VikingLink

nationalgrid

DESIGN CODE

For the Building and Outdoor Electrical Equipment Zone (Rochdale Envelope) Within the Proposed Converter Station Site

VKL-08-39-G500-012

August 2017

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1 Provenance of the Design Code

1.1 Design Codes

1.1.1 Guidance on design codes is found in Planning Practice Guidance: Design (Ref 1.1) which states:

"A design code is a type of detailed design guidance that is particularly useful for complex scenarios involving multiple parties in long-term development … (it) can allow organisations and local communities to work together more effectively, helping to build consensus about what kind of place everyone wants to create. …

Preparing a good code is about finding a balance between technical specificity and a succinct description of what is required. Some of the best and most effective codes are very short.

…avoid stifling responsible innovation and provide flexibility, design codes should wherever possible avoid overly prescriptive detail …

… should be succinct and carefully distinguish mandatory from discretionary components, avoiding ambiguous aspirational statements, unnecessary jargon and they should define any use of key technical terms."

1.2 This Design Code

1.2.1 This Design Code has been developed to inform the detailed design of the proposed converter station, part of the UK Onshore Scheme of Viking Link. This Design Code applies only to the building and outdoor electrical equipment zone illustrated on application drawing VKL-02-07-G-300-012 (Rochdale Envelope) which lies within the proposed converter station site (Ref 1.7).

1.2.2 The Design Code is submitted for approval as part of the planning application so that it can be used to comprehensively guide the detailed design of the proposed converter station building and outdoor electrical equipment zone (Rochdale Envelope). This will enable the local planning authority to relate and determine detailed design information submitted by NGVL for the purposes of discharging a condition or conditions relating to the detailed design of the converter station buildings and outdoor electrical equipment zone.

1.2.3 The Design Code establishes a clear and comprehensive set of design principles, presented and illustrated as ten design code principles, each of which is explained and illustrated. These design code principles are supported with testing sketches to demonstrate what might be achieved through application of the code principles.

1.2.4 The approach taken here is based on Infrastructure Planning Commission (IPC) guidance (Ref 1.2):

"…any flexibility should not permit such a wide range of materially different options such that each option in itself might constitute a different project for which development consent [for NGVL

purposes read permission under the TCPA] *should be sought and an ES* [Environmental Statement] *provided, nor allow a scheme to be implemented which is materially different from that assessed in the EIA* [Environmental Impact Assessment].

The level of information required is: 'sufficient information to enable 'the main,' or the 'likely significant' effects on the environment to be assessed…., and the mitigation measures to be described….' …

… the 'flexibility' referred to is not to be abused: 'This does not give developers an excuse to provide inadequate descriptions of their projects. It will be for the authority … to decide whether it is satisfied …that it has 'full knowledge' of its likely significant effects on the environment. If it considers that an unnecessary degree of flexibility, and hence uncertainty as to the likely significant environmental effects, has been incorporated into the description of the development, then it can require more detail, or refuse consent".

2 The Context of the Proposed Converter Station Site Within the Project

2.1 The Project

2.1.1 Viking Link is a proposed 1,400 megawatt (MW) high voltage Direct Current (DC) electricity link between the British and Danish electricity transmission networks. Figure 2.1 provides a schematic overview of Viking Link. It comprises approximately 762.16 km of DC onshore and offshore electricity transmission cables between new converter stations which are in turn connected to the high voltage electricity transmission networks at existing substations at Revsing, Jutland in Denmark and at Bicker Fen, Lincolnshire in Great Britain. Viking Link will enable Great Britain and Denmark to trade energy as a commodity within the European Energy Market. This will strengthen Great Britain's and Denmark's economies, improve the security of their electricity supplies and put downward pressure on wholesale electricity prices providing British and Danish consumers with access to cheaper, low carbon energy.

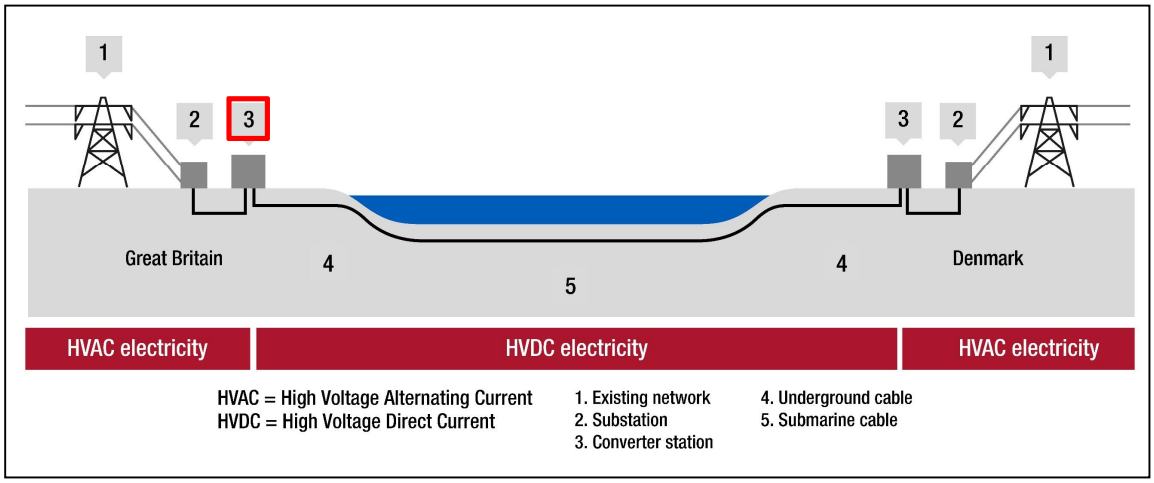


Figure 2.1 Overview of Viking Link

2.1.2 Due to the long linear transboundary nature of the Project it requires different consents, licences or permissions in different jurisdictions. For the purposes of Environmental Impact Assessment (EIA) and seeking the necessary consents, licences or permissions, Viking Link has been split as follows:

- The Danish (DK) Onshore Scheme comprising all works onshore in Denmark including approximately 75 km of onshore DC cables, converter station and less than 1 km of onshore Alternating Current (AC) cables connecting the Project to the existing substation at Revsing.
- The Offshore Scheme comprising up to 620 km of offshore DC cable from Denmark to Great Britain crossing the Exclusive Economic Zones (EEZ) of Denmark, Germany, the Netherlands and the United Kingdom.

- The UK Onshore Scheme: comprising all works onshore above Mean Low Water Springs (MLWS) in the UK including approximately 67.16 km onshore DC cables, converter station and approximately 2.34 km of onshore AC cables connecting the Project to the existing Bicker Fen 400 Kilovolt (kV) Substation.

2.1.3 The UK Onshore Scheme comprises:

- Installation of two (2) subsea high voltage DC cables between MLWS and landfall at Boygrift in East Lindsey;
- Installation of two (2) onshore DC cables between the landfall at Boygrift and the converter station at North Ing Drove in South Holland;
- Construction of associated Temporary Construction Compounds (TCC) and Temporary Works Areas (TWA) and temporary vehicle access arrangements required for DC and AC cable installation;
- Erection of converter station buildings together with the formation of internal roads, permanent access road from the A52, erection of security fencing, formation of landscaping with associated TCC;
- Installation of up to six (6) onshore high voltage AC cables between the converter station at North Ing Drove and the existing Bicker Fen 400 kilovolt (400kV) Substation owned and operated by National Grid Electricity Transmission Plc (NGET);
- Installation of link pillars along the AC cable route for inspection and maintenance purposes, these will be contained within fenced areas;
- Installation of two substation bays at Bicker Fen Substation to allow Viking Link to be connected to the National Grid electricity transmission system;[1]
- Installation of all associated drainage mitigation works; and
- Installation of fibre-optic cable(s) with the high voltage AC and DC cables.

2.2 Level of Design Detail

Overview

2.2.1 National Grid Viking Link Limited (NGVL) is seeking full planning permission from the four relevant Local Planning Authorities (LPA), East Lindsey District Council (ELDC), Boston Borough Council (BBC), North Kesteven District Council (NKDC) and South Holland District Council (SHDC) for the proposed UK Onshore Scheme as set out in 2.1.3 above. The proposed converter station site falls wholly in the administrative area of SHDC, the relevant LPA.

