Connection at Sutton Bridge

Summary

This representation describes an alternative grid connection at Sutton Bridge.

To avoid submitting information already before the examination, only significant differences from the original proposal are set out. These are described in as much detail as possible in order to clarify to what extent this alternative can deliver the same or greater benefits in the same timescale with lesser environmental impacts, and whether or not it is physically and commercially viable.

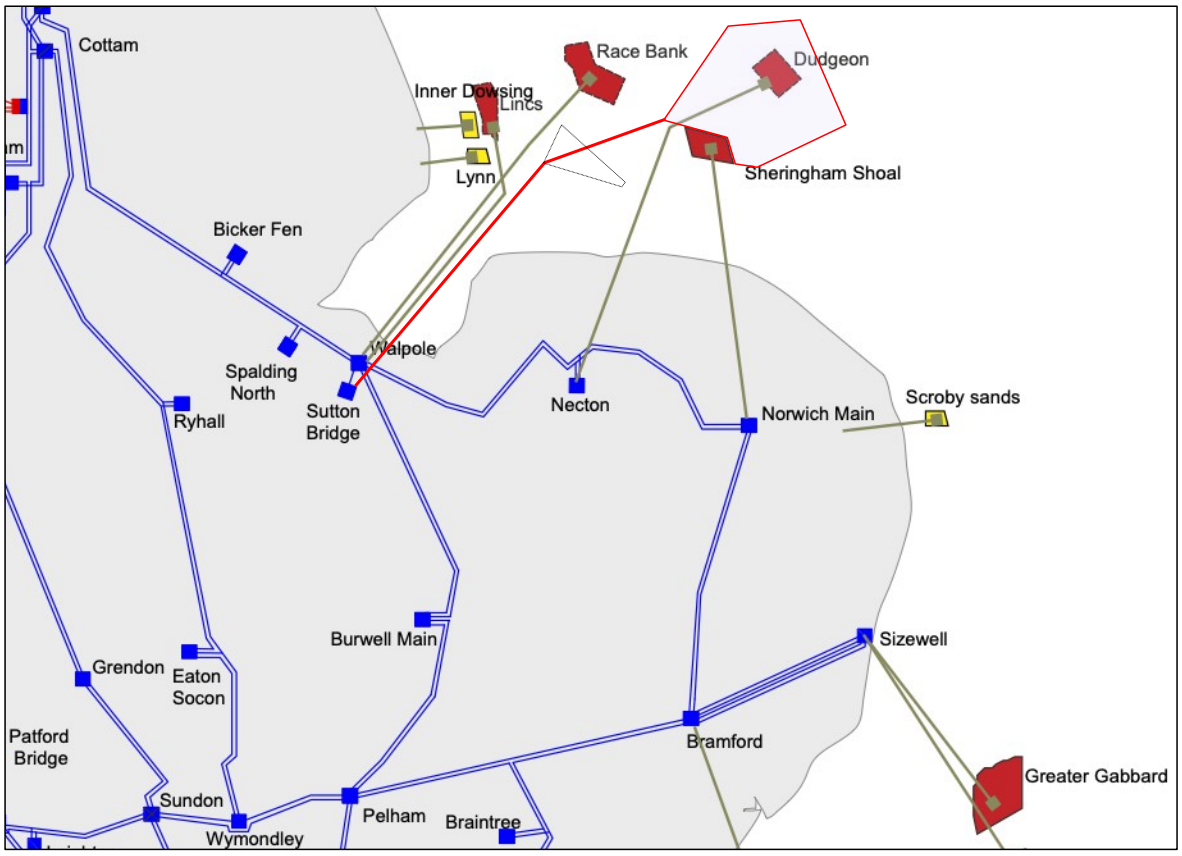
Design assumptions

The alternative grid connection is shown in outline below.

The applicant has explained that an output of 900MW is feasible and may be adopted post-consent without a material amendment of the DCO. Recognising the urgent need for renewable energy, this increased output level is therefore assumed. There are no other changes to the wind turbine arrays or the connection between the extension zones. One offshore platform may need to be re-positioned.

The export cable route extends westward towards Docking Shoal for a distance of about 35km and then turns south-west for a distance of about 50km to the onshore substation at Sutton Bridge. An existing pylon route is then used for the final connection to the National Grid substation at Walpole.

