**ENGINEERING / PROJECT**

# THE NATIONAL GRID ELECTRICITY TRANSMISSION PLC (SCOTLAND TO ENGLAND GREEN LINK 1) COMPULSORY PURCHASE ORDER 2023

## STATEMENT OF EVIDENCE

**Graham Law**
**Lead EPC Project Manager**
**National Grid Electricity Transmission plc**

## 1. QUALIFICATIONS AND EXPERIENCE

1.1 My name is Graham Law, and I am a Lead EPC Project Manager with National Grid Electricity Transmission Plc (NGET). I have a BEng (Hons) degree from the University of Newcastle upon Tyne in Electrical & Electronic Engineering, I am a Chartered Engineer and Member of the Institution of Engineering & Technology (MIET).

1.2 In my role with NGET I am responsible for the delivery of major electricity transmission construction projects.

1.3 I have 32 years of experience in the electricity transmission and distribution industry. After working for a Distribution Network Operator and Consulting Engineers I joined National Grid in 1999 and have held operational, management and project management roles.

1.4 My role on the Scotland to England Greenlink 1 project is the project management of the new converter station at Murton. This role includes project development, contract placement and delivery.

## 2. INTRODUCTION AND SCOPE OF EVIDENCE

2.1 The purpose of my evidence is to explain the engineering design and construction methodology of the Scotland to England Green Link 1 (the Project), specifically from the converter station to the point of connection into the new electricity substation at Hawthorn Pit. My evidence does not extend to the engineering design and construction for the methodology for the section of the Project from landfall to the converter station, which is the responsibility of Mr Karim and is dealt with in his evidence, save where there is overlap with the cable infrastructure, nor does it extend to the engineering design, construction or methodology of the new 400kV substation, which is the responsibility of Mr Omer and is dealt with in his evidence. For clarity below is a drawing showing the Project responsibilities between myself, Mr Karim and Mr Omer:

Mr Law – red

Mr Karim – blue

Mr Omer - green

2.2 My evidence also addresses the wider need for and benefits of the Project, including the alternatives for the Project, and how the Project will be delivered and funded. The overriding test with which the Secretary of State must be satisfied in order to confirm the Order is whether there is a compelling case in the public interest to justify the proposed interference with the private rights of those who have interests in the Order Land (paragraph 12 of the Ministry of Housing, Communities and Local Government's Guidance on Compulsory purchase process and The Crichel Down Rules (Updated February 2018)) (the **CPO Guidance**) (**CD B.6**). Other considerations that need to be demonstrated to the satisfaction of the Secretary of State are set out in the CPO Guidance and considered further in my evidence, below.

2.3 My statement of evidence is structured as follows:

2.3.1 Section 3 provides an overview of the Project.

2.3.2 Section 4 sets out the need for and benefits of the Project.

2.3.3 Section 5 explains how the Project will be delivered and funded.

2.3.4 Section 6 sets out the alternatives for the Project.

2.3.5 Section 7 describes the works and rights required for the Project (from the converter station to the point of connection, including the HVAC cables, and ancillary compounds).

2.3.6 Section 8 comments on objections made to the Order.

2.3.7 Section 9 contains my conclusions.

## 3. OVERVIEW OF THE PROJECT

3.1 NGET owns and maintains the high voltage electricity transmission network in England and Wales. In England and Wales, the high voltage electricity transmission system operates at 275,000 volts (275kV) and 400,000 volts (400kV), comprises some 7,000 route kilometres of overhead lines, over 600km of underground cable and over 320 substations. At the substations generation is connected to the system and the primary transmission voltage of 400kV or 275kV is transformed to lower voltages. The lower voltage electricity is taken by regional electricity companies (also called Distribution Network Operators, or DNOs) who supply it to industrial, commercial and domestic users across the UK.

3.2 NGET is the holder of an electricity transmission licence (the Transmission Licence) (**CD F.1**), granted pursuant to section 6(1)(b) of the Electricity Act 1989 (the **1989 A**ct) (**CD A.7**)

3.3 The Order has been made pursuant to section 10 and schedule 3 to the 1989 Act.

3.4 NGET is promoting and developing proposals for a subsea High Voltage Direct Current Link (**HVDC**) alongside Scottish Power Transmission (**SPT**). This will provide an HVDC link between Torness in East Lothian and Hawthorn Pit in County Durham (Project). The Project has been proposed in partnership with SPT, which is the transmission owner for southern Scotland and responsible for the onshore and offshore aspects of the Project in Scotland.

3.5 The primary objective of the Project is to reinforce the electricity network and increase transmission capacity across the B6 boundary between southern Scotland and northern England before 2030. The benefits of the Project are that it provides this reinforcement and

provides resilience to the electricity network, addressing the current boundary constraints and transmitting renewable energy produced in Scotland to the English national electricity system.

3.6 The Project comprises the following components:

3.6.1 **Scottish Onshore Scheme:** A converter station to the east of the Dunbar Energy Recovery Facility at Oxwell Mains, Dunbar, and a substation at Branxton in East Lothian, Scotland, with approximately 6.5 km of buried HVDC cable to a landfall south-east of Thorntonloch beach. The converter station and substation will be connected by approximately 3.5 km of HVAC cable. The substation connects the Scottish Onshore Scheme to the existing transmission system.

3.6.2 **Marine Scheme**: Approximately 176 km of subsea HVDC cable from Thortonloch Beach, Torness on the east coast of Scotland to Seaham, County Durham, in the north-east of England. The Marine Scheme is being developed jointly by NGET and SPT who have submitted marine licence applications to the Marine Scotland Licensing Operations Team (MS-LOT) and the Marine Management Organisation (MMO).

3.6.3 **English Onshore Scheme**: Approximately 10 km of underground HVDC cable from the landfall at Seaham, to a converter station at Hawthorn Pit in County Durham. The converter station will be connected to a new 400 kilovolt (kV) substation by approximately 1 km of underground High Voltage Alternating Current (HVAC) cable. The new 400 kV substation will connect the Project to the existing 275 / 400 kV Hawthorn Pit substation and the existing electricity transmission system.

3.7 The Project also includes works to existing overhead line electricity infrastructure and the installation of new overhead line electricity infrastructure, comprising the re-alignment of existing overhead lines at Hawthorn Pit, the relocation of a pylon, the removal of two pylons and the removal of existing overhead lines.

