

Sea Link

Volume 9: Examination Submissions

Document 9.6.5 Appendix E Details of Similar designs of converter stations and substations

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1. Details of Similar designs of converter stations and substations

Table 1.1 Sea Link Comparison with other Project Substations

Project name	Sea Link	Richborough (Kent)	Littlebrook (Kent)
Built / Operated by	NGET	NGET	NGET
Operational since	N/A	2019	2024
Project description	<p>Friston - The proposed Friston Substation would be constructed using gas insulated technology, with a footprint of up to 16,800 m2 (excluding drainage, access and landscaping works).</p> <p>Kent - HVAC connection in being made directly onto the existing OHL so there is a requirement for a new substation adjacent to Minister Converter Station. The total land needed for the combined area of the proposed Minster 400 kV substation and Minster Converter Station would be approximately 9 ha.</p>	<p>400kV electricity transmission connection between Richborough and Canterbury in Kent, connection point for the UK to Belgium interconnector (known as the Nemo Link)</p> <p>Planning application to Thanet DC: https://planning.thanet.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=ZZZZMWQEBJ742 Minster, Sandwich CT13 9NL</p>	<p>400kV substation in Dartford, Kent</p> <p>The facility enables the transmission of 2GW of low carbon and renewable energy from interconnectors and offshore wind farms off the coast of Kent</p> <p>Provision of a new 400kV substation including: A GIS hall sited centrally, a lower annex sits along the eastern side of the main hall, two smaller-scale, single-storey amenity buildings, five Super Grid Transformers (SGT) and six gantries; A backup diesel generator with enhanced noise attenuation; Laying out of a parking area for vehicles, with additional space reserved additional overflow parking; Earthworks and fencing</p> <p>Dartford Borough Council planning application: 18/01017/FUL https://publicaccess.dartford.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=PD4Q39BQFTC00 Harris way, Rennie Dr, Dartford DA1 5FE</p>
Dimensions (height x width)	<p>Friston - likely to comprise one or more buildings which could house services, storage workshop, and relay room, along with a backup diesel generator.</p> <p>The substation compound would include hard and soft landscaping, the substation would be enclosed by a fence and would contain a parking area and access road.</p> <p>Friston substation would also include cable sealing ends (CSE) which are vertical structures allowing the cables to exit the ground and</p>	<p>Site area: 2.65ha</p> <p>52.2m x 21.5m GIS hall</p> <p>Supergrid Transformers 22.5m x 13.3m</p> <p>Substation building max. height: 15m</p> <p>Outdoor electrical equipment max. height 12.7m</p> <p>Static Var Compensator compound 52.6m x 39m, 6.3m high</p>	<p>GIS hall up to 13.1m</p> <p>24.25m x 57.8m</p>

Project name	Sea Link	Richborough (Kent)	Littlebrook (Kent)
Built / Operated by	NGET	NGET	NGET

connect to solid bars, known as busbars, at approximately 8.45 m height above ground.

They would be combined with surge arrestors, metering and other ancillary equipment required to allow for the transition from above ground infrastructure to underground cables.

For the scenario where Friston Substation is built as part of the Proposed Project, the shape and arrangement of the substation may vary within the LoD however it would not be greater than the 16,800 m2 area.

The vertical LoD would include creating a level platform for the works which would involve cut and fill works to create the platform. The maximum height of any buildings or structures on the site above the platform would be 18 m plus roof equipment such as lightning rods, handrails and roof mounted plant.

The vertical above ground LoD for the overhead line modification works for the scenario where Friston Substation is built as part of the Proposed Project is 6 m above the indicative height.

Project name	Sea Link	Richborough (Kent)	Littlebrook (Kent)
Built / Operated by	NGET	NGET	NGET




Images	N/A		
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Technology	<p>Suffolk / Friston - The construction of the substation would also require modification works to the adjacent existing 400 kV overhead line. The 4ZW 400 kV route would need to be modified to accommodate a double circuit turn in and out of the proposed Friston Substation. This would involve removal of one existing 4ZW 400 kV overhead line pylon (4ZW020), and installation of two new pylons on the 4ZW 400 kV overhead line (4ZW020A and 4ZW020B). Installation of approximately two temporary masts/temporary towers would be required to facilitate the connection to the new substation. It could also include the re-conductoring of a short length of the 4ZW 400 kV overhead line and minor alterations to the pylons approaching the proposed Friston Substation (4ZW015 to 4ZW024).</p> <p>Pylon type, Steel lattice – typical standard height, 90 degree bends. Pylon height, Typically 54 m (standard height).</p> <p>Pylon footprint Typically 340 m2 (standard height)</p>	400kV GIS substation
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Project name	Sea Link	Richborough (Kent)	Littlebrook (Kent)
Built / Operated by	NGET	NGET	NGET

