Orford Ness Power Networks

By Barry Searle

For over 60 years, Orford Ness has been used for a wide variety of military purposes. Its electrical power requirements over this period have varied vastly and the purpose of this document is to provide some historical background detail.

1854

Strictly speaking, the first electrical activity on Orford Ness occurred in 1853, near the lighthouse, when an electric telegraph submarine cable was laid to Scheveningen in the Netherlands.

WW 1

In 1915, Orford Ness had been purchased by the government for use as an airfield and aviation warfare development centre. A Tange semi-diesel 30kW generator was installed at the northern end of The Street around this time to power the site. Little is known about it, but it would typically have had an output of around 100V DC. It is assumed that it was connected to a simple camp distribution network for lighting and powering machinery.

Interwar years

In 1929, the Black Beacon was built on the shingle side of Stony Ditch and was connected via a surface cable routed to the existing site generator.
In 1933, a dedicated power house was built next to the Black Beacon. This was then used to provide power to the Black Beacon and the newly built Bomb Ballistics range nearby. Little is known about the power house installation, but the generator was probably another 100V DC unit.

WW2

Here the power supply trail runs cold as little is known. Orford Ness carried on with a range of military work, and it's likely they carried on using the old infrastructure, possibly supplemented by military mobile generators.

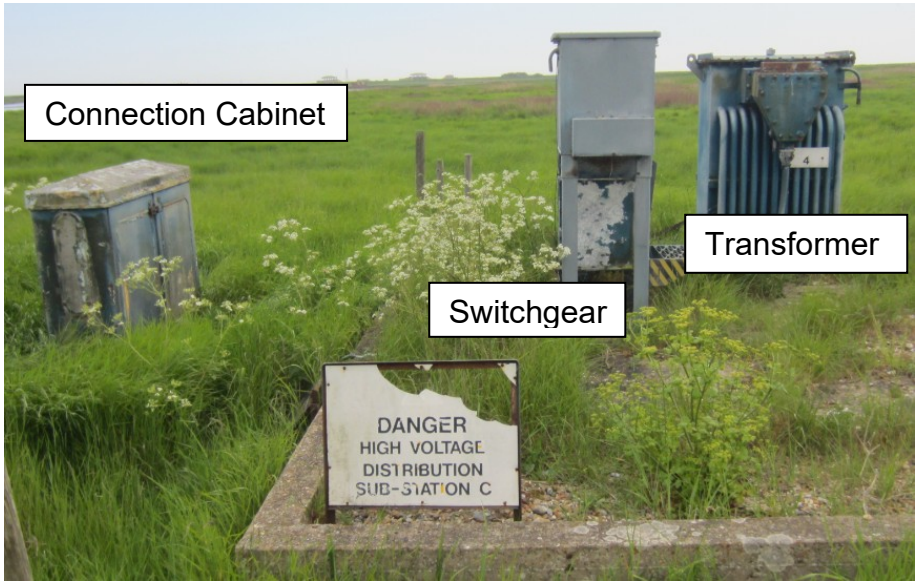
Cold War

In 1953, Orford Ness was selected as a major site for the environmental testing of nuclear weapons. The Atomic Weapons Research Establishment (AWRE) took over the site and started to make plans for a substantial building programme. It was clear that the planned test laboratories would have equipment installed that would require significant levels of electrical power. Design work started on an 11kV Orford Ness power network that would be connected to the mainland by means of a submarine power cable fed from Orford.
Little is known of the 1953 backhaul network on the Orford 'mainland' side. Significant reinforcement of the network must have taken place to cope with the large expected increase in load.

The 1953 AWRE Network

An 11kV submarine cable was laid from a point where the riverbank footpaths join on the Orford side. When it reached the ‘island’, it ran (underground) across the old airfield to a substation located at the western end of The Street. From here, an 11kV ring was laid connecting 8 ‘Plinths’, each of which comprised a large 415V 3-phase transformer with switching and fuse gear. It is likely that the Bomb Ballistics building was connected to Plinth G at this time and the old power house equipment was probably decommissioned.

Plinth C (later renamed sub-station C) located near the jetty



The 1959 AWRE Extension

In 1959, a significant second phase building programme was approved to the west of Lab 2.

This required the installation of a second substation next to the new control room which was fed from substation 1 and Plinth F. Labs 4 and 5 each had their own 11kV supply to a 300kVA transformer in each lab.

However, the Bomb Ballistics Building closed in 1959, so it was probably disconnected from Plinth G around this time.

The Orford Ness Lighthouse was fully automated in 1965. It is likely the Lighthouse was connected to Plinth D (located near the Black Beacon) around this time.

Cobra Mist

In 1968, AWRE work on the Ness was winding down, but suddenly there were plans to construct an enormous over-the-horizon HF radar station on the Lantern Marsh

end of the site. The proposal was truly monumental, with a potential radio power output in the order of 10MW. This level of loading required a fundamental rethink on how the electrical power could be delivered to such a remote site.
In 1969, a completely new power feed network was built. It used quad 33kV overhead power cables connected back to the national grid some distance inland. The cables were routed to a substation outside Orford. They were then extended at 33kV to a point near the riverbank on Town Marshes. Here the cables were routed underground north in parallel with the river and then crossed the river via submarine cables to two substations in the Cobra Mist building.
The construction was completed and testing began. Performance problems persisted until June 1973, when Cobra Mist closed and all the radar equipment was removed.