3.8 The English Onshore Scheme components of the infrastructure required to deliver the Project will comprise the following:

3.8.1 **Landfall**: A Transition Joint Pit (**TJP**), which will connect the marine HVDC cables forming part of the Marine Scheme to the onshore HVDC cables forming part of the English Onshore Scheme, at a landfall located to the north of Seaham Hall Beach, County Durham (the **Landfall**);

3.8.2 **HVDC Cables**: Approximately 10 km of two underground HVDC cables (and an optional fibre optic cable for performance monitoring) between the TJP and the converter station at Hawthorn Pit (the **HVDC Cables**);

3.8.3 **Converter Station**: Converter station buildings and outdoor electrical equipment together with formation of internal roads and erection of security fencing and provision of landscaping (the **Converter Station**);

3.8.4 **Substation**: A new 400 kV substation to the south of the existing Hawthorn Pit substation (the **Substation**);

3.8.5 **HVAC Cables**: approximately 1km of six underground HVAC cables connecting the new converter station and new substation and approximately 600m of nine

underground HVAC cables connecting the new Substation to the existing electricity substation at Hawthorn Pit (the **HVAC Cables**);

3.8.6 **New Permanent Access**: formation of a permanent converter station access road from Jade Business Park (the **New Access**);

3.8.7 **Temporary Compounds**: construction of associated temporary construction compounds, temporary work areas, and temporary vehicle access arrangements (the **Temporary Compounds**);

3.8.8 **Converter Station Compound**: construction of a construction compound for the converter station site (the **Converter Station Compound**);

3.8.9 **Removal of Overhead Lines**: the removal of existing overhead electricity lines, including three pylons, which currently connect to the existing electricity substation at Hawthorn Pit (the **Overhead Line Removal Works**); and

3.8.10 **New Overhead Lines**: the installation of new overhead electricity lines and one new pylon to connect to the new substation at Hawthorn Pit (the **New Overhead Line Works**).

## 4. NEED FOR THE PROJECT

4.1 The public benefit of the Project is set out at section 8 of the Statement of Case (**CD D.10**).

4.2 The National Grid Electricity System Operator (**NGESO**) is the electricity system operator for Great Britain. NGESO became a legally separate business from National Grid PLC in 2019. NGESO annually reviews the network capabilities requirements which includes the following notable activities and publications:

4.2.1 Future Energy Scenarios (**FES**) – are developed annually by NGESO with input from industry and other stakeholders. The FES represent a range of different, credible ways in which the energy could evolve taking account of policy and legislation, including net zero targets.

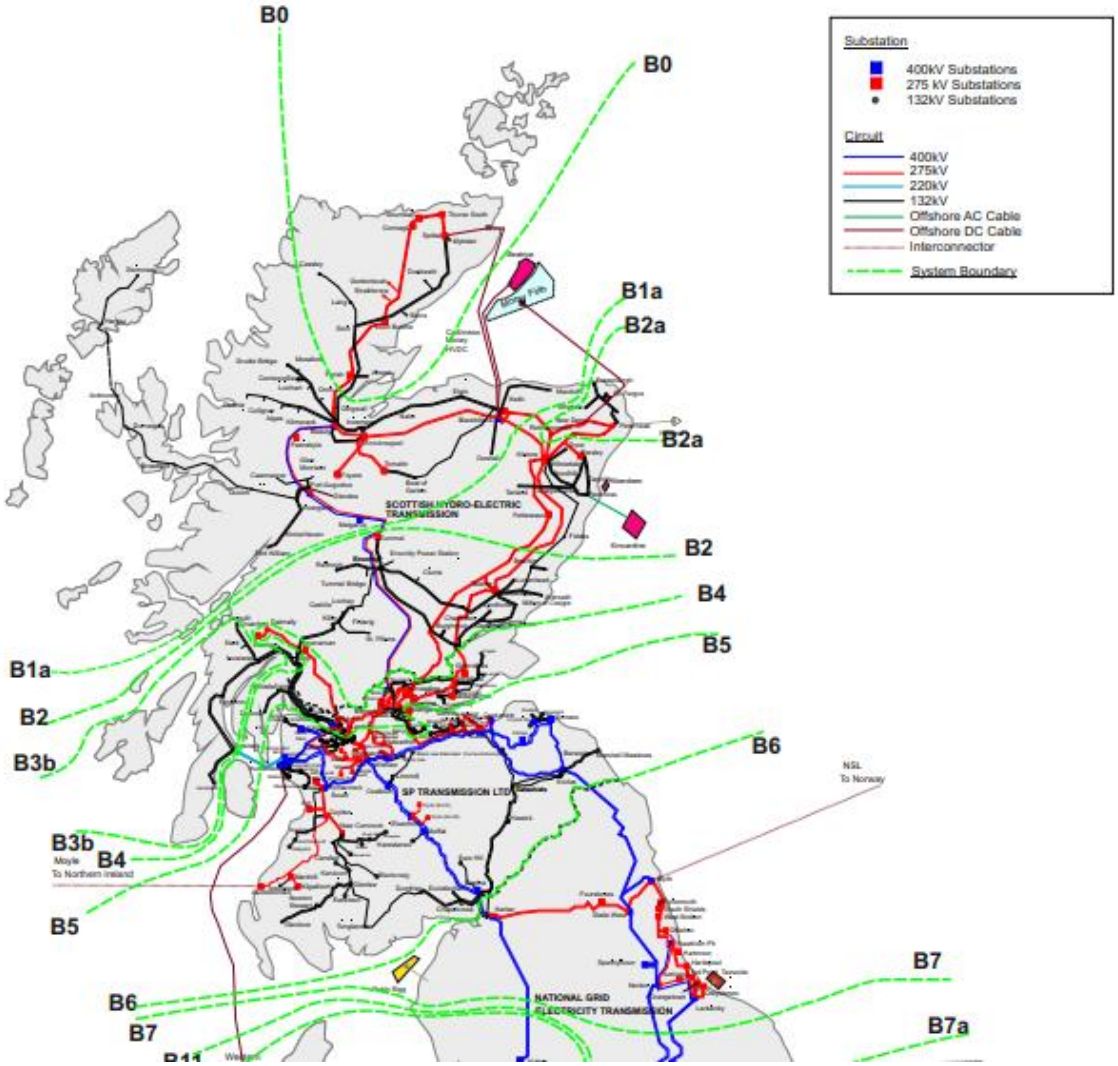
4.2.2 Electricity Ten Year Statement (**ETYS**) – using data from the FES, NGESO undertakes and annual assessment to identify points on the transmission system where more network capability is needed to ensure that energy is delivered efficiently and reliably to where it is needed.