	<p>Kent - HVAC connection from the existing Richborough to Canterbury 400 kV overhead line to the proposed Minster 400 kV Substation would be made via a new approximately 3.5 km overhead line (of which 2.2 km would be replacement of existing Richborough to Canterbury connection). The proposed new section of overhead line would be routed to the northeast from the existing Richborough to Canterbury overhead line, crossing the River Stour and a section of railway</p> <p>Pylon type, Steel lattice – typical standard height, 60 degree bends</p> <p>Pylon height, typically 46.5 m (standard height) and 41.4 m (low height - PC52A only)</p> <p>Pylon footprint Typically 113.54 m2 (standard height) and 105 m2 (low height – PC52A only)</p>		
Noise & Vibration	<p>Application Document 6.3.1.4.B Appendix 1.4.B Construction Plant Schedule presents the reasonable 'worst-case' noise and vibration levels from construction plant</p>		<p>The dominant noise sources at the new substation location will be the five Super Grid Transformers (SGTs). These will be in continuous service (except for faults and maintenance) and operate with a relatively constant sound power.</p> <p>Noise assessment indicates that for the nearest residential receptors at Marsh Street North, the BS4142 assessment level would be less than +5dB, which indicates that there would be no adverse impact. An assessment of +4dB could still be considered as a low impact, although given the very conservative estimate of the background noise levels at this location, the assessment is not considered significant. DBC EHO concurs with assessment.</p>
Lighting lux levels	<p>The external lighting system at the proposed Converter Station would meet the requirements of National Grid TS 2.10.04 Issue 1- 2017.</p> <p>This specifies that the minimum exterior lighting requirements are as follows.</p> <p>Maintained average illuminance: 6.0 lux.</p> <p>Maintained minimum point Illuminance: 2.5 lux.</p>	<p>Installed within fenced compound containing substation – illuminating access road, footways and outdoor equipment areas and ancillary buildings</p> <p>18x 6m high column mounted clusters of 70W floodlight lanterns, pointed into the site and tilted to minimise light spill into the SSSI to the north</p> <p>Lighting only required to operate when personnel are on site</p>	

Table 1.2 Sea Link Comparison with other Project Converter Stations

Project name	Sea Link	NEMO (Richborough, Kent)	Viking Link	North Sea Link
Built / Operated by	NGET	NGV / Elia	NGV	NG/Statnett
Operational since	N/A	2019	2024	2021
Project description	2 GW HVDC 2x converter stations in Saxmundham, Suffolk and Minster, Kent NGET	1GW HVDC Located between Richborough Energy Park in Kent and Zeebrugge, Belgium Joint venture between NGV and Elia (Belgium).	1.4GW HVDC Located between Bicker Fen, Lincolnshire and Revsing, Jutland, Denmark	1.4GW
Dimensions	Saxmundham Converter Station up to 6.5 ha in area (excluding landscaping and drainage and access). Valve halls up to 26 m in height excluding lightning protection, aerals, walkways, fall arrest equipment and potential architectural treatments (such as soft landscaping) Minster Converter Station, sited adjacent to Minster substation would occupy a site of around 9ha and be up to 28 m high plus external equipment (such as lightning protection, safety rails for maintenance works, ventilation equipment, aerals, and similar small scale operational plant).	6.5ha Converter Station footprint approx. half that of Sea Link. The building front edge (high point) compared to Sea Link is 2m less. So 21m.	More comparable to Sea Link proposals with 2x valve halls <u>South Holland DC Planning Application</u> Site: 30ha field (incl. Buffer zone and landscaping) 28,190sqm Above ground level building height of up to 24m	Valve Halls: four 'wings' each each at 45m x 30m and up to 25m high Equipment Halls: located between two of the valve hall wings, 50m x 35m with a height of up to 20m. Filter Halls: Connected to the equipment 60m x 35m and a height of up to 20m Control and Protection Equipment Annexe: Containing control panels and associated operator stations, offices, welfare facilities 40m x 20m with a height of up to 15m. DC Switch Hall: contains the termination of the HVDC cables with switchgear 70m x 50m and a height of up to 25m. Transformer Pens: external to the main building and contain the single phase power transformers, located within bunds
Images	N/A			