2.2.2 This section sets out the level of design detail which forms the base scheme design for the proposed converter station. This Design Code applies only to the building and outdoor electrical

[1] A bay consists of switching equipment including circuit breakers, disconnector and measuring equipment. NGET will be providing Viking Link the space available to connect to Bicker Fen

equipment zone (Rochdale Envelope) which lies within the proposed converter station site and is summarised in Table 3.1.

Proposed Converter Station

2.2.3 Converter stations are highly complex operational systems which necessitate significant detailed design work on a site by site basis; the detailed design of the proposed converter station will need to be undertaken by a specialist contractor. Many of the component parts of the site will be fixed by the operational or functional requirements of the equipment and its interconnections, but where elements provide some flexibility of design, scale, layout and appearance these will be developed in consultation with the local planning authority and discharged through planning condition submissions.

2.2.4 A Design Code is submitted for approval as part of the planning application so that it can be used to comprehensively guide the detailed design of the proposed converter station building and outdoor electrical equipment zone (Rochdale Envelope) and allow the LPA to relate and determine detailed design information submitted by NGVL for the purposes of discharging a condition or conditions.

2.2.5 For the purpose of seeking full planning permission, NGVL has taken a 'Rochdale Envelope' approach (Ref 1.2). This establishes the comprehensive base design for the proposed converter station within which the contractor's detailed design will comply. Further detail on this established approach is set out in section 2.3 of the Planning Statement (Ref 1.3).

2.2.6 This approach strikes an appropriate balance between providing SHDC with sufficient information to inform its consideration of the full planning application whilst recognising that a detailed scheme will be delivered through the submission of further detailed information to discharge a planning condition or conditions.

2.2.7 The level of detail provided by the base design of the proposed converter station is summarised below in Table 2.1.

Table 2.1 Proposed Converter Station – Base Scheme Design Details

Consideration	Design Detail
Access	Full details of the proposed permanent access road from the existing highway at the A52 to the proposed converter station site have been identified. (Proposed Permanent Access Road, Appendix 1 drawing no. VKL-08-39-G500-011 Drawing 1.8. Planning Application Red Line Boundary, VKL-02-34-G100-001 to 102)
Appearance	The requirements to be met by the Contractor, in agreement with SHDC, have been established including a selection of colour(s) and material(s). Full details of the final appearance would be confirmed as part of the detailed design to be discharged via planning condition.

Table 2.1 Proposed Converter Station – Base Scheme Design Details	
Consideration	**Design Detail**
Landscaping	Full details of the proposed landscape masterplan as well as proposed offsite planting have been identified. A landscape masterplan (Ref 1.4) has been prepared as part of the planning application.
Layout	Development zones (Proposed Converter Station Operational Phase, Appendix 1 drawing no. VKL-08-39-G500-011 Drawing 1.2; Proposed Converter Station Construction Phase, Appendix 1 drawing no. VKL-08-39-G500-011 Drawing 1.3) have been identified based on the location and size of building units and outdoor electrical equipment as well as other requirements such as landscape planting and drainage. Full details of the final layout would be confirmed as part of the detailed design by planning condition.
Scale	Maximum dimensions including building heights and floor space, heights of any outdoor electrical equipment and finished ground levels have been identified (Rochdale Envelope).
Drainage	An Outline Drainage Strategy (Ref 1.5) has been developed. These are based on the maximum parameters of the proposed converter station. Full details of the final drainage scheme would be confirmed as part of the detailed design by planning condition.
Security	Details of site security measures which will be required such as fencing and Close Circuit Television (CCTV) have been included. Full details of the final security scheme would be confirmed as part of the detailed design by planning condition.
Lighting	Details of site and building lighting which will be required have been included. Full details of the final lighting scheme would be confirmed as part of the detailed design by planning condition.

3 The Proposed Converter Station Site's Component Zones

3.1 Within the planning application the proposed converter station site contains seven identified zones within which particular features or functions will be located, as described below in Table 3.1 and illustrated in Figure 3.1. Full planning permission is sought for all matters in all zones. Details which cannot be finalised at this stage will be subsequently submitted for approval by discharge of conditions. Detailed design of converter station buildings and structures: scale, layout and appearance will be developed in accordance with engineering requirements and the principles set out in this Design Code.

Table 3.1 Proposed Converter Station Component Zones

Zone	Description
(1) Building and outdoor electrical equipment zone (Rochdale Envelope)	This comprises two zones which have been defined based on the maximum heights Above Ground Level (AGL) of the building(s) and / or outdoor electrical equipment which could be installed within them. · **Sub-zone A** is located within the northern portion of the converter station zone containing buildings up to 16 m AGL and / or outdoor electrical equipment up to 24 m AGL. This would include components such as the transformers and AC switchyard. · **Sub-zone B** is located within the southern portion of the converter station zone containing buildings and / or outdoor electrical equipment up to 24 m AGL. This would include components such as the DC switch hall, valve halls and AC reactor. The siting of the building and outdoor electrical equipment zone (Rochdale Envelope) is fixed as are its maximum dimensional parameters. The building and outdoor electrical equipment zone (Rochdale Envelope) is the subject of this Design Code which will guide the development of detailed design which cannot be finalised at this stage and which will be submitted subsequently by discharge of conditions. AGL means above the re-profiled/finished ground level, zone 1 (building and outdoor electrical equipment zone (Rochdale Envelope)) is located at 2.9 mAOD with zones 2, 3 and part of 4 slightly below this. Nothing may protrude beyond the sub-zones in dimension.
(2) Perimeter road zone	This comprises a permanent perimeter road which would form a continuous circuit around the proposed converter station to facilitate access. It has been defined taking into account the largest vehicles which will require access to the site as well as appropriate clearances for vehicles based upon swept path analysis.

Table 3.1 Proposed Converter Station Component Zones	
Zone	**Description**
(3) Security zone	This comprises an 8 m wide 'buffer' zone within which security fencing would be erected. This incorporates the clearance required between the security fence and the perimeter road internally and landscape planting externally. It would include security fencing up to 3.5 m in height and incorporate security gates for pedestrian and vehicle access / egress. Surveillance cameras will also be installed at regular intervals.
(4) Additional hardstanding zone	This comprises an area for permanent car parking for up to twenty vehicles as well as an area of hardstanding to provide a permanent laydown area for the storage of equipment and plant as well as providing an area to be used for siting of temporary offices and welfare facilities in the event of future maintenance activities. Part of the hardstanding will be located inside of the security fence and the remainder will be situated outside of the security fence.
(5) Reinstated zone	This comprises areas within the converter station site which are not required for permanent development, ponds or landscape planting. The reinstated zone lies to the east of the proposed converter station and could potentially be returned to agricultural use. The reinstated areas to the north and south of the proposed converter station would be seeded but would not be returned to agricultural use.
(6) Attenuation zone	This comprises an area of the proposed converter station site which would be used to establish an attenuation pond as part of the permanent drainage scheme. The attenuation zone is the maximum area required to accommodate pond(s) of sufficient volume to control the rate of estimated surface water runoff from the developed area.
(7) Landscape planting zone	This comprises a variable 30-40 m wide 'buffer' zone which follows the perimeter of the proposed converter station site. Within this zone a combination of earthworks and landscape planting will provide permanent landscape screening. Further detail is illustrated in the Landscape Masterplan (Ref 1.4) submitted with this application.

3.2 Figure 3.1 identifies the location of the proposed converter station zones within the proposed converter station site.