4.2.3 Network Options Assessment (**NOA**) – The NOA sets out NGESO's recommendation for which reinforcement projects should receive investment during the coming year. These are assessed by NGESO so that the most economic and efficient solutions are recommended to proceed, and others told to hold or stop. The NOA uses the latest methodology approved by Ofgem, and outputs from the FES and ETYS.

4.3 Due to Scotland's abundant availability of natural resources, both on and offshore, there is a large growth of renewable generation capacity. Scotland is characteristically an exporting region where installed generation capacity is more than enough to supply the local demand. Larger demand areas lie in central and south of England and so the energy flows across the southern Scottish and northern English boundaries are predominantly north-to-south, which is the main driver for reinforcements. The FES, ETYS and NOA have identified that Scotland

has significant quantities of green energy and there is a need to increase the cross-border capabilities of the electric transmission network. The electricity transmission system across Great Britain is divided by a number of boundaries used to split the system into parts. The B6 boundary separates the transmission network at the Scottish Power Transmission and NGET interface running approximately along the border between Scotland and England, shown in the drawing below.

4.4




Electricity Transmission System Boundaries in Scotland and the north of England

4.5 In times of good and high wind conditions across Scotland when the generated power exceeds the capability of the transmission network then energy generation needs to be managed to ensure that the capability of the network is not exceeded. The NGESO manages any shortfall in boundary capacity by reducing the power flows. This is achieved by constraining generation and paying the generators to reduce output. Managing shortfalls in network capability across boundaries results in additional costs, referred to as 'constraint costs' to operate the network. Some level of constraint is expected as part of the economic operation of the network, however, where excessive constraints occur then investment in new infrastructure may be needed to provide additional network capability. Analysis from NGESO forecasts that unless the electricity transmission network is upgraded, there would be significant constraints across the network, and in particular across the Scottish-English border

throughout the next decade, which ultimately results in additional customer costs. When this cost becomes larger than the required investment to resolve the capacity constraint, it is considered right to proceed with investment to remove the constraint. The Project will deliver part of the required upgrade.

4.6 The existing B6 boundary capacity is 6.3GW. The Project will add an additional 2GW of capacity across the B6 boundary between southern Scotland and northern England.

4.7 The Eastern Link (which includes the Project) achieved approval to proceed in the NOA published in 2015/2016. The requirement for reinforcement has increased as the volume of renewable energy generation connecting to, or forecast to connect to, this part of the network has increased. In the 2019/2020 and the 2020/2021 NOA, proceed signals have been given to two cross border reinforcements which includes the Project. The ESO's annual NOA process, has consistently shown the need for investment across multiple northern transmission boundaries of the GB network. The Project will deliver part of this need.

4.8 The NOA published in January 2022 (**January 2022 NOA**) gave a "proceed" signal to three east coast reinforcements including the Project, and the NOA published in July 2022 (**July 2022 NOA**) continues to support east coast reinforcement including the Project. The July 2022 NOA identifies the Project as a Holistic Network Design (**HND**) essential option, being a reinforcement that is essential to deliver the Pathway to 2030.

4.9 Government policy paper British Energy Security Strategy (7/4/22) states 'Our ambition is to deliver up to 50GW of offshore wind by 2030.'

4.10 This demonstrates the national need for the Project. This is further supported by the national energy policy set out at section 8 of the Statement of Case and the national planning policy set out at section 8 of the Statement of Case.

4.11 At a project specific level, NGET is obliged to seek the approval of the initial needs case and the final needs case for the Project from Ofgem under the regulatory regime.

4.12 Ofgem has approved the initial needs case and the final needs case for the Project, with the final needs case approved in the Eastern HVDC – Conditional Decision: Final Needs Case dated 8 July 2022 (the **Ofgem FNC Decision**) **(CD D.8)**. The final needs case approval is conditional on, and subject to planning consents being obtained and agreement on the Project Assessment.

4.13 In the Ofgem FNC Decision, Ofgem confirmed that the Project is necessary and will deliver significant benefits for consumers by allowing additional renewable generation to connect to the network and reduce constraint costs. Ofgem have also confirmed that the technical options are clear and demonstrable with robust cost benefit analysis, and that through appropriate technical consideration NGET has come to the preferred option for the Project. The Ofgem FNC Decision reflects the national need for the Project.

4.14 Ofgem have also identified the Project as an Accelerated Strategic Transmission Investment (**ASTI**) project. ASTI projects will form part of a new regulatory framework which is aimed at providing earlier access to project funding in order to accelerate the delivery of ASTI projects and achieve the Government's 2030 objectives.

4.15 Ofgem's analysis suggests that, if all ASTI projects are delivered by their optimal delivery dates, consumers will see a net benefit of up to £2.1bn in terms of reduced constraint costs

and carbon savings. Ofgem are clear that this consumer benefit is contingent upon timely project delivery.

4.16 At a local level, Durham County Council (DCC) has recognised this need in its Committee Report (**CD C.2 and CD C.3**) where it concludes in respect of the Planning Application that: "*It is needed to enable the transmission of electricity, including that generated from renewable sources such as wind, from where it is generated to where it is used. As such, the proposed development represents enhanced electricity infrastructure that is urgently needed in order to achieve the Government's objectives and commitments for a secure and low carbon energy system*."

4.17 The need for the Project, and the associated public benefits, is that it meets an identified urgent national need for new electricity transmission infrastructure. It meets the primary objective of boundary reinforcement.

## 5. PROJECT DELIVERY AND FUNDING

5.1 NGET and SPT have jointly developed the Project including onshore and offshore route selection, and substation and converter station locations. The Project development has included intrusive and non-intrusive site surveys. Detailed designs will be completed by contractors. There are three main contracts currently out to tender:

- Converter stations north and south, including southern HVAC cable.
- DC cable route – onshore and offshore.
- New substation including connections into the existing transmission networks and upgrading of existing transmission networks.

5.2 Key Project milestones are:

- Sept 23 – Early works – vegetation clearance, public rights of way diversions, temporary haul road construction;
- Jan 24 – Converter Station contract award;
- Oct 24 – First site access for Converter Station contractor;
- Sept 27 – Converter Station energisation complete; and
- Mar 28 – HVDC link trial operation completion

***Planning Permission***

5.3 As explained in section 6 of the evidence of Mr Smith, a planning application (ref: DM/22/01663/OUT) (the **Planning Application**) was submitted to Durham County Council. The planning application is an outline planning application for the erection of a new 400 kilovolt electricity substation, a converter station, and the laying out of replacement public open space on land to the west and south of Jade Business Park, with all matters reserved. Planning permission was granted on 28 July 2023.

