



National HEDGE

PORT Architecture + Urbanism

Infrastructure conceptualized and designed to perform only one operation reflects a nineteenth-century mentality towards urbanization that misses the latent opportunities for synthesis and hybridization embedded within these already established network corridors. We see the desire to redesign the electricity pylon as an occasion to fundamentally re-conceive the broader urbanistic role of the entire electricity grid within the totality of the UK landscape, bundling ecological connectivity and habitat expansion with the necessary control and management of an elemental urban infrastructure system.

Our proposal re-imagines the iconic British hedgerow as a flexible, nationwide ecological-infrastructure regime. Deployed as a continuous, horizontally-thickened hedge complex (green lanes) in the right-of-ways and easements of existing and future electricity grid corridors, *National HEDGE* represents an integrated, progressive reinterpretation of a culturally significant system of territorialization capable of supporting substantial ecological expansion as well as offering a contemporary and iconic image of infrastructural integration into the landscape of the UK.

The intent of this approach is two-fold. The first objective is to integrate the electricity grid into the varied landscapes of the UK, not through formal exuberance or aesthetic mitigation, but through the compositing of seemingly oppositional landscape systems to create new, hybrid forms of urbanization. The second aspect is the reestablishment of a nationwide ecological regime that stitches together and reconnects the fragmented, eroding natural habitats of the UK countryside by linking established infrastructure easements and right of ways to the country's most significant areas of natural preserve — the UK's 15 National Parks.

The following report outlines additional specifics of this proposal as they relate to: 1) Access and control of the electricity grid corridor; 2) Maintenance of the hedge complex; 3) Morphological precedent for the hedge complex; 4) Flexibility and transportability of the *National HEDGE*; 5) Ecological habitat expansion; and 6) Potentials for carbon sequestration and biomass production.

Ultimately, the benefits of a hedgerow network of this scale are both significant and numerous. They include: cultural heritage; landscape character and texture; control and maintenance of the grid corridor; employment generation through required management and maintenance; continuous source of biomass; carbon and greenhouse gas sequestration; wildlife habitat and refuge; soil and water management; support of the UK Biodiversity Action Plan; and the creation of an iconic, integrated urban landscape system that can stand the test of time much like the electricity pylon itself.

As was noted in the competition brief, it is fundamentally necessary to “explore the relationship between our energy infrastructure and the environment within which it needs to be located,” whilst developing an infrastructural system that balances “the needs of our communities and [preserves] the beauty of our countryside.” **The *National HEDGE* proposal offers a transformative, ambitious, deliverable approach to the contemporary integration of the UK's national electricity grid into the diverse landscapes of the commonwealth which enhances both the grid and the broader landscape.**

ACCESS + CONTROL

The format and configuration of the *National HEDGE* complex are calibrated to the particular landscape, urban and ecological situation present. That said, regardless of the specific local configuration, certain access and control accommodations are consistently abided by so as to assure proper installation, maintenance and operation of the pylon and the grid in perpetuity. These accommodations include: a 3.25-meter maximum vegetation height within the easement corridor; provisions for a 5-meter-wide service road in all corridors; maintenance of a 12.5-meter unobstructed radius around the base of each pylon; a 6.5-meter direct access route between the service road and the service radius; and the demarcation of the overall easement boundaries by the presence of the hedge complex, deterring unnecessary or inappropriate occupancy.

