AQUIND Limited

AQUIND INTERCONNECTOR

Environmental Statement – Volume 3 – Appendix 3.5 Additional Supporting Information for Onshore Works

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

Document Ref: 6.3.3.5

PINS Ref.: EN020022

AQUIND Limited

AQUIND INTERCONNECTOR

Environmental Statement – Volume 3 – Appendix 3.5 Additional Supporting Information for Onshore Works

PINS REF.: EN020022

DOCUMENT: 6.3.3.5

DATE: 14 NOVEMBER 2019

WSP

WSP House

70 Chancery Lane

London

WC2A 1AF

+44 20 7314 5000

www.wsp.com

DOCUMENT

Document	**6.3.3.5 Environmental Statement – Volume 3 – Appendix 3.5 Additional Supporting Information for Onshore Works**
Revision	001
Document Owner	WSP UK Limited
Prepared By	C. Agwu
Date	14 November 2019
Approved By	M. McGuckin
Date	14 November 2019

CONTENTS

TABLES

APPENDIX 3.5 ADDITIONAL SUPPORTING INFORMATION FOR ONSHORE WORKS

1.1. PROPOSED DEVELOPMENT – ONSHORE

1.1.1. PARAMETER TABLE

1.1.1.1. The overall parameter approach for the Proposed Development is available in Section 3.4, Chapter 3 (Description of the Proposed Development) of the Environmental Statement ('ES') Volume 1 (document reference 6.1.3). The parameter applicable to the Onshore Components is summarised in Table 1.

Table 1 – Onshore component parameters

Parameter Outline Consent	Maximum	Notes
Converter Station Area	55 ha	Area within Order Limits
Converter Station	4 ha (200 m x200 m)	Levelled site – excluding landscaping
Converter Building height	26m	To be measured from 300 mm above levelled site.
Height of tallest element	30m	Lightning conductors
Telecommunications Compound	0.03 ha (10 m X 30 m)	Within Converter Station Area
Telecommunications Building(s)	8 m long x 4 m wide x 3 m high	Within Telecommunications Compound
Telecommunications Building(s) height	3 m	To be measured from 300 mm above levelled site.
Optical Regeneration Station(s) Compound	0.06 ha (18 m X 35 m)	At Landfall

Optical Regeneration Station(s)	10 m x 4m x 4 m	To be measured from 950 mm above levelled site.
Maximum Onshore Cable burial depth	3000 mm	Typically between 1250 mm and 1500 mm
Minimum Onshore Cable depth	500 mm	to cable covers, typically 750 mm to covers in roads and verges 900 mm elsewhere.
Maximum HDD depth Landfall	25 m	
Maximum HDD depth Onshore	20 m	Onshore includes Langstone Harbour Crossing
Joint Bay	6 m x 3 m x 1.85 m depth	Excavation will be 15 m x 3 m to allow installation works.
Transition Joint Bay	8 m x 3 m x 2 m	Excavation will be approximately 15 m x 5m

1.1.2. CONVERTER STATION AREA

NGET Substation Connection

1.1.2.1. The Applicant has a Connection Agreement in place with National Grid Electricity System Operator ('NGESO') (NGET before the legal separation) to connect to the existing 400 kV Lovedean Substation in Hampshire.

1.1.2.2. To facilitate the connection of the Converter Station, there will be a requirement to provide additional electrical infrastructure at Lovedean Substation.

1.1.2.3. Lovedean Substation is the point of connection for the Proposed Development into the National Electricity Transmission System ('NETS'). One connection point is proposed to be located on the western side of the Substation and the other on the eastern side of the Substation, one for each circuit.

1.1.2.4. The outdoor electrical infrastructure required in Lovedean Substation will be similar to the outdoor equipment which forms part of the proposed Converter Station and is also found within typical electrical substations. It will include electrical equipment such as switchgear, measurement and protection devices, filters, etc, that enable the connection between the Lovedean Substation via High Voltage Alternating Current ('HVAC') Cables to the HVAC part of the Converter Station.

1.1.2.5. The electrical equipment at Lovedean Substation is expected to be a combination of Air Insulated Switchgear ('AIS') and Gas Insulated Switchgear ('GIS').

1.1.2.6. To facilitate the Applicant's connection capacity of 2075 MW[1], two bays are required at Lovedean Substation to connect on to the NETS.

1.1.2.7. It is possible that the Applicant through the appointed contractor will deliver the connection works or alternatively they may be delivered by the National Grid TO as part of its licence conditions. The appropriate approach will be established in the Construction Agreement between the Applicant and NGESO prevailing at the time of the commencement of the Converter Station construction.

Western Extension

1.1.2.8. There is expected to be an extension of Lovedean AIS substation to the West, including ground levelling works to bring the ground level in line with the existing substation.

[1] Each circuit will have the export capacity of 1037.5MW and the import capacity of around 1000MW, net of transmission and conversions losses. Such an arrangement provides at least 50% power, as the two circuits are designed to be completely electrically independent, with no overlapping equipment or services. Throughout this Application, the Project's capacity is referred to as 2000MW.