The 60km onshore cable route is practically eliminated. This removes nearly all the concerns raised by interested parties in relation to onshore impacts. A single-stage concurrent development scenario is also assumed, although the adoption of other multi-stage scenarios would have little or no impact.



Source: Electricity Ten Year Statement 2022, with Dudgeon and Sheringham Shoal Extension projects added.

Description

The export cable route from Sheringham Shoal to Docking Shoal is similar to earlier proposals for a Hornsea zone grid connection at Walpole and raises no new issues. The length of this first section is about 35km. Assuming offshore construction is approximately twice as expensive as underground construction onshore, the cost of this first section is broadly equivalent to the original 60km route from landfall at Weybourne to Norwich Main and does not affect physical or commercial viability.

From Docking Shoal, the export cable follows a route previously surveyed for the Race Bank and Docking Shoal offshore wind farms. This route was chosen after the comparison of several different alternatives and was found to be physically and commercially viable for the output of Race Bank.

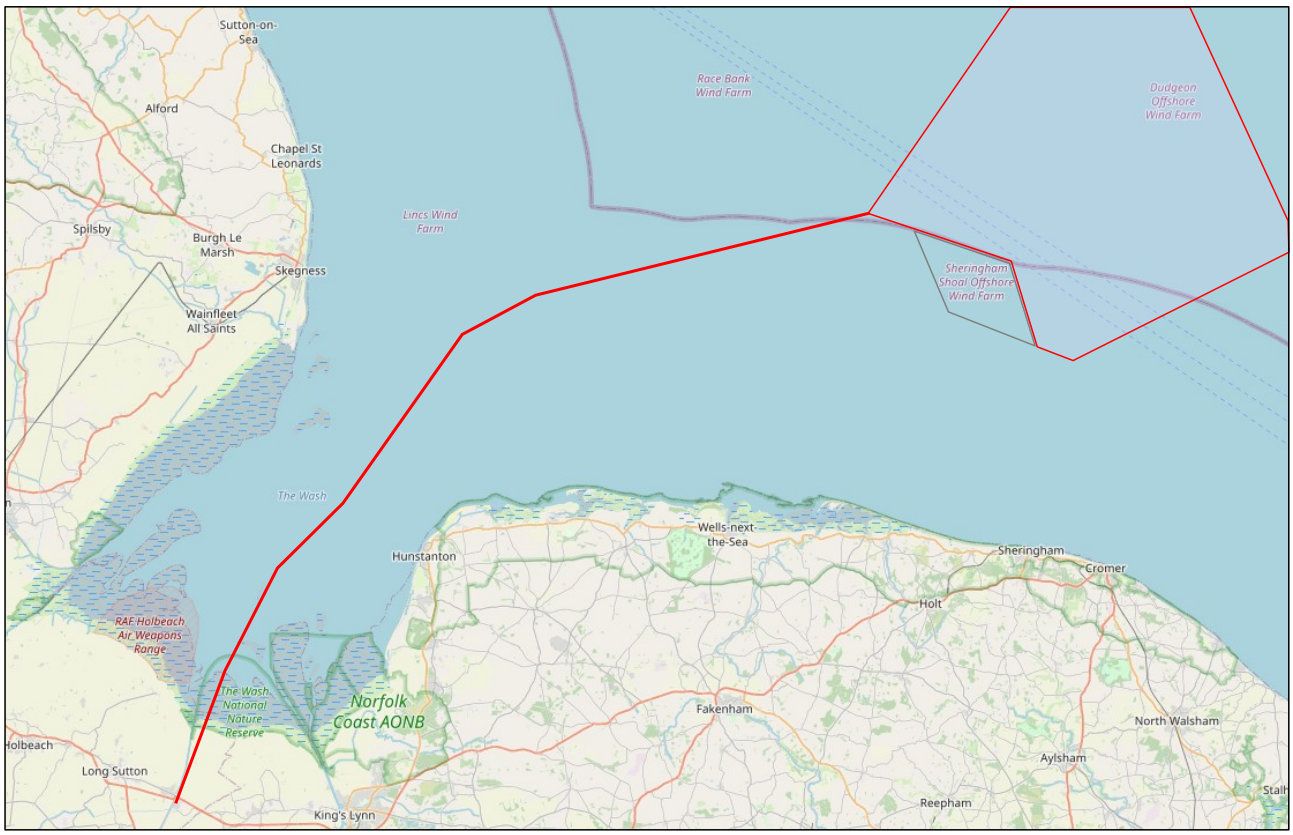
The cost and environmental challenge of a route through The Wash to the mouth of the River Nene may be no greater than the cost and environmental impact of the original 20km export cable route from Sheringham Shoal to Weybourne, which has additional onshore impacts near the landfall area.