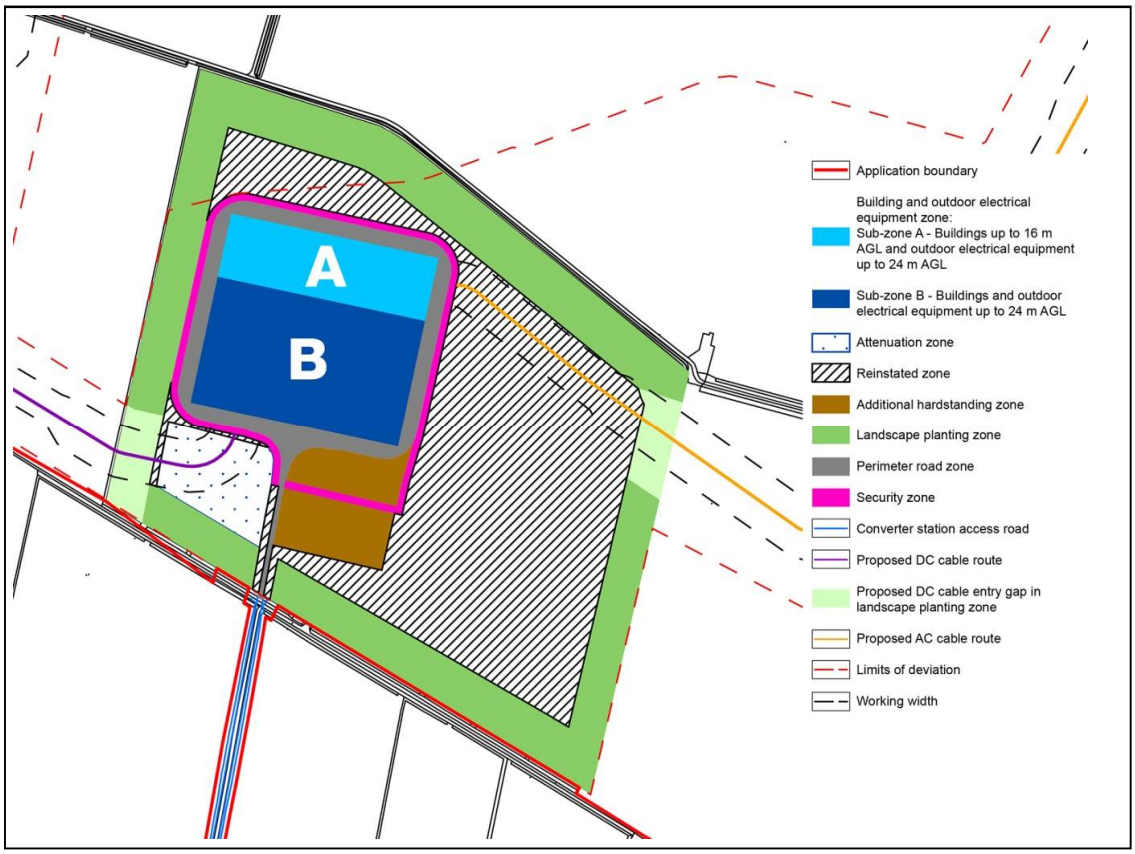


Figure 3.1 Proposed Converter Station Operational Phase Drawing

4 Design Intent

4.1 The design intent is to achieve an effective and efficient design that brings together and harmonises a diverse range of enclosed buildings, outdoor equipment enclosures and external works, which responds to its context and environment with appropriate mitigation of impacts ascribed to its construction or operation.

4.2 The distinctive aspect of the proposal is the scale of the development within a relatively open landscape subject to long views. A simple, clean and elegant form and silhouette should be achieved with controlled details but without compromising the operational requirements of the proposed converter station.

4.3 Because the specialist contractor responsible for the detail design and construction of the converter station has yet to be appointed, certain aspects of the detailed design are expected to be a condition for subsequent approval by SHDC. This Design Code is intended to further guide the detail design of the building and outdoor electrical equipment zone (Rochdale Envelope).

5 Critical Dimensions

5.1 The Converter Station Operational Phase Plan, submitted for approval (Ref 1.6), shows the two sub-zones that comprise the building and outdoor electrical equipment zone. For the purposes of this Design Code, they are referred to as:

1. **Sub-zone A**, the smaller sub-zone accommodating fewer and less tall buildings and more outdoor electrical equipment, and
2. **Sub-zone B**, the larger sub-zone accommodating more and taller buildings and some outdoor electrical equipment.

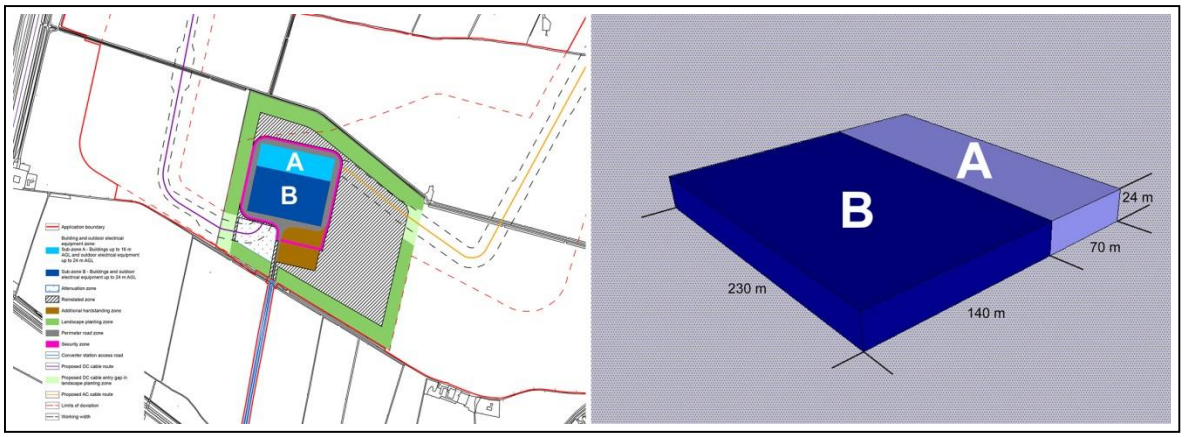


Figure 5.1 Sub-zones A and B

5.2 **Sub-zone A** is 230 m by 70 m by 24 m AGL.

It may contain buildings up to 16 m AGL.

It may contain external equipment enclosures up to 24 m AGL.

5.3 **Sub-zone B** is 230 m by 140 m by 24 m AGL.

It may contain buildings up to 24 m AGL.

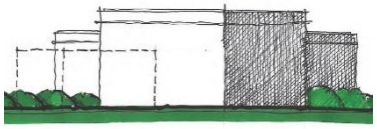
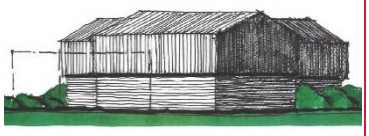
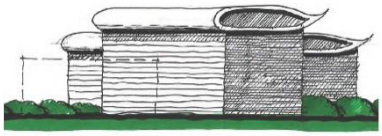
It may contain external equipment enclosures up to 24 m AGL.

5.4 Nothing may protrude beyond the sub-zones in dimension. The sub-zones of the building and outdoor electrical equipment zone (Rochdale Envelope) and their parameters are not interchangeable.

6 The Functional Style

6.1 Following feedback received on potential design styles during consultation a 'functional' design style has been taken forward and is the subject of this Design Code. The three previously considered styles shown in Figure 6.1 were presented during the Phase 1 Consultation with local communities:

Figure 6.1 Potential Converter Station Design Styles - Phase 1 Consultation

		
Functional: The building is simply what it needs to be without unduly mitigating or drawing attention to its design.	**Contextual:** This draws on agricultural forms and groupings in the larger elements.	**Landmark:** This promotes a landmark character by using contemporary architectural and sculptural forms to the silhouette, particularly the roof.

6.2 The **functional style** represents an engineering and infrastructure aesthetic where the architecture is less self-conscious and is less concerned with ornament and statement than with being a clear and unfettered expression of engineering function and content. The challenge is to ensure that architecturally disparate elements coalesce into a harmonious, considered and durable overall design, particularly in the consideration of details, forms, colour, junctions and materials.

6.3 At the Phase 2 Consultation with local communities, two colour variants of the functional design style were presented, both shown in Figure 6.2 on the following page, based on blue and green palettes to demonstrate colour variants.

Figure 6.2 Proposed Converter Station Functional Design Styles - Phase 2 Consultation

The functional style with a **blue** colourway, as presented in an artist's illustration for pre-application consultation.

The functional style with a **green** colourway, as presented in an artist's illustration for pre-application consultation.

7 Using the Design Code

7.1 The Design Code does not prescribe how to design the proposed converter station but instead provides comprehensive design guidance through a series of ten design principles. Compliance with individual Design Code principles in isolation may not result in an acceptable overall solution and the Design Code should not seek to unnecessarily stifle innovation. It may be acceptable, for example, in developing the design to put forward variants to the code provided that the key principles are not compromised and that the overall benefit justifies what may be a minimal departure from the code.

7.2 The key principles in the application of the Design Code are:

1. The siting and maximum dimensions are fixed.
2. Innovation within the code may be acceptable if justified as beneficial in dialogue with the local planning authority.

7.3 The 'Functional' style Design Code sections are prefixed F1, F2 and so on. Within each of the sections below, will be found a code **principle(s) relayed** in white-on-red text as shown in the example below:

CODE PRINCIPLE:

TOPIC: Code principles within each elemental section in the Design Codes appear like this.