5.4 NGET can also make use of its permitted development rights as a statutory undertaker and is seeking consent for overhead line works under Section 37 of the Electricity Act 1989 (the **1989 Act**).

***Funding***

5.5 NGET is completing the tender process for the majority of the Project cost base and has taken expert advice on the remaining likely costs of implementing the Project, including the funding of the acquisition of the interests in land described in the Order.

5.6 An assessment of the required funding has taken into account the total cost of payments for acquiring both freehold land and rights over land. This total cost has included the estimated value of compensation payable in relation to disturbance, severance and injurious affection, third party professional fees, blight and claims arising under both Section 10 of the Compulsory Purchase Act 1965 and Part 1 of the Land Compensation Act 1973.

5.7 The estimated land costs for delivery of the English Onshore Scheme are £4.8million. This has been included in the Project budget in the construction phase and will be available when powers pursuant to the Order are exercised.

5.8 The land acquisition costs and potential compensation claims for blight will be fully met as and when they are required, and this would include any "early payments" under the blight provisions of the Town and Country Planning Act 1990. The Project has a contingency for lands activities which would meet any valid claims which may be made in future.

5.9 NGET has significant financial standing. NGET publishes its full accounts as required by its licence conditions on an annual basis. The financial results set out in the 'Annual Report and Accounts 2022/2023 show that NGET has underlying operating profits of £983 million. NGET also has a regulatory asset value of £17,072 million.

5.10 NGET is regulated by its economic regulator, the Office for Gas and Electricity Markets (**Ofgem**), which carries out price control reviews to set NGET's permitted revenues. These reviews limit the amount of money that can be earned by NGET from charges to use the transmission network. Therefore, NGET is incentivised to be more efficient in managing its infrastructure.

5.11 Each price control is set for a particular period, after which a new one replaces it. The current price control period is known as 'RIIO-T2'. This took effect on 1 April 2021 and will run for five years.

5.12 The RIIO model (Revenue = Incentives + Innovation + Outputs) places a greater focus on incentives to drive the innovation that is necessary to deliver a sustainable energy network, combined with value for money for consumers, now and in the future.

5.13 Ofgem has confirmed that the Project is to be delivered by NGET pursuant to the LOTI (Large Onshore Transmission Investments) process. The LOTI process is a regulatory license framework in which NGET provide the necessary substantiation for any project that constitutes an investment in the transmission network that:

5.13.1 is expected to cost £100m or more of capital expenditure; and

5.13.2 is in whole or in part, either load-related; or

5.13.3 related to a shared-use or sole-use generator connection project.

5.14 The LOTI process comprises three stages of approval by Ofgem: 1) initial needs case; 2) final needs case; and 3) project assessment. Ofgem has approved the initial needs case and the final needs case.

5.15 Funding under LOTI is only approved by Ofgem at the Project Assessment stage, which is designed to be aligned with the procurement process for each LOTI project. Ofgem does not provide for the funding of construction activity ahead of the Project Assessment stage for any LOTI project.

5.16 The first stage of the Project Assessment stage was submitted in August 2023 and the second stage of the Project Assessment is expected to be submitted to Ofgem for approval in September 2023. The Project Assessment is the final stage in which Ofgem sets the funding allowances for all construction activities to execute the Project.

5.17 In August 2022, Ofgem proposed a package of measures aiming to facilitate accelerated delivery by the Transmission Owners (**TOs**) including NGET. In December 2022, Ofgem subsequently decided to implement a new Accelerated Strategic Transmission Investment (**ASTI**) regulatory framework to fund the large strategic onshore transmission projects required to deliver the Government's 2030 ambitions. Ofgem has subsequently consulted on proposed changes to the electricity transmission owner's RIIO-T2 licence conditions required to implement the ASTI framework in order to allow for earlier access to project funding in order to accelerate the delivery of ASTI projects. This consultation closed on 28 March 2023. The finer details of the ASTI framework have not yet been finalised and issued by Ofgem.

5.18 The pivot from LOTI to ASTI is due to take effect during 2023 and investments "in flight" such as this Project will "port" over to the ASTI framework. NGET will go through the Project Assessment phase with Ofgem pursuant to ASTI once it is introduced.

5.19 Therefore, funding will be available by the time that the Order enables the exercise of powers of compulsory acquisition. This will be in place in respect of both construction costs and land compensation costs. National Grid would expect the funding required to meet the estimated implementation costs will be made available. This funding will be subject to the appropriate internal governance and approval.

***Conclusion on project delivery and funding***

5.20 Planning permission was granted for the Project on 28 July 2023. NGET will otherwise be utilising the permitted development rights available to it and securing a consent under s37 of the Electricity Act 1989 as set out in the proof of evidence of Mr Hugh Smith.

5.21 I am therefore confident there is no legal or physical impediment to the implementation of the Project as required by paragraph 15 of the CPO Guidance (**CD B.6**).

5.22 NGET has assessed the costs of implementing the Project and the costs of acquiring the necessary land and rights over land required for the Project.

5.23 Project funding, via the ASTI framework, will be available by the time that the Order enables the exercise of powers of compulsory acquisition in respect of both construction costs and land compensation costs.

5.24 Given National Grid's strong credit rating, the requisite funding is available to meet the implementation and land acquisition/compulsory purchase compensation costs associated with the Project as and when required (including any advance payments).

5.25 Therefore, I consider that the criteria in paragraphs 13 and 14 of the CPO Guidance are satisfied.

## 6. ALTERNATIVES TO THE SCHEME

6.1 NGET's regulatory duties in relation to developing and maintaining an efficient, coordinated and economical National Electricity Transmission System are set out in Section 9 of the Electricity Act 1989 (**CD A.7**).

6.2 In developing the English Onshore Scheme, NGET also has a duty under Schedule 9 of the Electricity Act 1989 (**CD A.7**) to consider amenity and to have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest.

6.3 NGET's 'Approach to Options Appraisal' (**CD F.3**) describes a framework and references a list of topics that allows NGET to identify and balance technical, socio-economic, environmental, and cost considerations to help inform decisions around Project options.

6.4 As explained in more detail in section 7 of the Statement of Case, NGET undertook a detailed optioneering exercise in designing the Project and arriving at the final form of the English Onshore Scheme. NGET's approach to assessing alternatives is set out in the Environmental Appraisal Report: Volume 2: Chapter 02: Project Alternatives dated May 2022 prepared by NGET (the **Alternatives Report**) (**CD D.6**).

6.5 As set out in section 8 of Mr Smith's proof of evidence, NGET has undertaken a number of studies and public consultation events in arriving at the final form of the English Onshore Scheme.