Given the higher output level of 900MW, and previous experience of the installation and use of the export cables for the Lincs and Race Bank offshore wind farms, there is no reason to suppose that this second section of the export cable route is not physically or commercially viable. A final length of about 7km of underground onshore cable completes the route to Sutton Bridge as shown below.

The cost of the export cable is estimated to be broadly the same as for the application as submitted.

The onshore substation is constructed alongside the existing Sutton Bridge Power Station, which is currently mothballed. The successful construction of the power station building provides evidence of the feasibility of constructing the much smaller onshore substation on a directly adjoining site.

The capacity of the existing 3.85km pylon route from Sutton Bridge to the National Grid substation at Walpole is 1340MW. As an alternative to the use of the existing pylon route, a new underground cable could be installed from Sutton Bridge to Walpole following the route used for the Lincs and Race Bank offshore wind farms. This could allow the existing pylon route from Sutton Bridge to Walpole to be permanently removed, thus making a positive contribution to the local environment.



Onshore substation

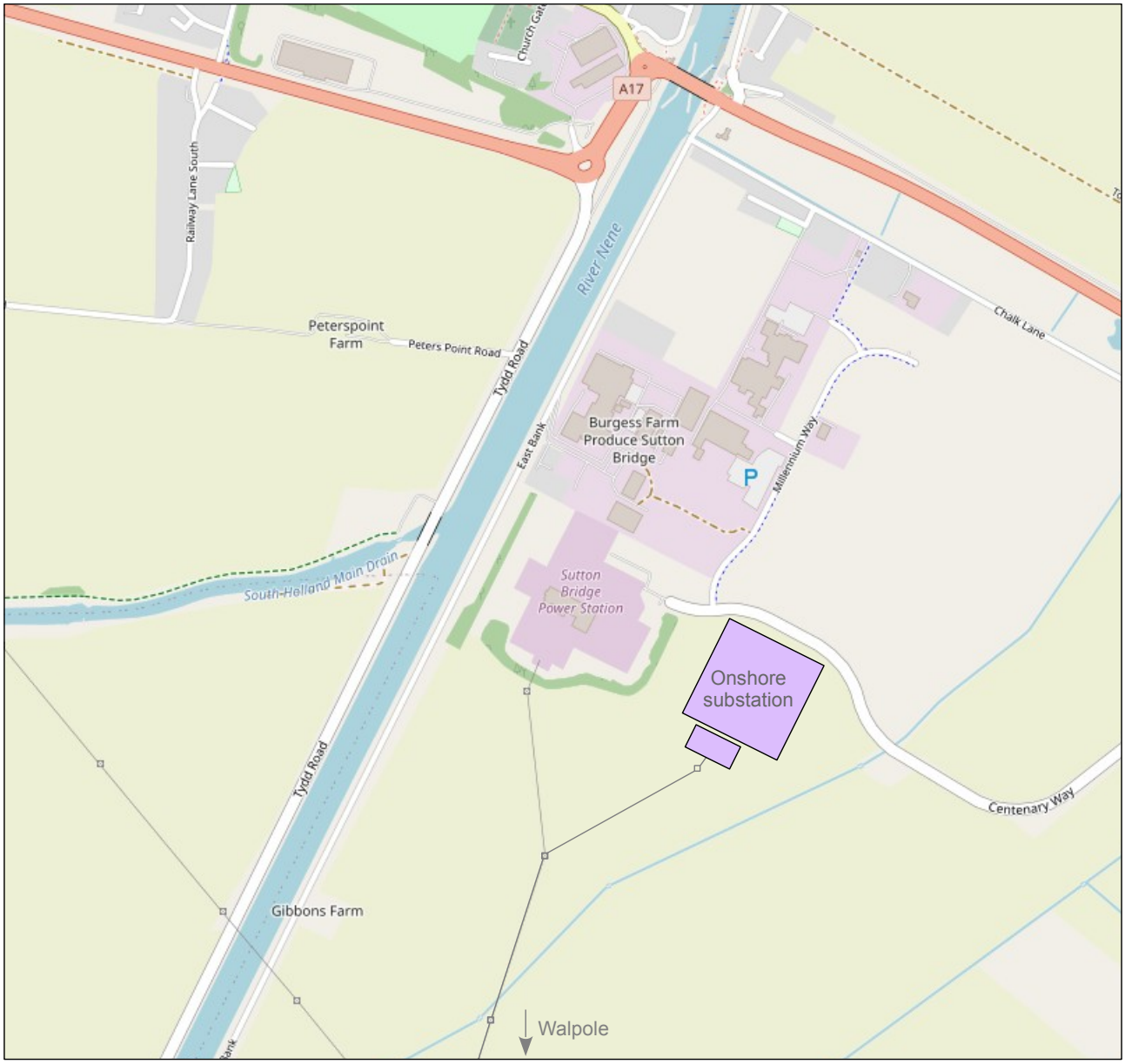
In the first instance, it is assumed that the existing 400kV pylon route would be upgraded to provide an independent path of at least 900MW to the National Grid substation at Walpole, as shown below.