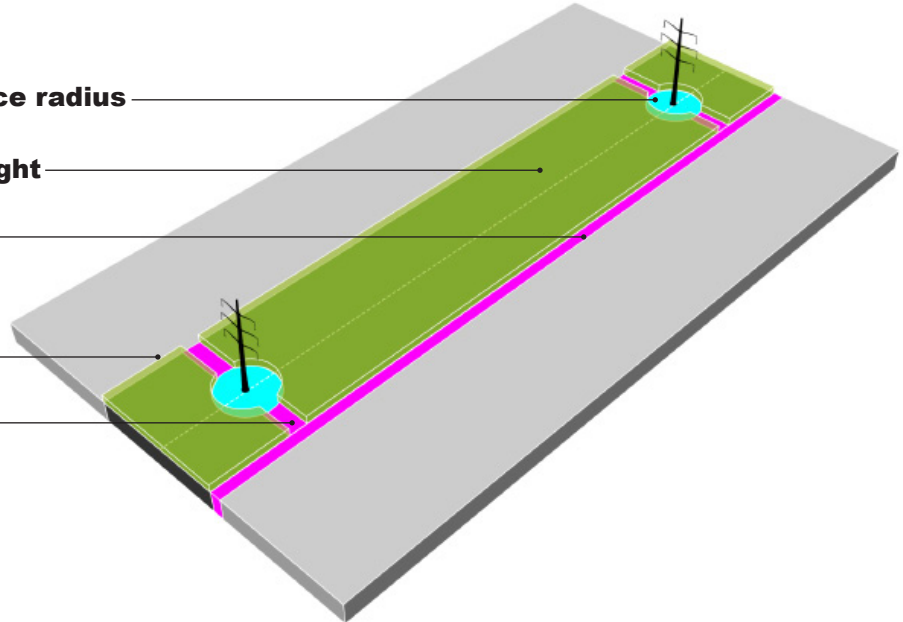
12.5M unobstructed service radius

3.25M max vegetation height

**5M service corridor
(alignment varies)**

clearly defined boundary

**6.5M direct access route
(alignment varies)**



OPERATIONS + MAINTENANCE

We fully acknowledge that the *National HEDGE* proposal will require an increased maintenance regime for the electricity grid corridor. However, a couple of points are worth noting in regards to this requirement. First, in order to foster a healthy hedge complex, cutting of the hedge need only occur in two- to three-year cycles in order to allow the hedge complex to breathe but not grow out of hand. Cutting more frequently than this actually damages the health of the system, eventually leading to failure. As such, we propose that hedges within a particular area of the corridor not all be cut to the same height, but rather cycled at an established set of differing heights in order to promote a range of habitat types, and to prevent subjecting the hedge to stresses that over a long period of time may ruin its condition. Secondly, we believe this increase in necessary labor can be viewed as an overall positive induced effect given the current economic malaise, and can be offset by the potential economies of biomass production described below. The extent of this necessary labor increase is held in check by the wide range of mechanical hedge trimming equipment already common in the market. The key to successful integration of the *National HEDGE* proposal is using the necessary maintenance procedures not as a generic pro-forma cutting operation, but as a carefully calibrated ecological management regime.



Recently trimmed Midland hedgerow.



Typical flail-head tractor used for hedge maintenance.