6.6 As set out in Mr Chandler's proof of evidence, NGET has engaged and continues to engage with relevant landowners over the substantive form of the English Onshore Scheme.

6.7 The primary objective of the Project is to reinforce the electricity network and increase transmission capacity across the B6 boundary between southern Scotland and northern England before 2030, in order to meet the urgent need for the Project as identified in section 4 of this proof of evidence.

## 7. PHYSICAL COMPONENTS AND WORKS REQUIRED TO CONSTRUCT THE INFRASTRUCTURE

7.1 Section 3 above sets out the key components comprising the English Onshore Scheme of the Project. This section of my statement of evidence provides further detail on those components from the Converter Station to the Substation, including the HVAC Cables, New Access and Converter Station Compound, including:

7.1.1 the infrastructure that will be constructed and installed;

7.1.2 the construction works and methodologies that are required for this infrastructure; and

7.1.3 the spatial extent of the land and new rights that are needed to facilitate the construction, operation and maintenance of the infrastructure comprised in the Project by reference to the Order Maps (**CD D.2)**.

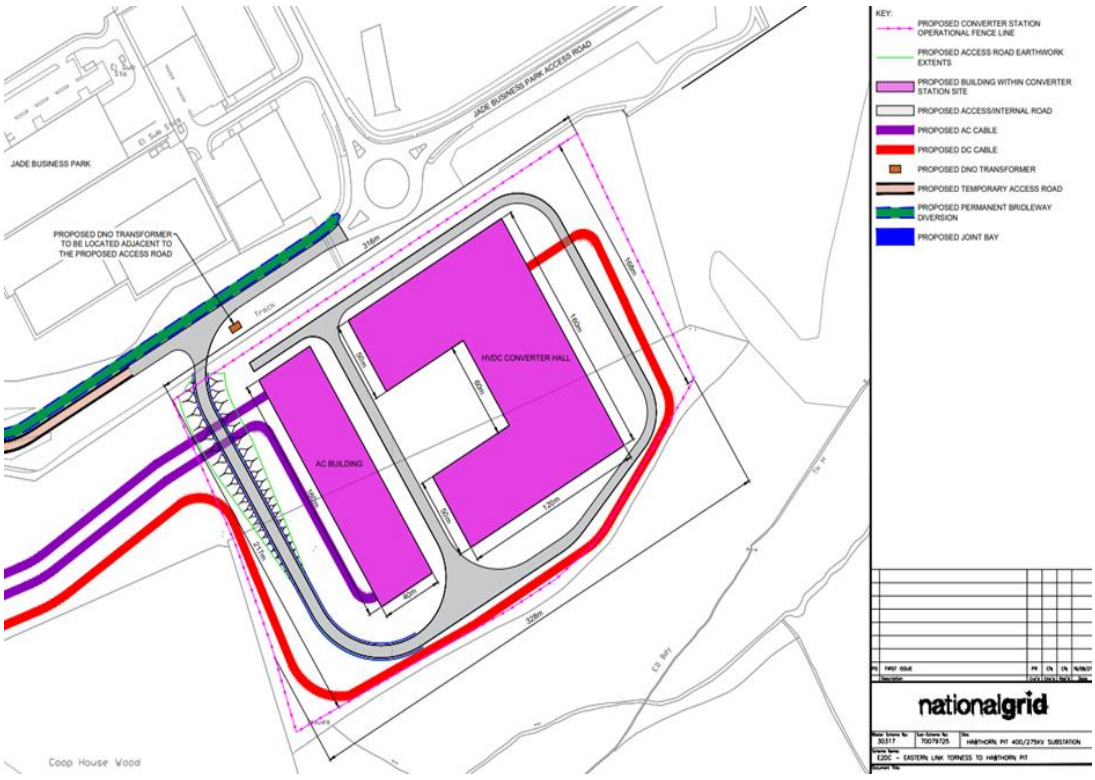
7.2 NGET developed a design for the Project for the purposes of seeking planning permission and promoting the Order (**CD D.1**). This was informed by a wide range of surveys and

assessments, including ecological surveys, geophysical surveys, ground investigations (e.g., boreholes), soil surveys, and land drainage assessments. Planning permission was granted in July 2023 (**CD C.4**).

7.3 NGET undertook an optioneering exercise to identify potential locations of the new converter station. The selection criteria included:

- Close proximity to existing NG transmission infrastructure at 400kV. A 400kV connection to existing transmission infrastructure is essential to provide efficient power transfer.
- Available footprint of 200m x 300m. For comparison North Sea Link converter station at Blyth has a footprint of approximately 240m x 225m and Flintshire Bridge converter station 380m x 225m.
- Suitable means of access and egress.
- Minimising environmental impacts.

Five potential sites were identified and assessed against the selection criteria. The agricultural field adjacent to Jade Business Park was selected as the preferred location having the best balance of the project needs and impacts. An indicative Converter Station design on the selected location is shown below:




7.4 The final design of the Converter Station is not yet known. Once appointed the Converter Station contractor will be responsible for developing the detailed design, including matters such as route alignment and micro-siting for the HVAC cable. The procurement process which will lead to the appointment of the contractor is ongoing. It is currently anticipated that contracts will be awarded in January 2024.

***Construction Phase***

**Converter Station buildings and outdoor electrical equipment (together with formation of internal roads and erection of security fencing and provision of landscaping) Plot 7-28)**