7.4 The Design Code is not relevant to the construction phase of the building and outdoor electrical equipment zone (Rochdale Envelope).

F1 Code element: Architectural Form and Silhouette

F1.1 The design of the building and outdoor electrical equipment zone (Rochdale Envelope) should be cognisant of:

1. the proposed converter station building and outdoor electrical equipment zone (Rochdale Envelope) is sited in a relatively open landscape with long views of it from all directions;
2. there is little by way of architectural context to draw on;
3. the building and outdoor electrical equipment zone (Rochdale Envelope) will contain a range of forms and scales;
4. there will be a combination of proposed buildings and outdoor electrical equipment; and
5. within the building and outdoor electrical equipment zone (Rochdale Envelope) there will be a range of structures that offer very few opportunities for alteration for design purposes.

CODE PRINCIPLE F1.1:

FORM: Proposed buildings should have simple monolithic forms without unnecessary or small articulations, avoiding small recesses or small height differences, and aiming at simplicity rather than complexity.	
Simple forms without unnecessary breaks on plan or elevation are more likely to have less impact in long views. Forms and façades should generally appear solid and unbroken, avoiding recesses and projections.	
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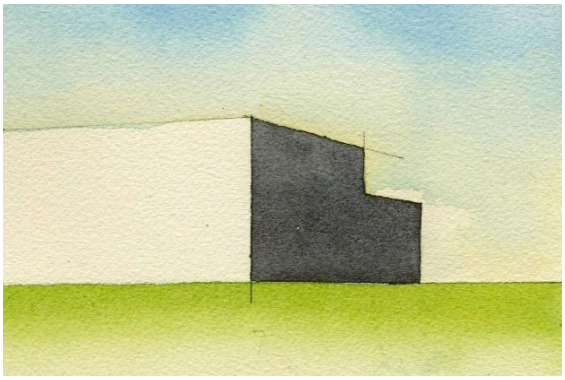	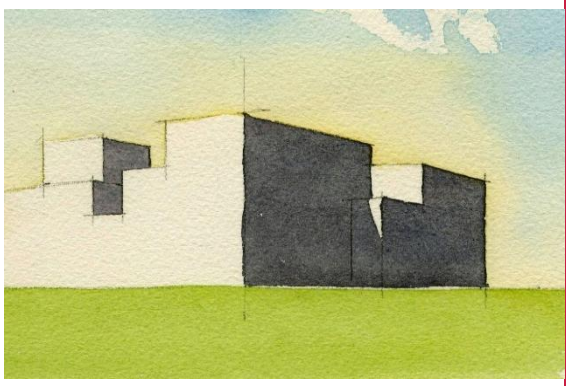

CODE PRINCIPLE F1.2:

SILHOUETTE: The proposed buildings should offer a clean and unbroken silhouette from all external viewpoints.

Whatever the heights of proposed buildings, all equipment on the roofs, including mechanical and electrical plant, safety access equipment, masts and antennae, should be recessed or placed behind parapets so that they are not visible in an elevation view. Small height differences between nearby buildings should be evened out and aligned on a modular basis (also see Code Principle F5.2)

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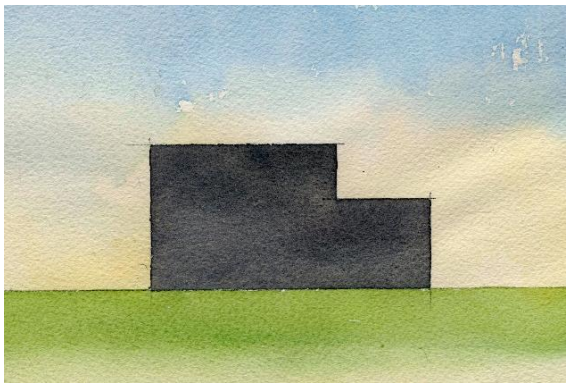	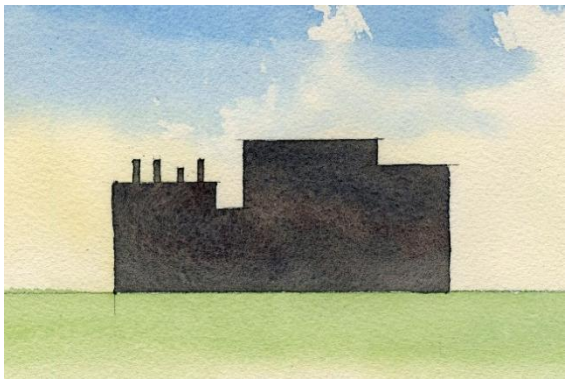
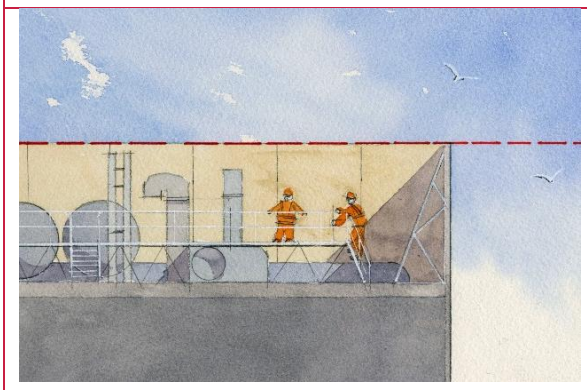	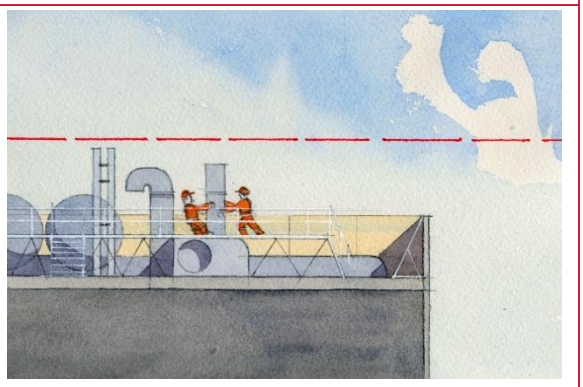

CODE PRINCIPLE F1.3:

STRUCTURE: The primary structure of the proposed buildings should be within the proposed buildings and should not be externally expressed.

Externally expressed structures can cast strong shadow lines, visible from great distances, which will disrupt the simplicity of form that is sought. This principle does not relate to blast and fire containment structures to transformer bays.