1.1.2.9. Construction of one additional bay, likely to be AIS within the extended Lovedean Substation operational compound.

1.1.2.10. Installation of three additional cable sealing ends within the extended Lovedean Substation operational compound

1.1.2.11. Installation of one HVAC Cable circuit between the extended Lovedean Substation operational compound and the Converter Station.

1.1.2.12. Installation of three cable sealing ends within the Converter Station compound for the HVAC circuit

Eastern Bay

1.1.2.13. Installation of one additional bay, likely to be GIS bay, within the existing Lovedean Substation operational compound

1.1.2.14. Installation of three additional cable sealing ends within the existing Lovedean Substation operational compound

1.1.2.15. Installation of one HVAC Cable circuit through the existing Lovedean Substation operational compound to the Converter Station compound.

1.1.2.16. Installation of three cable sealing ends within the Converter Station compound for the HVAC Circuit

1.1.3. OPERATION AND MAINTENANCE

Operation

1.1.3.1. The access road (i.e. associated with access to the Converter Station from existing highway network) will be required during the construction stage and maintained during the Operational Stage of the Proposed Development. This will allow the movement of vehicles to and around the station during the Construction Stage and Operational Stage.

1.1.3.2. The Converter Station will be enclosed by a perimeter security fence, likely an external steel palisade fence as well as an inner electrified fence of approximately 2.4 m and 3.4 m in height, respectively. These fences will be separated by a sterile zone. Access to the Converter Station will be strictly controlled and only permitted to those with the appropriate training and authorisation.

1.1.3.3. The access to the Converter Station perimeter and its facilities would be controlled by the Applicant. A personnel access gate would be likely be operated by a key card or key pad security system.

1.1.3.4. Lighting columns will be installed along the perimeter fence and around the outdoor equipment areas. In normal night time operation there will be no illumination of the site. Lighting would only be used in the event of unauthorised access to the site or if emergency repair work was required on the outdoor equipment. The light fittings will be appropriately designed to ensure that light is only directed only to the necessary areas.

1.1.3.5. The Converter Station will contain the following substances that would be subject to Control of Substances Hazardous to Health ('CoSHH') regulations.

Table 2 – Substances subject to CoSHH Regulations to be contained within the Converter Station

Substance	Application
Mineral oil	Insulation medium in Alternating Current ('AC') capacitor units, if the project requires harmonic filters
Transformer oil	Provides insulation and cooling for power and instrument transformers
Diesel	Diesel generator
Monoethylene glycol	Anti-freeze
Sulphur hexafluoride ('SF6')	Used in circuit breakers as an arc extinguishing medium
Sulfuric acid	Sealed lead acid batteries

1.1.3.6. Appropriate storage and handling measures will be in place. The transformers and diesel generator(s) will be bunded to ensure any oil leakage is safely contained.

1.1.3.7. There are no operational requirements associated with the Onshore Cable Route.

1.1.3.8. The Fibre Optic Cable ('FOC') Infrastructure will also be operated remotely (i.e. unmanned). However, regular access to the proposed equipment, both within the Telecommunications Building(s) at the proposed Converter Station Area and the proposed FOC amplification equipment within the ORS near the coast, will be required during the Operational Stage.

Maintenance

1.1.3.9. AQUIND Interconnector will be designed, manufactured and installed for a minimum service life of 40 years. Due to the dynamic nature of power electronics, the control system may need to be replaced at 15-20 years. Some equipment may need to be refurbished/replaced one or more times during the service life of the Interconnector.

1.1.3.10. Cable systems are reliable and do not tend to require intrusive maintenance. The maintenance that is required includes, but is not limited to, cleaning of the air insulated terminations, visual inspection of pressure gauges at the cable terminations to check for oil leaks and visual inspection of the steel work at terminations to check for corrosion e.g. structure, cable cleats and link-boxes. There will also be the requirement to carry out vantage point surveys on the cable route to confirm no third-party risk e.g. digging near the cable.

1.1.3.11. At the link-box/link pillar locations, electrical connections between the metallic sheaths of cables can be removed, enabling tests to establish the integrity of the cable oversheaths during commissioning, regular maintenance, and in the event of suspected damage. Cable tests would be carried out approximately every two years or before re-energisation of the interconnector after an outage period.

1.1.3.12. Visual inspection of the output of the Distributed Temperature Sensing ('DTS') hardware which is located within the Converter Station would be required. Changes in the temperature profile (either hot spots or cold spots) could indicate that changes have occurred along the Onshore Cable Route. Hot spots could indicate that ground levels have increased or that another heat source has been installed adjacent to the power cables. Cold spots could indicate that Marine Cables have become exposed.

1.1.3.13. Whilst the Onshore Cables require minimal maintenance; cable failures are possible, albeit rare in occurrence. These can occur due to a defect in the cable or due to 3rd party interference. An onshore cable fault can typically leave the interconnector out of service for approximately 2 weeks during repair.