Sutton Bridge power station was upgraded in 2016 to support intermittent renewable generation and flexible short term operation, and to work efficiently with the power market balancing mechanism.

It was the first power station of its kind in the UK to be upgraded to the latest specifications for the reduction of emissions, and can be regulated down to 35% of peak output. It can also be upgraded to use hydrogen. The power station is not currently in regular use and local employment is at risk.

In the future, it may be beneficial to re-start the use of Sutton Bridge power station. The latest report from the Climate Change Committee, issued in March 2023, confirms the need to provide for 'low wind years' and in particular increasing occurrences of 'wind drought' – extended periods of several weeks when low offshore wind generation coincides with high seasonal demand. If an underground cable is used for the final connection from the onshore substation to Walpole, additional ducts could be laid at the same time for the future use of the Sutton Bridge power station. This would allow the power station to be brought back into use, and the existing pylon route removed, at some later date.

A further alternative would be to cross-connect the two sites locally at the 400kV voltage level.



Transmission capacity

Circuit capacities are shown in Appendix B of the Electricity Ten Year Statement for 2020. The substation code for Sutton Bridge is SUTB and the substation code for Walpole is WALP. Row 551 of Appendix B, Section B-2-1c, shows the capacity of the existing single-circuit pylon route:

Node 1	Node 2	Length (km)	Winter Rating	Spring Rating	Summer Rating	Autumn Rating
SUTB41	WALP41	3.85	1340	1340	1150	1340

Existing grid connection agreements are shown in the TEC Register, issued at regular intervals by National Grid. At 24th March 2023 the TEC Register shows the following entry at Row 951:

Project Name	Customer Name	MW Connected	Plant Type
Sutton Bridge	Sutton Bridge Power Generation	850	CCGT (Combined Cycle Gas Turbine)

Until late 2016, the Hornsea Three project held a grid connection agreement for 2000MW directly at Walpole using an underground cable connection from its landfall point. This information shows that a grid connection agreement of at least 900MW at either Sutton Bridge or Walpole is feasible.

Environmental impacts

The onshore substation is significantly smaller than the existing Sutton Bridge power station, shown below, and could use similar external treatment. This would be the main long term onshore impact.

With the removal of the 60km onshore cable route, the remaining environmental impacts are mostly offshore. Impacts on the Cromer Shoal Chalk Beds MCZ are practically all removed, and charts are included overleaf so that the remaining offshore environmental impacts can be fully evaluated.

Conclusion

Offshore construction is generally considered to be quicker than onshore, and the dependency upon a new 180km pylon route from Norwich to London to deliver the full energy output is removed. It would appear, therefore, that an alternative proposal can deliver the same or greater benefits in the same timescale with lesser environmental impacts and is both physically and commercially feasible.

Offshore charts