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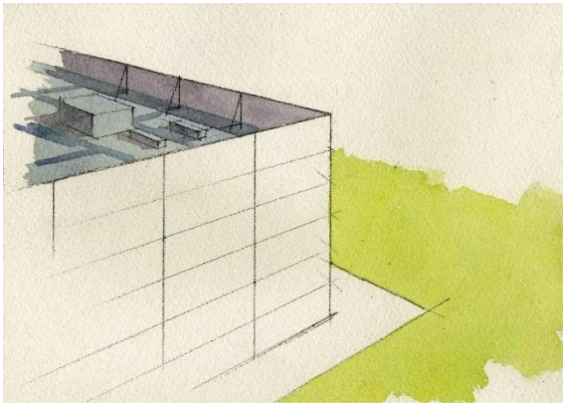
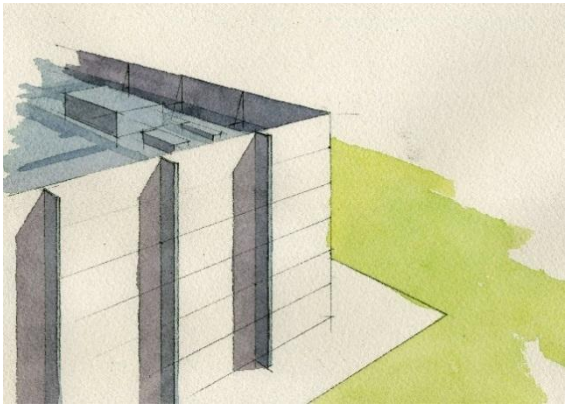
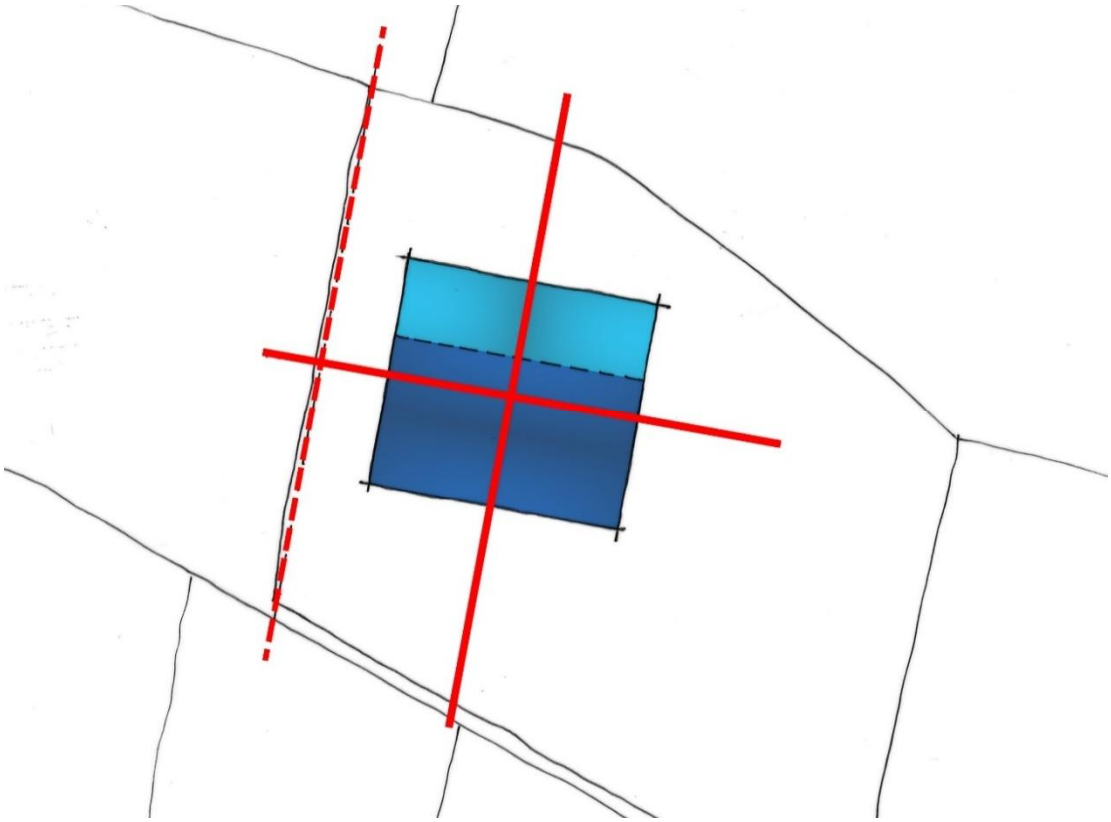
	

F2 Code element: Axes and Orientation

F2.1 To ensure visual cohesion within the building and outdoor electrical equipment zone (Rochdale Envelope), a common orthogonal grid axis should be maintained throughout the proposed converter station zone. To minimise disruption to the simplicity of form which is aimed at, where proposed enclosed buildings have a requirement for windows and openings higher than 6 metres AGL, and if there is no operational or functional difference, these should face inwards rather than be contained in outward-facing elevations.

CODE PRINCIPLE F2.1:

AXES: Everything within the building and outdoor electrical equipment zone (Rochdale Envelope) should be aligned on a single orthogonal grid axis.
The orthogonal grid should be aligned with the western boundary of the proposed converter station site.


CODE PRINCIPLE F2.2:

ORIENTATION: Windows and other openings higher than 6 metres AGL should preferably face into rather than out of the building and outdoor electrical equipment zone (Rochdale Envelope).	
No windows or openings should appear above 6 metres AGL unless operationally justified. Windows and openings at higher levels may be unnecessarily conspicuous.	
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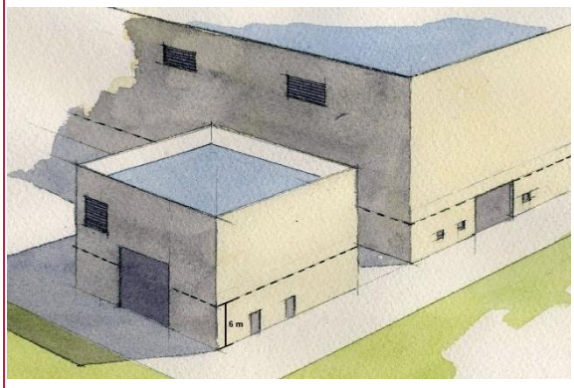
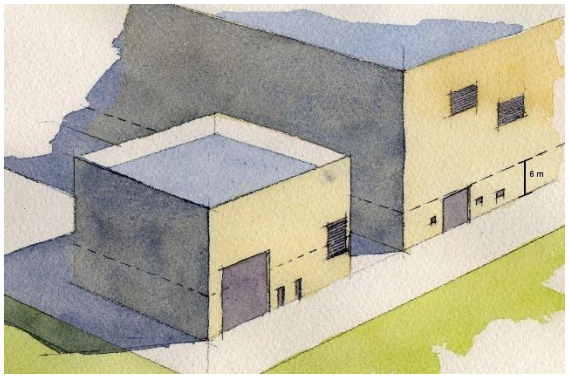
	

F3 Code element: Landscape Planting Zone Mitigation

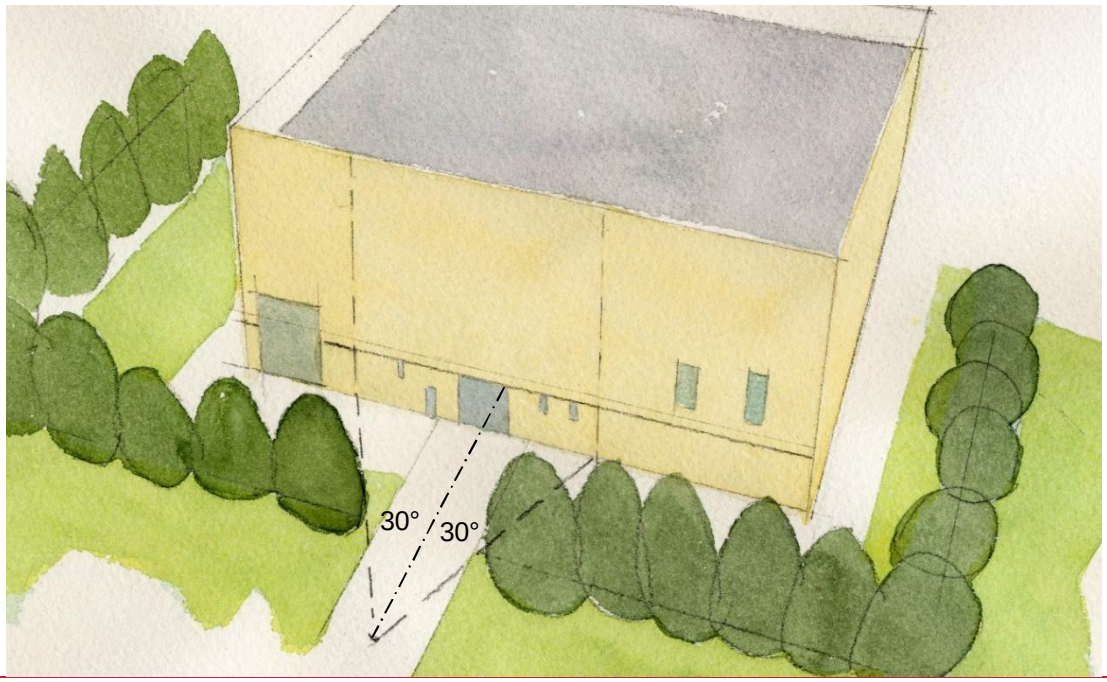
F3.1 The building and outdoor electrical equipment zone (Rochdale Envelope) has around it, and at differing distances from it, a landscape planting 'buffer' zone of up to 40 metres deep. There are places where the landscape planting zone will be interrupted to allow for vehicular access to the proposed converter station site, and to accommodate underground cable routeing, leaving a gap in the landscape planting zone of up to 30 metres wide. In these gaps, where landscape planting cannot provide visual mitigation, the following design principles should be applied:

1. a cone of vision of 30 degrees on both sides of the centre-line should be added at the opening of the gap in the landscape planting zone;
2. there should be less Design Code relaxation, as suggested in other code principles, below 6 metres AGL within the cone of vision,
3. façade interruptions and openings should be avoided in the cone of vision; and
4. elevation profiles and articulation should retain uninterrupted simplicity wherever practicable.

CODE PRINCIPLE F3.1:

CONE OF VISION (PLAN): A cone of vision should be established, at 30 degrees on both sides of the centre-line, within which additional care should be taken.