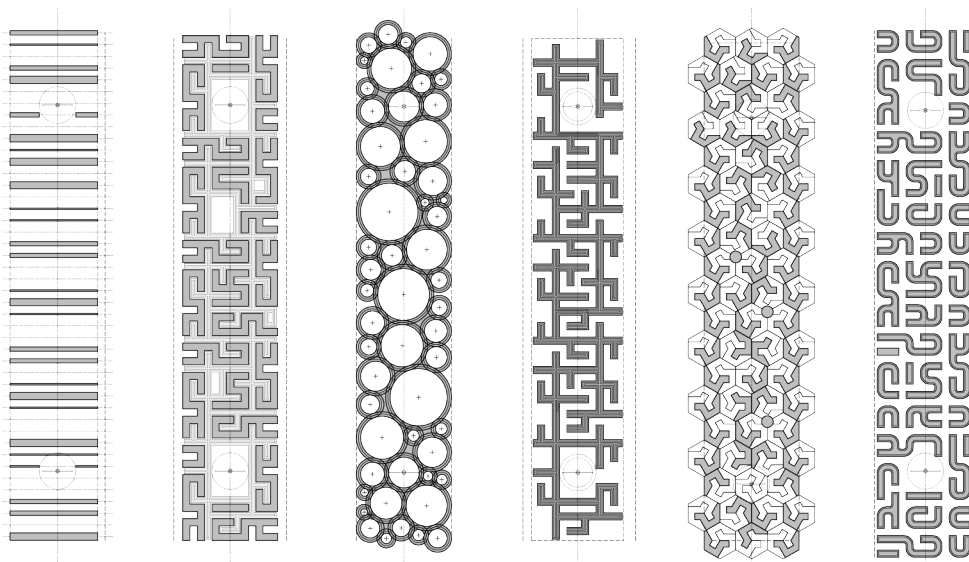
HEDGE MORPHOLOGY

One of the most compelling aspects of the traditional hedgerow as a point of departure for re-conceiving the broader urbanistic role of the entire electricity grid within the UK landscape is the range of vernacular variations present in historic examples, reflecting distinct cultural, topographic, climatic and ecological conditions. In addition, there is a plethora of ornamental hedge configurations — both antecedent and contemporary — from which to draw inspiration. We do not conceive of the *National HEDGE* as a monolithic entity. Rather, it is conceived of as a highly customizable ecological infrastructure that is capable of local calibration whilst maintaining robust performance across the entire network.



FLEXIBILITY + TRANSPORTABILITY

Given the nature of this competition, it is worth pointing out that the *National HEDGE* proposal is able to accommodate any morphological variation of the electricity pylon, both new and old. In addition, it is able to accommodate any width easement; any urban or rural context; and any topographic condition. In fact, the flexibility of the traditional hedgerow is maintained and enhanced in this contemporary variation. It can be utilised as a retrofit of an existing corridor, or as the baseline of a new right of way. It can preempt the deployment of a line, and remain in place should a line be removed. In circumstances where the grid is submerged below grade, the hedge complex can be configured to permit access to the line below, whilst maintaining the ecological connectivity that is the primary characteristic of the proposal. Rarely does an infrastructural regime exhibit both the hedge complex's formal iconography, as well as its agile situational adaptability.



hedgerow configuration studies

ECOLOGY + HABITAT

As has been noted previously, the most noteworthy characteristic of the *National HEDGE* proposal is its ability to stitch together the highly fragmented ecologies of the UK landscape through the retrofit of a nation-wide infrastructure network. Hedges comprising native plants and shrubs are recognized as a priority habitat for conservation action by the UK Biodiversity Action Plan (BAP). Representing a mix of woodland, scrub and grassland, hedgerows can accommodate a wide range of plant and animal species across the countryside, as well as serve to facilitate movement when configured at a landscape scale. Multiple hedgerows in parallel, called green lanes, provide a particularly good habitat for these species. Hedgerows are important for cultivating a number of threatened and rare species including the brown hairstreak butterfly, the curl bunting, the great-crested newt, the greater horseshoe bat, the turtle dove, the dormouse and the bumble bee. Twenty-one BAP priority bird species are associated with hedgerows — 13 of which reside primarily within hedge habitats. In addition, in many upland areas, hedgerows represent a significant portion of the broad-leaved cover.

The proposed hedge complex will also serve to reduce the loss of soil from fields, preventing both wind erosion and wash away in storm events. Hedgerows filter many of the fertilizers and pesticides used in agriculture, preventing these compounds from reaching nearby watercourses. The hedge complex also regulates the flow of water through an increased rate of evapotranspiration and a reduction of peak flows.



CARBON SEQUESTRATION + BIOMASS PRODUCTION

Given the scale and expanse of the national electricity network, the quantity of vegetal mass that would constitute the *National HEDGE* complex is significant. Presently, the UK has approximately 814,159km of hedgerow. Based on an assumption of a 1.5m-wide typical hedge, a 60-m wide easement with 50 percent hedgerow coverage, and 20,920km (13,000mi) of electricity grid, the National HEDGE could constitute as much as a 51.4 percent increase in total hedgerow length with approximately 418,400km of new hedgerow across the countryside. Conservative estimates suggest 600-800kg of CO₂ sequestered within 1km of hedgerow per year for up to 20 years. Thus, the National HEDGE could reduce atmospheric carbon dioxide by anywhere from 251 million kg to 335 million kg per year — roughly equivalent to 45 percent to 59 percent of the total CO₂ emitted by UK and Crown dependencies in 2009, according to the most recent statistics available from the Department of Energy and Climate Change.

In addition, the harvested material collected from the maintenance and management of the hedge complex represents a substantial, continuously available source of woody biomass that could be converted into cellulosic ethanol and methanol without adversely impacting market pricing of other commodities such as foodstuffs.

THE NATIONAL HEDGE HAS THE CAPACITY TO REDUCE ATMOSPHERIC CO₂ BY 335 MILLION KG PER YEAR.



Woody biomass processing facility.