1.1.4. DECOMMISSIONING STAGE

1.1.4.1. It is anticipated that the cable's operational lifetime will exceed that of the Converter Station equipment, however at the end of the cable's asset life, the options for decommissioning will be evaluated. The final cable decommissioning plan is still to be determined, and may depend on requirements at the time. If a decision were to be taken to decommission the Onshore Cables instead of leaving in-situ, every effort would be made to recycle as much material as possible and it is likely that the ducts would remain in situ therefore removing the need to excavate the entire route. The FOC would be decommissioned in the same way as identified for the Onshore Cables.

1.2. ONSHORE CONSTRUCTION STRATEGIES

1.2.1. UTILITIES – POWER AND WATER

1.2.1.1. The 11 kV Scottish and Southern Energy Networks ('SSEN') overhead line running parallel to Broadway Lane would be replaced by an underground cable to provide clear access for the Access Road in to the Converter Station Area. This work is expected to be classed as non-contestable works and as such SSEN are expected to undertake the works and secure their wayleaves for the change of their network.

1.2.1.2. The Converter Station will have clean water pumped to the site for general use during operation of the scheme from Portsmouth Water. The location of the proposed connection point is Broadway Lane. Portsmouth Water would be responsible for the connection to existing mains water and the provision of the water pipe to up to the edge of the public highway adjacent to the Order Limits. The contractor will be responsible for the installation to the connection point. The water connection pipe is likely to installed along the new Access Road.

1.2.1.3. The site will have a drainage system to separately process the foul water, clean surface water oily water from the converter station area. Refer to Appendix 3.6 (Surface Water Drainage and Aquifer Contamination Mitigation) of the ES Volume 3 (document reference 6.3.3.6) for further information.

1.2.1.4. The attenuation ponds will be designed to cater for extreme rainfall events up to and including the 1 in 100 year return period rainfall event, which has an annual exceedance probability of 1% with an additional allowance of 40% for climate change. The climate change allowance has accounts for the potential increase in intensity of rainfall events in the future. An outlet control will be designed/used to limit discharge to greenfield run-off. In general, the design would be in accordance with Construction Industry Research and Information Association ('CIRIA') C698 in relation to the design of SuDS compliant drainage system.

1.2.2. ACCESS & EGRESS

1.2.2.1. There will be an internal roadway network within the Converter Station to accommodate abnormal load movement to transformer position or any other location where abnormal load delivery/removal is required as well as access to all buildings These will also enable eventual access around the converter station for both vehicles and personnel during operation.

1.2.3. FIRE PROTECTION SYSTEMS

1.2.3.1. The Converter Station would have an active fire protection system consisting of fire detection and fire extinguishing systems. Passive measures for fire protection would include fire rated buildings/compartments and the use of non-flammable or flame-retardant equipment. The philosophy for the whole system would be designed to appropriated British Standard European ('BS EN') standards and industry acceptable documents such as National Grid Technical Specifications and agreed with the local fire authorities during detailed design.

1.2.3.2. As part of detailed design process, a fire risk assessment would be undertaken to determine and qualify fire protection measures. Risk factors under consideration would include the probability of a fire occurring in a given area, the consequences of a fire occurring and the criticality of the equipment to be protected; the inputs to the fire risk assessment can be summarised as follows:

- Equipment redundancy and replacement;
- Operator's business continuity plans; and
- Tolerance to system downtime.

1.2.3.3. At this stage, to provide flexibility for the design development by the Contractor's design team, sufficient space has been left on site for the installation of a deluge system. Although a common approach is to provide suitable containment and allow a fire to extinguish itself within a suitably contained area.

1.2.4. ELECTRIC AND MAGNETIC FIELD (CONVERTER STATION)

1.2.4.1. The technical specifications will require that the Converter Station is designed to keep Electric and Magnetic Fields ('EMFs') below public and occupational exposure policy limits. EMFs are produced by voltage and current flow within the electric power system; though are also naturally present such as due to the magnetic field of the Earth (to which a compass responds) and natural electrical electric fields in the atmosphere. For public exposure, compliance is required with 1998 International Commission on non-Ionizing Radiation Protection ('ICNIRP') guidelines for AC fields and with 1994 ICNIRP guidelines for DC static fields. For occupational exposure, limits defined in the Control of Electric Fields at Work Regulations 2016 which implement ICNIRP 2010 guidelines will be required to be complied with.

1.2.4.2. The expected maximum magnetic field strength due to the proposed AC Cable at 33 µT (50 Hz) at 1 metre above ground, is well below the public exposure basic restriction level (360 µT).

1.2.4.3. The public would not be exposed to electric fields from the Direct Current ('DC') Cables because the field is contained by the cable's protective metal sheath.

1.2.4.4. The calculated prospective maximum electromagnetic field strength due to the DC Cables is well below the limit for public exposure to static magnetic fields (approximately 1000 times lower than the limit of 40,000 µT).

1.2.4.5. Refer to Appendix 3.7 (Onshore Electric and Magnetic Field Report) of the ES Volume 3 (document reference 6.3.3.7) for further information on onshore Electric and Magnetic Fields.