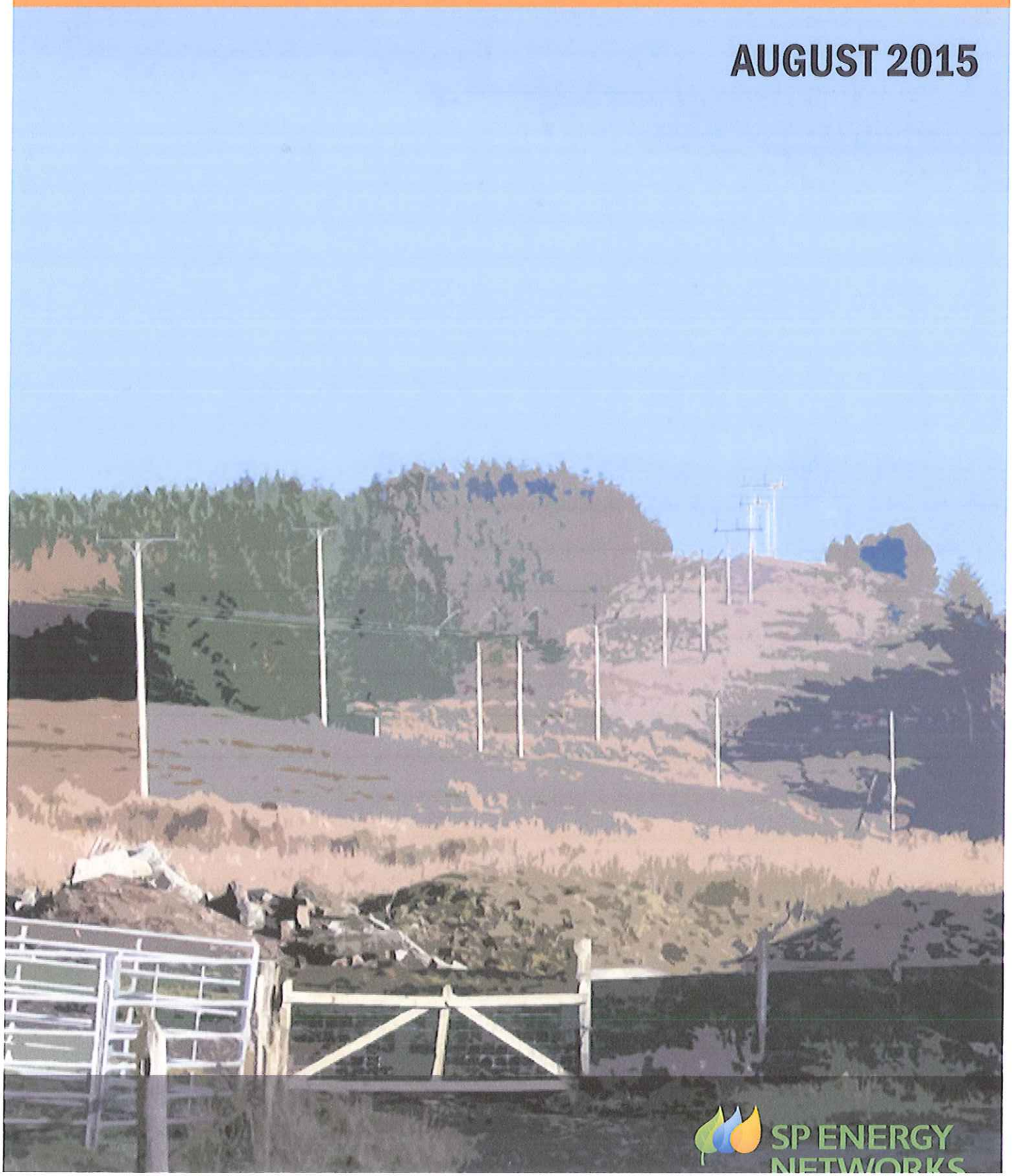
LOCH URR GRID CONNECTION: PHASE A

Routeing Consultation Document

AUGUST 2015



SP ENERGY NETWORKS

These images show another ScottishPower substation, and reflect the broad design of the proposed Kendoon North substation, rather than an exact replica of that proposed.

R3.2.6 Whilst the location of the proposed Kendoon North substation is considered as part of this routeing consultation report, in order that a considered and viable location is proposed, the substation will not form part of the Section 37 application for the proposed OHL. Due to its size, it is not considered appropriate to include it as ancillary infrastructure, and as such a separate Town and Country Planning Application will be submitted for this structure, in advance of the Section 37 application for the OHL.

R3.3 OVERHEAD LINE

R3.3.1 In light of its licence obligations to provide the best technical and most cost-efficient solution for connection, SPT policy seeks to find an OHL solution for all transmission connections and only where there are exceptional constraints would underground cables be considered as a design alternative. Such constraints can be found in urban areas and in rural areas of the highest scenic and amenity value. Where an overhead line solution is not achievable for technical reasons, the company will look to an underground cable solution as an alternative.

R3.3.2 The primary reasons for selecting an overhead option, against that of an underground connection, are as follows:

- The physical extent of land required;
- The fault repair time;
- Difficulties associated with general maintenance;
- Increased cost;
- Greater ground disturbance from excavating trenches;
- The restriction of development and planting within the underground transmission cable corridor; and
- Requirements for cable sealing end compounds or platforms at each end of each section of underground cable.

R3.3.3 The starting point for considering this connection is therefore the assumption that the grid connection will be provided by an OHL along its entire length (i.e. as opposed to an underground cable). Should the constraints determine that an underground cable is required this will be evaluated as necessary.