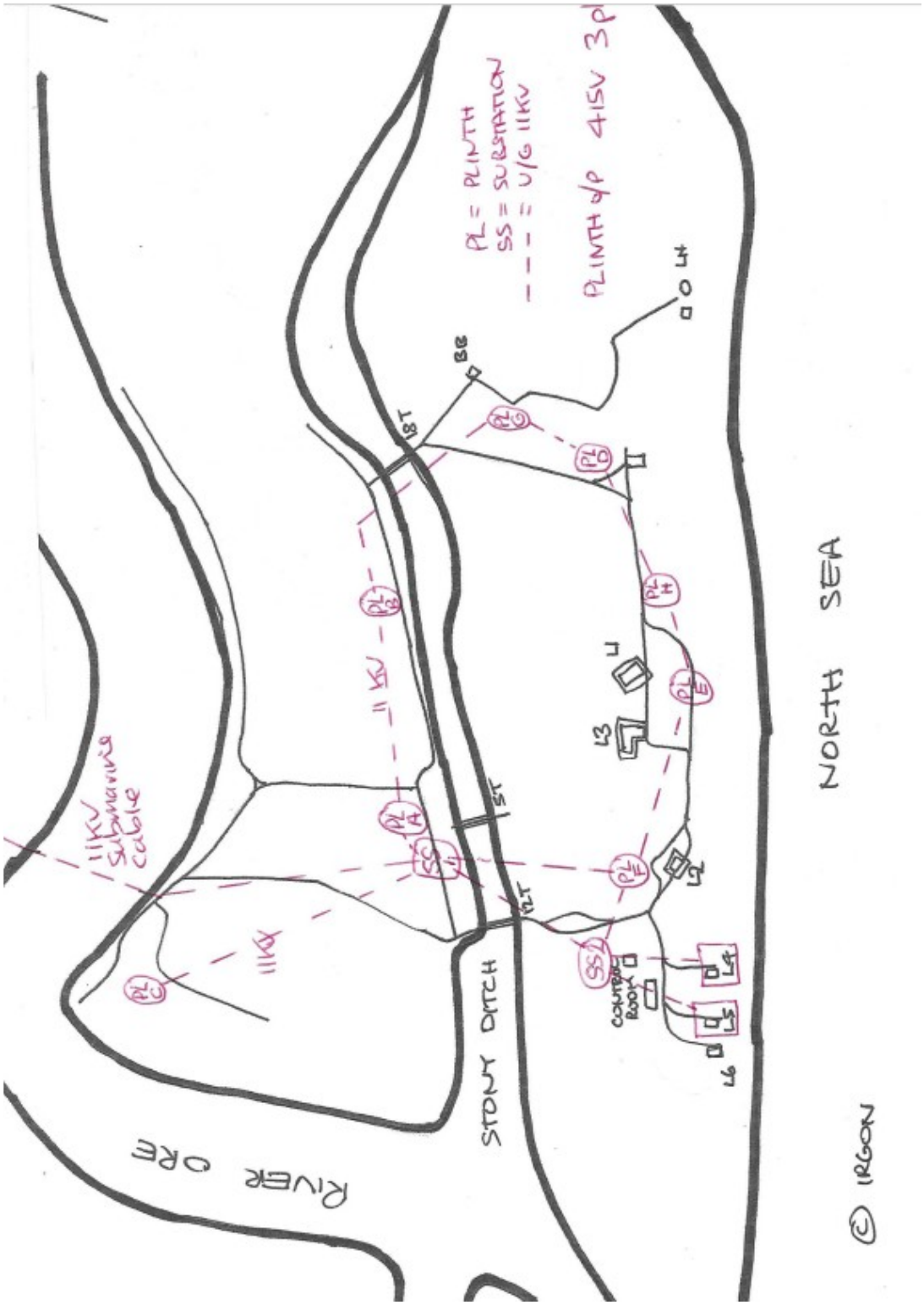
BBC World Service
The BBC took over the Cobra Mist building in 1973 and started to install some medium wave transmitter equipment. At round this time, it is likely the feeder network from Orford substation was down rated to 11kV, probably to reduce unnecessary electrical stress and life extend the underground cables.
The BBC transmitter site closed in 2012 and Cobra Mist Ltd now owns the site.
As far as I am aware the 11kV infrastructure remains connected to the building.

AWRE Orford Ness Site closure
AWRE Orford Ness closed in 1971 and all the AWRE equipment was removed from the site. Little is known about what actually happened in detail to the power network, but the following sequence of events probably took place.
The 11kV Orford Ness ring network was largely decommissioned along with the old submarine cable from Orford.
A new 11kV overhead route was installed from one of the Cobra Mist substations across Kings Marsh to the old existing substation 1 and on to Plinth D in order to maintain a mains supply to the lighthouse.

National Trust Ownership
The NT purchased Orford Ness in 1993 and the 11kV overhead supply from Cobra Mist was used to supply the buildings refurbished by the Trust together with the lighthouse. The network was probably further simplified decommissioning substation 1 and installing a small pole mounted 11kV transformer to supply the NT buildings. The lighthouse continued to use the existing and substantial Plinth G transformer.

The reliability of the network declined and the lighthouse supply cable failed in 2012. The lighthouse used batteries and a generator until its final closure in June 2013. The NT carried out a feasibility study on its power supply options and decided the most affordable option was to install an independent power supply based on a hybrid PV panel/diesel generator and battery storage unit.
It is understood that this hybrid arrangement is in the process of being improved and modernised.

The 1953-1960 AWRE Orford Ness 11kV Power Network



The 1970 Cobra Mist 33kV National Grid Power Network