Project name	Sea Link	NEMO (Richborough, Kent)	Viking Link	North Sea Link
Built / Operated by	NGET	NGV / Elia	NGV	NG/Statnett
Technology	The converter stations would include a DC hall, converter transformers, valve hall, reactor hall, AC switchyard, control building, strategic spare parts building, low voltage (LV) electricity supply, fire deluge pump house, car parking, a permanent access road and landscaping	GIS on site, unsure of exact quantities HVDC PLUS technology developed by Siemens, based on Voltage Source Converter (VSC) technology in a Modular Multilevel Converter (MMC) configuration	1400MW HVDC PLUS technology developed by Siemens GIS capacity, bipolar configuration, but understood to be only operating at c.800MW	1400MW Bipolar configuration: two cables, one positive and one negative, operating at ±525 kV.
Noise & Vibration	<p>Predicted absolute sound levels range between 8 and 28 dB LAeq,T, with corresponding night-time noise rating levels ranging between 13 to 32 dB LAr,Tr, typical existing night-time background sound levels ranging from 20 to 25 dB LA90, and existing average night-time ambient noise levels ranging from 38 to 45 dB</p> <p>The assessment indicates that with standard mitigation measures and based on the indicative plant data, the impact of operational noise from the proposed Saxmundham Converter Station would be a negligible to small magnitude.</p> <p>Operational noise from proposed Minster Substation and Minster Converter Station - negligible</p>	The operational noise is in our noise assessment available on share point.	<p>https://planning.sholland.gov.uk/OcellaWeb/viewDocument?file=dv_pl_files%5CH04-0823-17%5CES_C_Ch26_Noise+and+Vibration+%28CS%29_RevFINAL.pdf&module=pl</p> <p>Noise from the operation of the proposed converter station will not exceed 25 dB.</p> <p>Operational vibration will be controlled by design at source as this is essential for the longevity of the plant. Any low levels of vibration would be most unlikely to be perceptible beyond the immediate structure of the buildings and would be below the thresholds of significance for vibration. Off-site vibration would be a negligible impact at all locations</p>	Operational noise rating is predicted to be 5 dB above the lowest background noise levels. Based on high receptor sensitivity for residential properties and a low magnitude of effect, the operational noise levels from the converter station are assessed to be of minor adverse significance over a long-term period. This effect is therefore considered to be not significant
Lighting lux levels	<p>Lighting contour plans indicate that light levels at both the Saxmundham Converter Station and Friston Substation would fall below 1 lux within approximately 13-15 m of the lighting fixtures and therefore within the boundary of both the substation and converter station.</p> <p>Lighting contour plans indicate that light levels at the Minster Converter Station and Substation would fall below 1 lux within approximately 13-15 m of the lighting fixtures.</p>	<p>The lighting lux levels for NemoLink take into consideration wildlife, e.g. bats, hence external lights are only switched on while the night shift carries out its routines, or there is an outage for planned or unplanned maintenance.</p> <p>Once a year planned outage for 4 days.</p> <p>Targeted external lighting levels include 10 Lux average for slow moving traffic areas and 5 Lux average for pedestrian and general outdoor areas</p> <p>Installed within fenced compound containing buildings –illuminating access road, footways and outdoor switchgear areas.</p>	Lighting is direction controlled to minimise glare	<p>Lighting (when required) as part of the converter station site will be controlled to avoid the unnecessary illumination of areas beyond the development. Glare and the spread of upward light will be kept to a minimum to reduce sky glow and minimise visual intrusion within the open landscape. It is not necessary to illuminate the whole perimeter. The entrance and walkways for access and egress and emergency exits will however need illuminating for safety reasons.</p> <p>Lighting assessment compares baseline lux levels of 5 at 0700-2300 and 1 at 2300-0700, with levels only marginally exceeded.</p>

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		<p>12m high column mounted clusters. Each column fitted with one, two or three 1x single mounted 150W 50N lantern; 12x twin 150W 50N lanterns; and 8x triple 150W 50N lanterns (17,500 lumen)</p> <p>Building mounted lighting to illuminate pedestrian areas, perimeter routes and accesses. 26x 42W fluorescent lamps (3,200 lumen). Timer controlled but inhibited from 23:00 – 07:00</p>		<p>Operational lighting only to be used in winter during 0900-1700</p>

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