OVERHEAD LINE DESIGN

R3.3.4 The overhead line is proposed as a 132kV connection to be supported by the 'Trident' wood pole design, which will have a starting point of the substation within the Loch Urr wind farm, and an endpoint of the Kendoon North collector substation adjacent to the L7 route (as described above). This would link to this route at a point between Dalshangan and New Cumnock, the location of which is to be determined through the routeing and siting process undertaken within this document.

R3.3.5 The 'Trident' wood pole 132kV overhead line design utilises two standard pole types, as illustrated on **Figure 3**; a 'single' pole and an 'H' pole configuration. For single poles, the nominal height of the wood poles is likely to be c.15m, with a maximum above-ground height of 22m and a minimum above-ground height of 10m. The spacing between the poles will vary but will generally be 100m,

with a maximum span length of 150m. For the 'H' pole configuration, the height will again be between 10m and 22m (above-ground).

R3.3.6 The 'Trident' overhead line design specification is a UK Electricity Industry Design Standard and the final designation of pole type is generally dependant on three main factors: altitude, weather and the topography of the route. The size of poles and span lengths will also vary depending on these factors, with poles being closer together at high altitudes to withstand the effects of greater exposure to high winds, ice and other weather events. The pole configuration, height and the distance between poles will therefore only be fully determined after a detailed line survey.

R3.3.7 The proposed wood pole will support three conductors (wires) in a horizontal flat formation as shown in **Figure 3**. In addition, there is an earth conductor suspended beneath the main conductors in order to provide lightning protection. This also includes fibre optic cores for communication purposes.

R3.3.8 Following identification of the proposed route for the new line, a detailed topographical survey will be carried out. This is required to identify the proposed positions and heights of each individual tower and wood pole. Site surveys to examine the subsoil conditions will also be carried out at proposed tower and wood pole positions where required. These will inform the tower foundation designs.

OVERHEAD LINE CONSTRUCTION

R3.3.9 Overhead line construction typically follows a standard sequence of events which is:

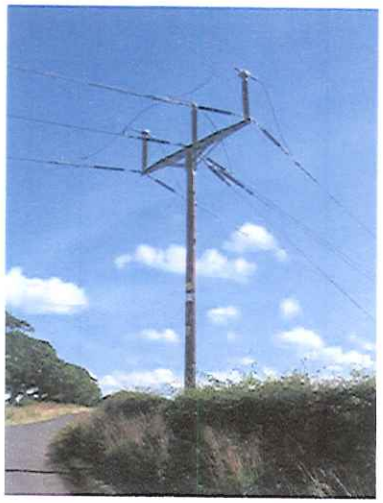
- Prepare access to the pole locations;
- Install pole foundations;
- Erect wood poles;
- String conductors; and
- Reinstate pole sites and remove temporary accesses.

R3.3.10 For wood pole line construction, a crane is unlikely to be necessary, with the 'poles' generally being erected using normal agricultural machinery such as a digger with a lifting arm. Once the poles have been erected, the conductors are winched to/pulled from section poles, thus access to these structures is required for conductor drums and large winches.

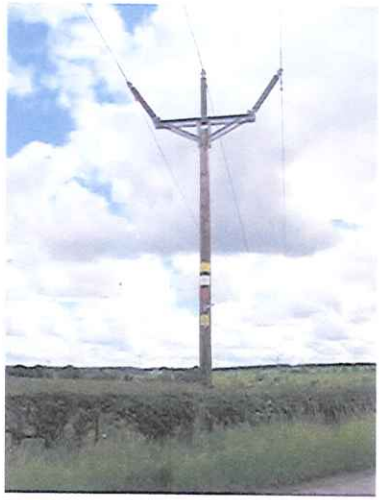
R3.3.11 A tracked excavator and low ground-pressure vehicles, (e.g. tractor, argocat, quad bikes) will be used to deliver, assemble and erect each wood pole structure at each location. The erection of the wood poles will require an excavation to allow the pole brace block and/or steel foundation braces to be positioned in place. A typical pole excavation will be $3m^2$ by 2m deep. The excavated material will be sorted into appropriate layers and used for backfilling. No concrete will be used. The excavator(s) then hoist the assembled structure into position and once the structure has been braced in position the trench is backfilled.

R3.3.12 Prior to stringing the conductors, roads and railways that are to be crossed by the power line have to be protected by building a scaffold tunnel through which vehicles/trains can pass. Other obstacles such as existing power lines have to be either switched off, deviated or protected using 'live line' scaffolds.

R3.3.13 In all cases, every effort is made to cause least disturbance to landowners and local residents during construction. The route of the line is selected to avoid as far as possible communities and individual dwellings, and ground disturbance during construction of the new line will be reinstated.



Trident single pole, vertical insulators



Trident single pole, 'trident' insulators

Trident 'H' pole turning pole

Trident 'H' pole straight-line pole

Trident single and 'H' poles in moorland setting

Trident 'H' turning pole in moorland setting

Trident single and 'H' poles passing through forestry

Trident single poles in lowland setting with lattice towers

Trident single poles in lowland setting, with wind farm

Trident single and 'H' poles passing through forestry & moorland

edp

THE ENVIRONMENTAL DIMENSION PARTNERSHIP

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ScottishPower EnergyNetworks

project title:

Proposed 132kV Overhead Line Between Loch Urr and Kendoon

drawing title:

Figure 3: Form of the Proposed Overhead Line

date: 05 DECEMBER 2013 drawn by: CA
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scale: NTS