The cone of vision, on the ground, and where it meets the proposed buildings and/outdoor electrical equipment, should be kept uncluttered where practicable.



CODE PRINCIPLE F3.2:

CONE OF VISION (ELEVATION): Elevations of proposed buildings visible in the cone of vision should retain uninterrupted simplicity where practicable.	
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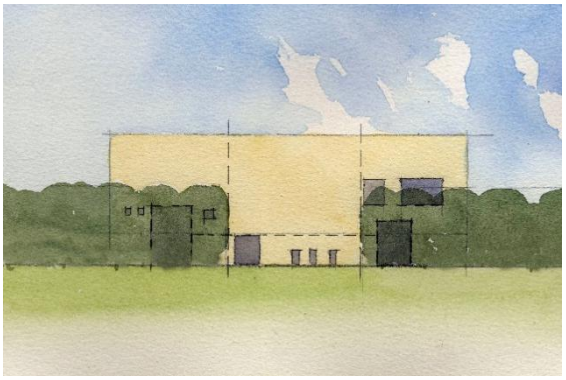	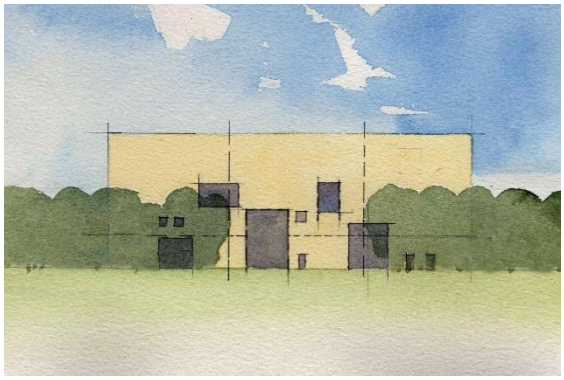

F4 Code element: Outdoor Equipment Enclosures

F4.1 Proposed outdoor electrical equipment will include a range of equipment of differing sizes, shapes, solidity, heights, materials and colours. It is also the element of the building and outdoor electrical equipment zone (Rochdale Envelope) least likely to be able to accommodate Design Code principles.

F4.2 There are guiding principles which should be followed:

1. **Dimensional Parameters**: All proposed outdoor electrical equipment must be contained within the maximum dimensions (height AGL, width, length) of the sub-zones in which they are located within the building and outdoor electrical equipment zone (Rochdale Envelope).
2. **Axes**: Proposed buildings and outdoor electrical equipment (Rochdale Envelope) should all share a common orthogonal grid axis.
3. **Colour and Materials**: Where there is a choice, and where safety and visibility requirements do not suggest otherwise, a common close colour range should be used, typically a narrow spectrum of grey, particularly where higher than 6 metres AGL. Textured surface applications with low reflectivity are preferable.

CODE PRINCIPLE F4.1:

DIMENSIONAL PARAMETERS: Dimensional parameters for the proposed external equipment enclosures of length, width and height AGL may not be breached.	
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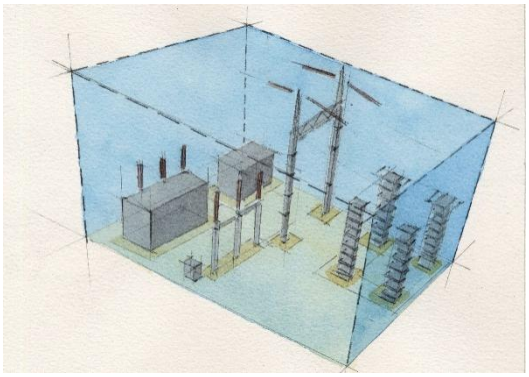
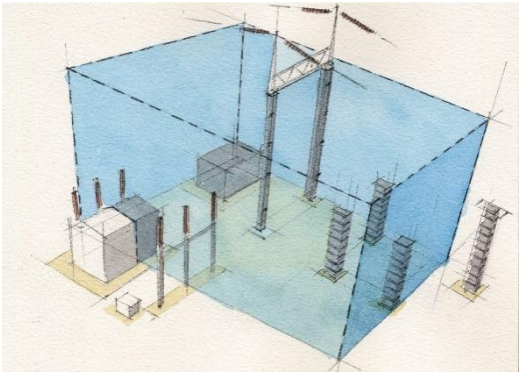
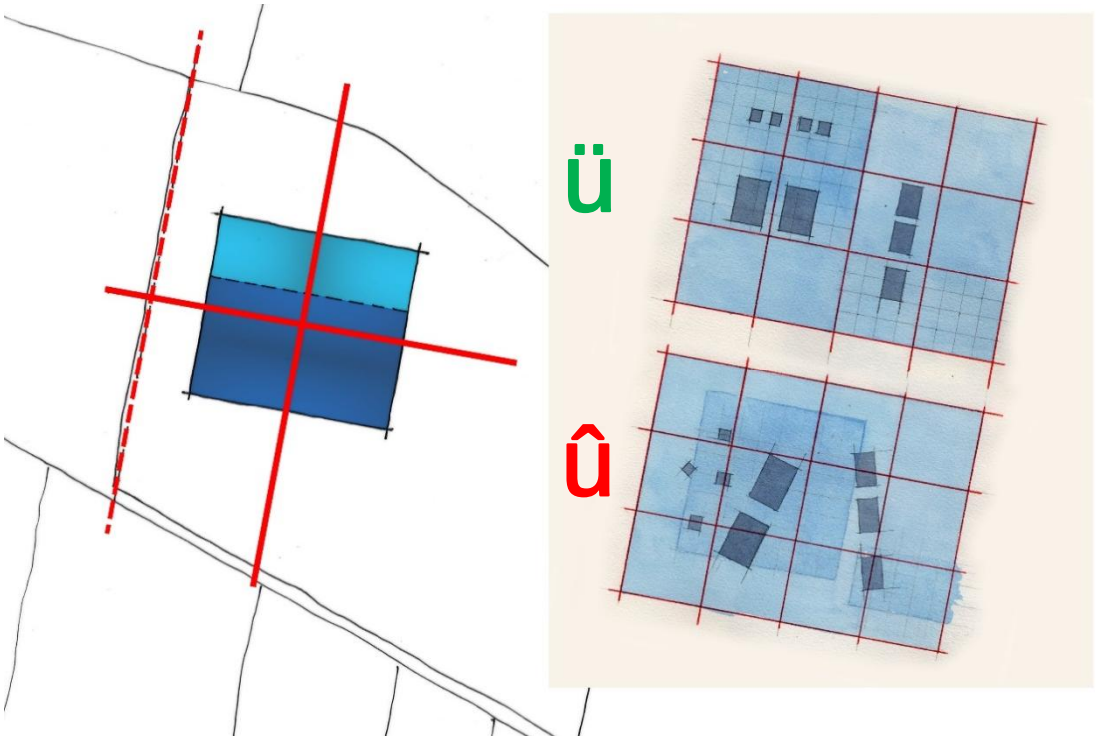
	

CODE PRINCIPLE F4.2:

AXES: Orthogonal grid axes for the building and outdoor electrical equipment zone (Rochdale Envelope) should be applied where practicable to all proposed outdoor electrical equipment.



CODE PRINCIPLE F4.3:

COLOUR AND MATERIALS: Proposed outdoor electrical equipment higher than 6 metres AGL should where safe and practicable be of similar colours, with low-reflectivity surfaces.	
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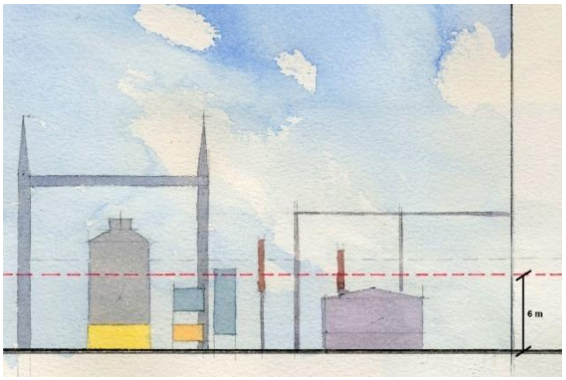	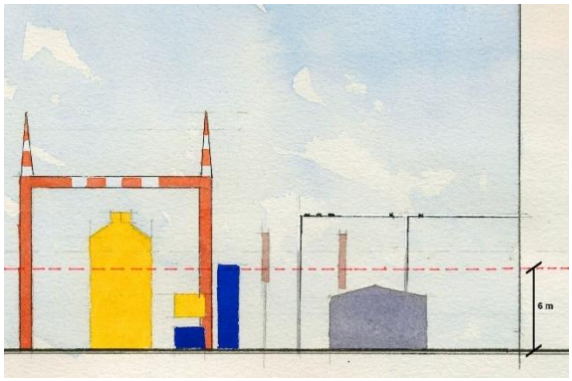

F5 Code element: Façades

F5.1 **Façades**: Façade design should be co-ordinated across the different proposed buildings so that, although separated, they look cohesive in long views.