***Physical Components***

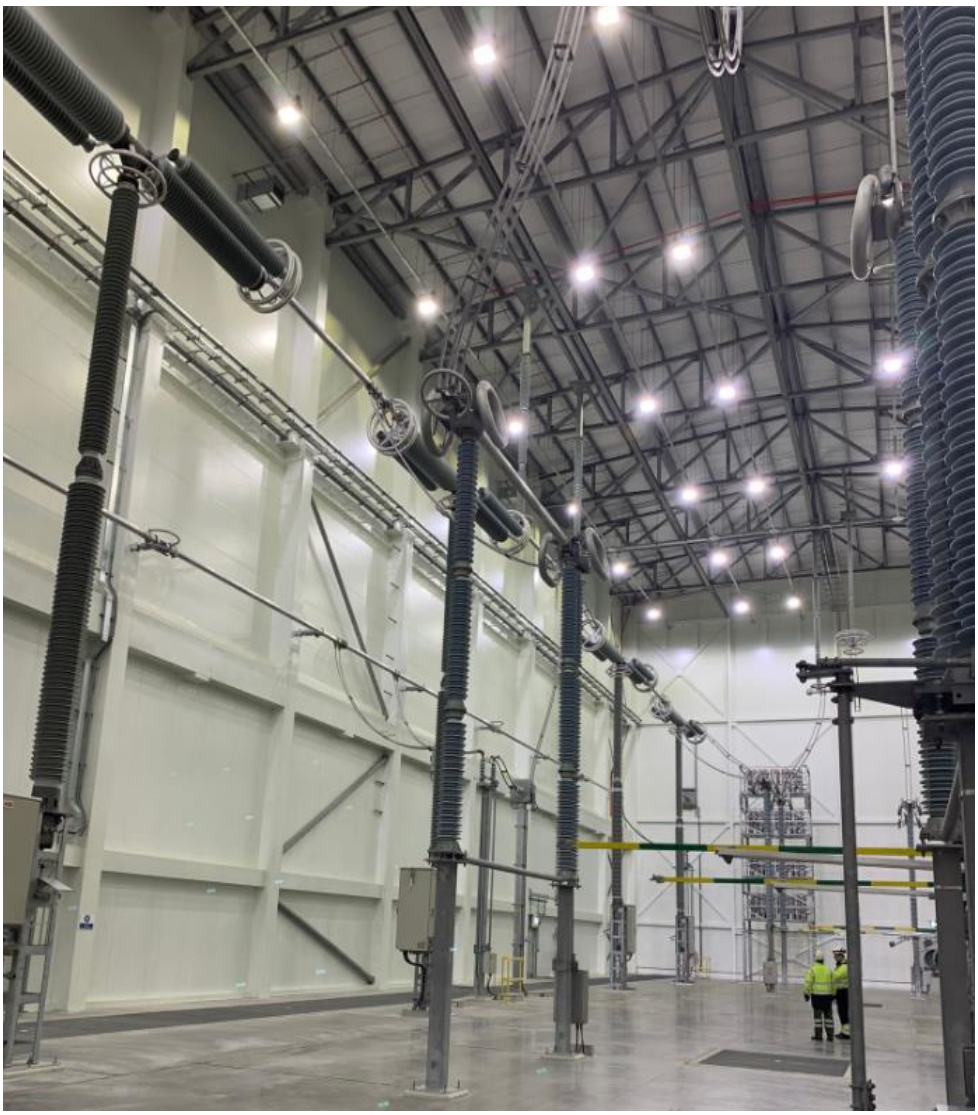
7.5 The Converter Station is located approximately 890m south-east of the existing Hawthorn Pit substation. The footprint of the Converter Station site is approximately 7 ha and is located on agricultural land, bound by Coop House Wood to the south and south-west, agricultural land to the west, and Jade Business Park to the north. The land to the north-east of the Converter Station is currently open land. A visualisation of the proposed Converter Station is shown below:

7.6 The Converter Station is required to convert electricity from DC to AC and will comprise the following components (in separate zones of development) within a secure fenced compound:

Zone 1

7.6.1 DC Hall - the 525 kV HVDC Cables terminate here. The switch hall also contains DC switchgear to connect to power electronics. This equipment will be enclosed in a building up to 26m in height. The height of the building is determined by the

electrical clearances required at an operating voltage of 525kV. The photograph below shows a typical DC hall:



7.6.2 Valve Halls and AC Inductors – contain high voltage power electronics equipment that converts electricity from DC to AC and vice-versa. This equipment must be located indoors in buildings up to 26m height within a controlled environment.

7.6.3 Transformer bays – these change the AC voltage to an appropriate level for transmission via the AC system/ or prior to conversion to DC. The transformers are normally sited outdoors and separated by concrete fire protection walls. Typical dimensions are 15m long by 15m wide by 16m high. Cooling fans are also provided on transformers. Noise enclosures can be fitted around the transformers if required.

Zone 2

7.6.4 Control Building – contains control panels and associated operator stations, protection and communication equipment, offices and welfare facilities and other auxiliary systems all located within an enclosed building up to 15m high.

7.6.5 AC switch gear and filters ("switch yard") – connects the Converter Station to the AC transmission system. It includes a range of electrical equipment including

harmonic filtration and reactive compensation equipment, circuit breakers, transformers, busbars and insulators. The main function is to allow the effective integration of the DC system into the AC system. This equipment will be enclosed in a building or series of buildings up to 20m high.

7.6.6 Backup Generator – the Converter station requires its own power typically provided at high voltage by the DNO, a back-up generator (or battery storage) would be used to provide electricity supply in the event of a failure of the electricity supply; and

7.6.7 Spares Building – a building to house spare parts and components; this will be supplemented by hardstanding areas provided for storage of a spare transformer and spare cable drums.

Zone 3

7.6.8 Perimeter road zone which will contain a permanent perimeter road which would form a continuous circuit around the Converter Station to facilitate movement of vehicles and access.

Zone 4

7.6.9 Landscape planting zone which will comprise grassed areas and landscape planting around the Converter Station in order to provide permanent screening.

***Works required / construction methodology***

7.7 It is anticipated that NGET will award the Converter Station contract in January 2024. Following contract award the contractor will commence the detailed design and procurement stage of the Project leading up to first site access in October 2024. The first activity following first site access is to clear and level the site followed by the civil works for the new converter station buildings, fencing, drainage and earthing which will run through until approximately July 2026. The mechanical and electrical equipment installation follows which should be completed in January 2027. Off load commissioning of all new equipment takes approximately six months prior to energisation of the new converter station in September 27. A six-month trial operation of the full HVDC link is planned for completion in March 28.

