) to manage the works. This will follow industry best practice to ensure no environmental impact.

SSENT will review Balfour Beatty's CEMP prior to the starting of construction work as well as reviewing their Construction Method Statements and carrying out regular audits and inspections. This will ensure compliance with SSENT's ISO14001 Environmental Management System.

An Environmental Clerk of Works (ECoW) shall be employed by Balfour Beatty to provide on-site environmental expertise and ensure environmental compliance throughout the construction works. They will carry out toolbox talks, undertake regular monitoring and auditing, review project RAMS (Risk Assessment and Method Statements) and identify pre-construction survey requirements for the successful implementation of all environmental requirements and best practice..

Notes

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If you have any questions or queries on our works at Tealing substation then please get in touch with our Lead Community Liaison Manager, Louise Anderson



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