F5.2 **Relief**: Façades should be smooth and unbroken, avoiding unnecessary shallow articulations and recesses.

F5.3 **Modularity**: Adopted across and between all proposed buildings should be a common elevational module, i.e. a repetitive elevational organising grid with which elevations should be synchronised.

CODE PRINCIPLE F5.1:

FAÇADE RELIEF: Façades should look smooth and boldly articulated, particularly when higher than 6 metres AGL.	
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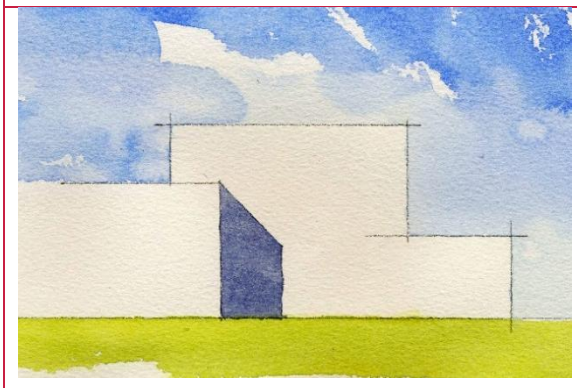	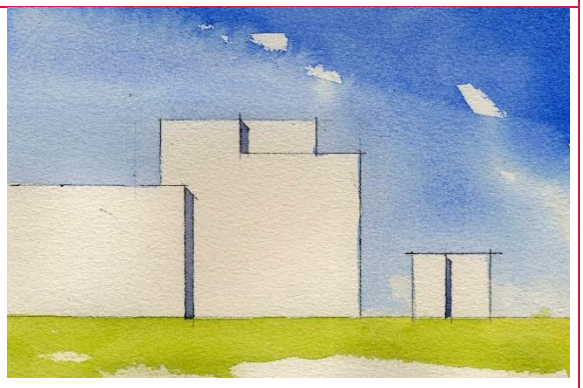

CODE PRINCIPLE F5.2:

FAÇADE MODULARITY: Façades should have a common elevational organising grid, common to buildings and to the spaces between them.	
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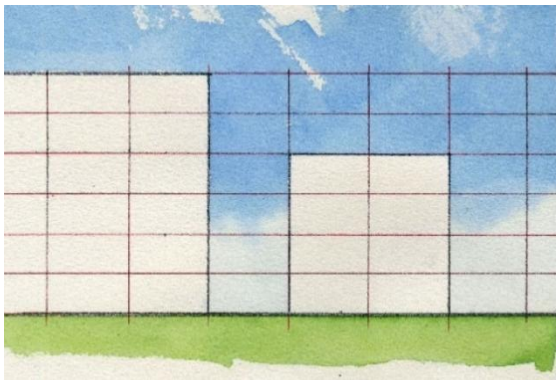	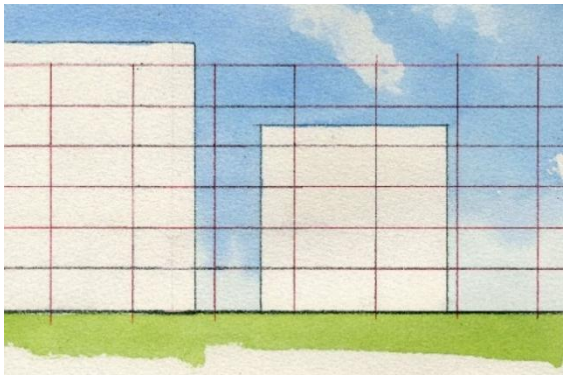

F6 Code element: Façade Materials

F6.1 **Surface**: Surface materials should be smooth or lightly ribbed or textured and should not have a directional grain when viewed from a distance. If applied as butted panels rather than sheets, visible joints and seams should align with the elevational organising grid.

F6.2 **Plinth**: The lowest band of the proposed buildings may in places be required to be of masonry, concrete or similar construction to accommodate accesses, doors, and openings. Where this is required, such elements should be of substantial length and aligned with the elevational grid.

CODE PRINCIPLE F6.1:

FAÇADE MATERIALS: Façade materials should be lightly textured. Where butted as panels, seams and joints should be aligned with the elevational façade grid.	
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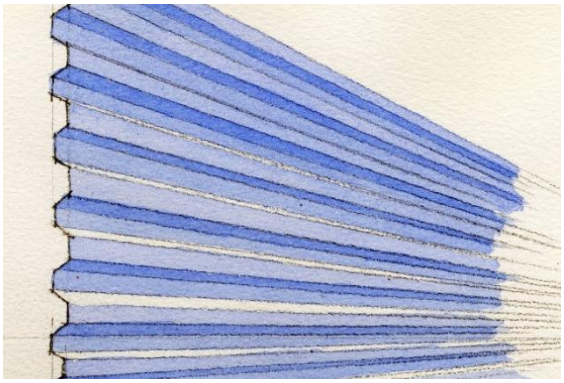	
	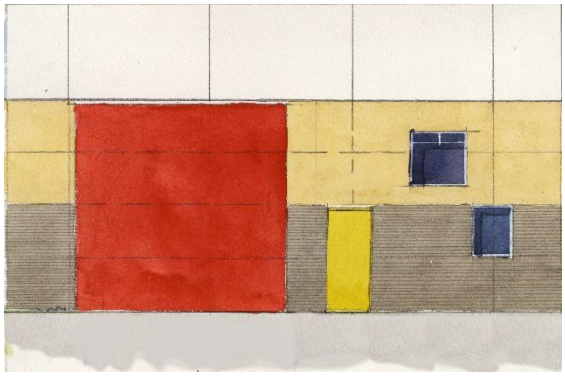

F7 Code element: Colours

F7.1 Colour can play a significant role in mitigating the visual impact of the proposed buildings.

F7.2 **Colourways and Mix**: Three colourways are suggested, but not limited to: a green range, a blue range, and a blend of the green and blue ranges. The same approach is to be taken across all proposed buildings. Between three and five colours should be used depending on the final colourway chosen, and more for blended ranges. The lowest modular colour band should contain only the darkest colour. The distribution of colours should be irregular, lightening upwards, and applied similarly across all buildings.

CODE PRINCIPLE F7.1:

COLOURWAYS AND MIX: Colourways should be applied, diminishing upwards, irregularly distributed, and accommodated within the elevational organising grid to give a vertical emphasis.