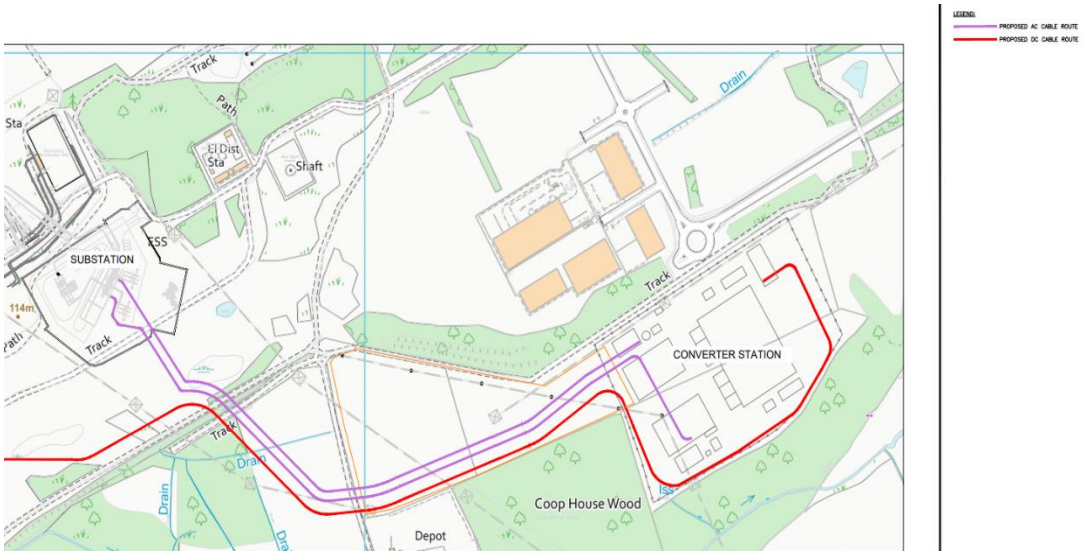
***Land and Rights needed***

7.8 As the Converter Station comprises integral above ground infrastructure, freehold acquisition of Plot 7-28 is sought. To ensure that the rights acquired pursuant to the Order are proportionate, the Order also includes the following rights: Access Rights in respect of the new permanent access road; Drainage Rights in respect of the land required as part of the drainage system; and Landscaping Rights in respect of the landscape planting zone and Coop House Wood.

7.9 Coop House Wood (Plots 7-14 and 7-17) also forms part of the screening proposal for the Converter Station from a landscaping perspective. Therefore, the Order includes the imposition of the Landscaping Right over Coop House Wood to ensure that Coop House Wood is retained and continues to screen the Converter Station.

7.10 Six underground HVAC cables approximately 1km in length between the Converter Station and new 400kV Substation are to be installed to export the power from the converter station. There are two circuits with three cables per circuit. It is anticipated that the cables will be

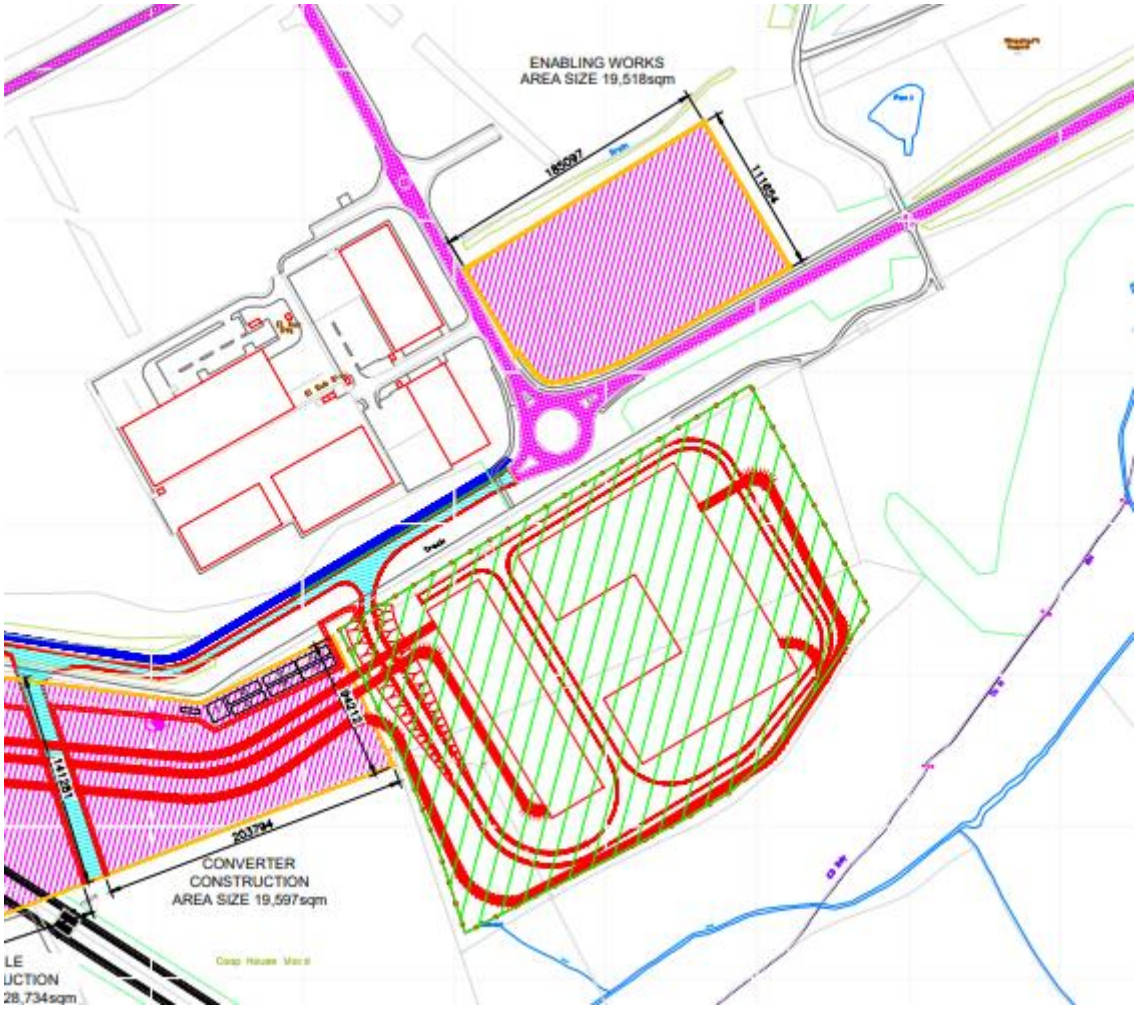
installed in 2025/26 over 11 months. Exact dates will be determined upon the appointment of the converter station and substation contracts and finalisation of their respective programmes. Indicative cable routes are shown in the drawing below:




**Construction Compound for the Converter Station Site Plot 7-27**

***Physical Components***

7.11 In order to facilitate construction of the Converter Station a construction compound is required. The construction compound will compromise of hardstanding and a perimeter fence and will be used for the storage of plant and machinery and the stockpiling of materials, as well as for the provision of site management offices, parking, and welfare facilities for construction personnel (kitchen facilities, storerooms, toilets) in accordance with Health and Safety and Construction Design and Management requirements. The proposed construction compound is shown in below as the Enabling Works Area:




***Works required / construction methodology***

7.12 Work to establish the construction compound will commence approximately two months prior to first site access. The area will need to be cleared and a temporary surface installed suitable for the installation of portacabins, storage containers, car parking and equipment storage. Suitable access/egress points will need to be constructed along with water and electricity supplies for the welfare facilities and security fencing. Upon completion of construction all equipment and surfacing will be removed and the land reinstated.

***Rights needed***

7.13 A package of 'Construction Compound Rights' needs to be acquired over Plots 7-27 to enable the construction compound to be created, used and removed following completion of construction. The land will then be reinstated.

***Operational Phase***

**<u>Converter Station buildings and outdoor electrical equipment (together with formation of internal roads and erection of security fencing and provision of landscaping)</u>**

***Physical Components***

7.14 The Converter Station will be operated and maintained by a small team of NGET employees (approximately 10) who may be supplemented by additional NGET staff or contractors during equipment maintenance shutdown periods.

**HVAC Cables**

7.15 Buried HVDC cables do not normally require significant routine maintenance other than periodic route inspections.

## 8. OBJECTIONS MADE TO THE ORDER

8.1 NGET's Statement of Case and the evidence of Mr Chandler outlines the 17 relevant objections remaining at the time of writing, NGET's response to them and the status of negotiations.

8.2 No objections have been submitted in relation to the acquisition of the converter station, and no objections relates to the construction and operation of the converter station.

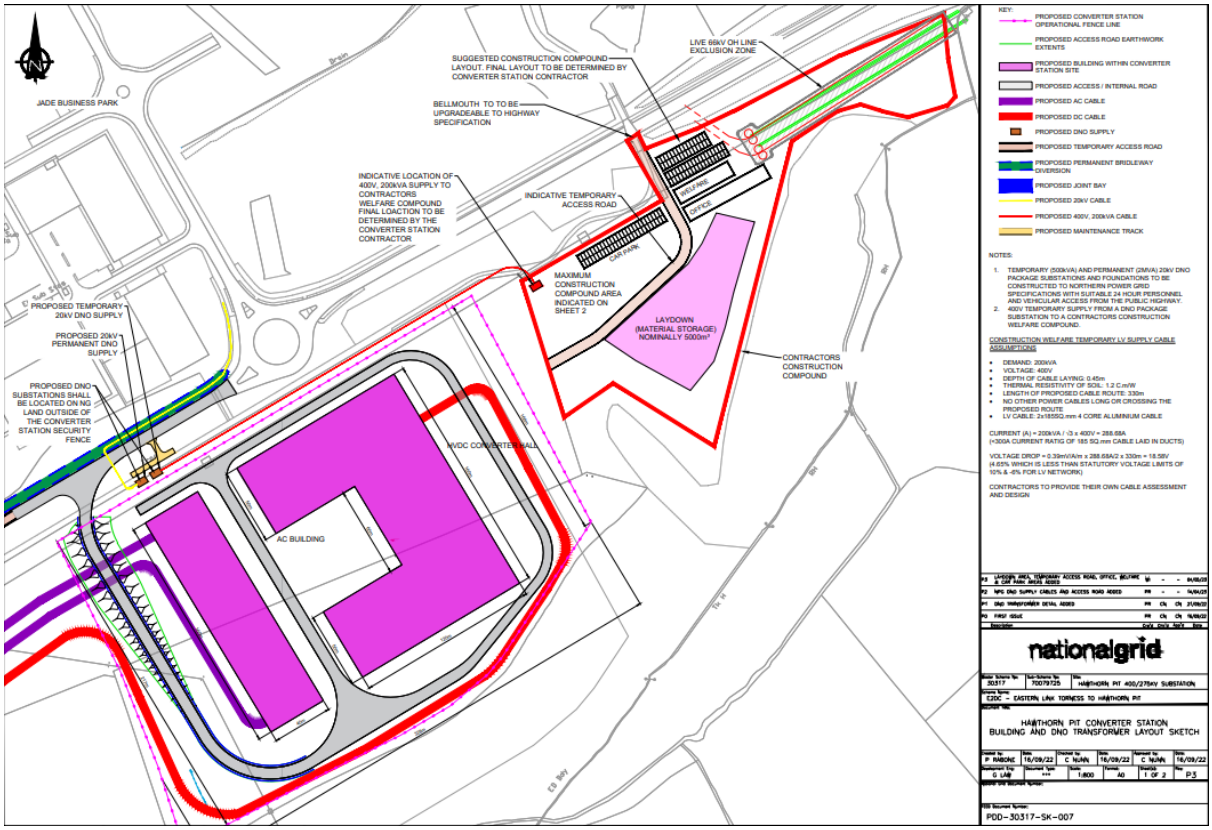
***DCC Land – Alternative Construction Compound***

8.3 As explained in section 7 of Mr Smith's evidence, NGET engaged extensively with DCC as part of the design of the English Onshore Scheme and has selected a design which does not prejudice current or potential development plans. The Converter Station site was chosen, in part, to ensure that it:

8.3.1 was sited on the opposite side of the road from the allocated Jade Business Park site and would be seen in the context of the Jade Business Park development on the wider site; and

8.3.2 did not prejudice any future development of the East Durham Link Road.

8.4 NGET requested an area of land from DCC to be used as a construction compound on land immediately adjacent to the existing Jade business park. DCC advised that the area requested was to be included in the Jade Phase 3 development due to start in 2023 and is therefore not available. DCC further advised that another area was available to the north-east of the proposed converter station. NGET undertook surveys of the area and assessed the available space in comparison to previous NGET converter station compounds. NGET advised DCC that the area is in principle suitable for use as the Converter Station contractor's construction compound for the duration for the Project from approximately October 24 to March 28, subject to reaching an agreement with DCC. A smaller construction compound area is not deemed to provide sufficient space and could restrict the efficient delivery of the converter station. The alternative construction compound is shown in the drawing below:




## 9. SUMMARY AND CONCLUSION

9.1 In my statement of evidence I have described the physical components of the Project, namely the converter station and the HVAC cables, together with the works that are required to construct and/or install those physical components, with reference to the illustrative drawings and photographs embedded within it. I have also described the rights that are needed to enable those works to be undertaken safely.

9.2 I consider that the engineering design and construction methodology of the above elements of the Project is appropriate, feasible, and compliant with the relevant standards, codes, and guidance.

9.3 In my statement of evidence, I have also set out the need for the Project, the primary objective of the Project and the funding position in respect of the Project. I conclude that there is an urgent need for the Project and that the English Onshore Scheme meets that need for the Project and achieves the primary objective.

9.4 No more land than is necessary for the purposes of the safe construction, operation and maintenance of the Project has been included in the Order (**CD D.1 and D.2**).

## 10. DECLARATION

10.1 I confirm that the opinions expressed in this proof of evidence are my true and professional opinions.

**Graham Law**

**5 September 2023**