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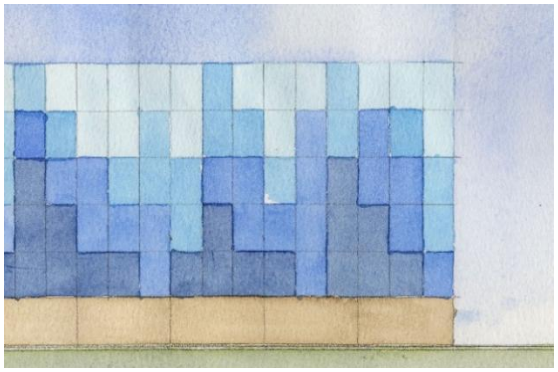	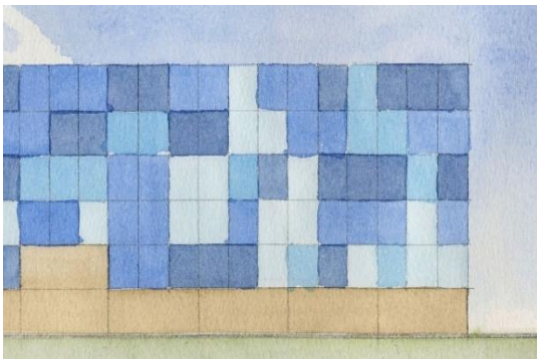
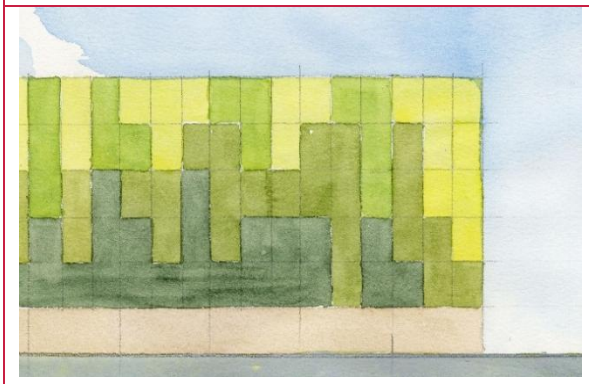	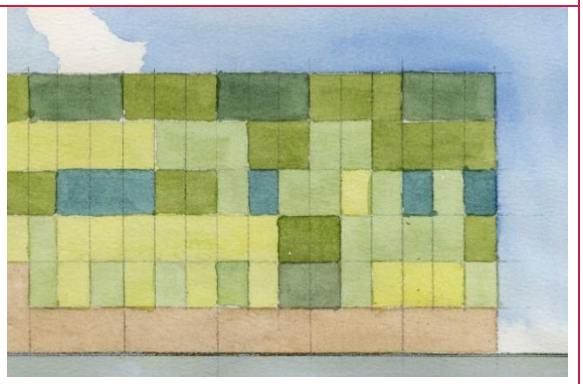

CODE PRINCIPLE F7.1:

COLOURWAYS AND MIX: Colourways should be applied, diminishing upwards, irregularly distributed, and accommodated within the elevational organising grid to give a vertical emphasis.	
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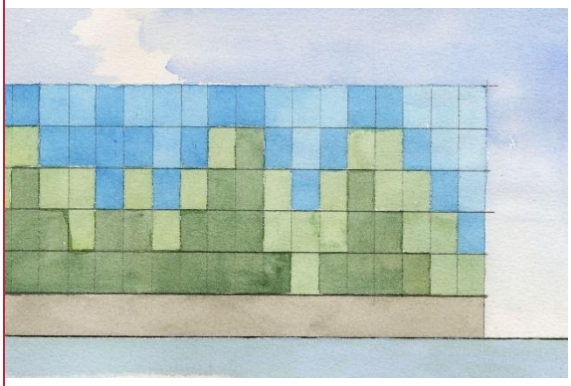	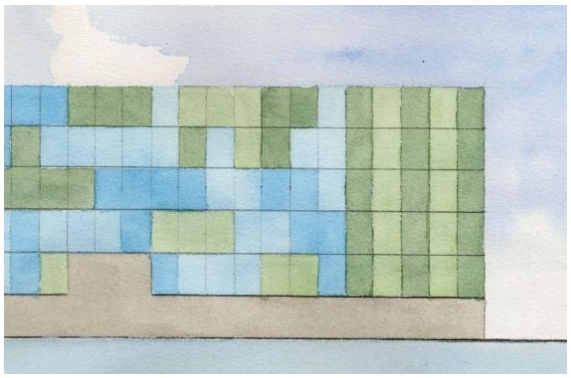

F8 Code element: Openings, Doors and Windows

F8.1 Façade apertures can have a disproportionate visual impact on a larger building in a more open landscape. It is anticipated that most windows and doors will be at ground level, the effect of which will be mitigated by the darker colour at the lowest level, and structural landscape mitigation applied to the site. Where apertures are necessary at a higher level, and particularly on outward facing facades, these should be grouped where possible, and aligned with the elevational façade grid.

F8.2 To ensure visual cohesion between buildings, and between buildings and open equipment enclosures, a common orthogonal axis and elevational grid should be maintained throughout the building and outdoor electrical equipment zone (Rochdale Envelope). To minimise disruption to the simplicity of form which is being aimed at, where proposed buildings have a requirement for windows and openings higher than 6 metres AGL, and if there is no operational or functional reason not to, these should face inwards rather than be contained in outward-facing elevations.

CODE PRINCIPLE F8.1:

OPENINGS, DOORS AND WINDOWS: Where not at the lowest level or below 6 metres AGL, these should be grouped and aligned with the elevational façade grid.	
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CODE PRINCIPLE F8.1:

OPENINGS, DOORS AND WINDOWS: Where not at the lowest level or below 6 metres AGL, these should be grouped and aligned with the elevational façade grid.	
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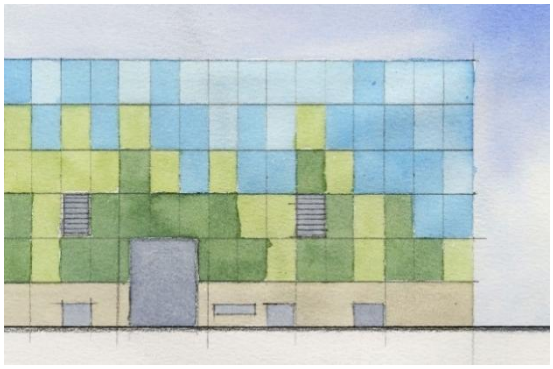	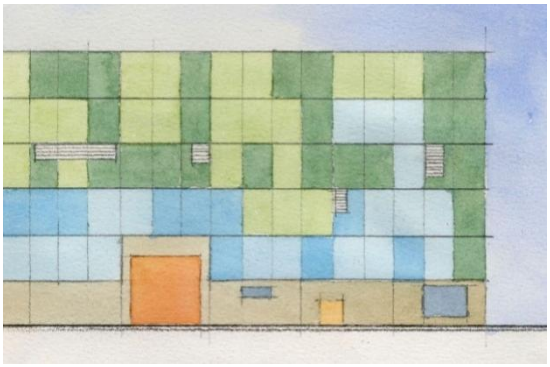

F9 Code element: Critical Details

F9.1 Smaller details can become more prominent on a larger and more visually exposed building. In the case of the proposed buildings this is less important below 6 metres AGL where landscape mitigation will be most effective, other than where there are gaps in the landscape planting zone (F3 Code element). Above 6 metres AGL care needs to be taken to avoid undue prominence being afforded to critical details.

F9.2 Rainwater goods should be internalised.

F9.3 Parapet copings and trims should not project and cast shadows.

F9.4 External lighting and CCTV equipment above 6 metres AGL, if any, should be pole-mounted away from the building.

CODE PRINCIPLE F9.1:

CRITICAL DETAILS: Where not at the lowest level or below 6 metres AGL, these should be grouped and aligned with the elevational façade grid.	
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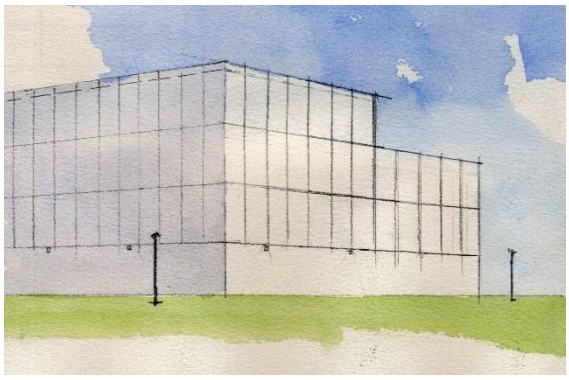	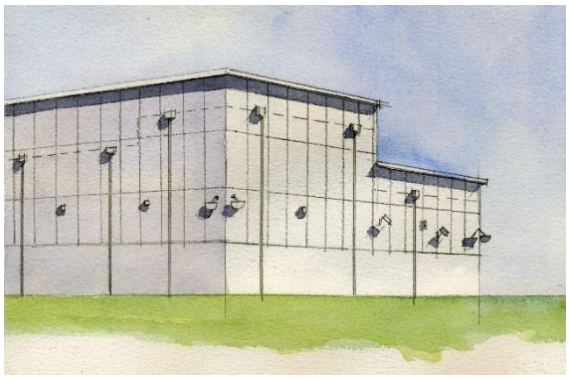

F10 Code element: Lighting

F10.1 The building and outdoor electrical equipment zone (Rochdale Envelope) will be visible in an open landscape. Operational, safety and security requirements for lighting must be paramount, but careful attention is required to ensure that external lighting is not obtrusive.

F10.2 The building and outdoor electrical equipment zone (Rochdale Envelope) will generally have a low lighting profile. The proposed converter station site will be manned day and night. Lighting will typically provide low-level illumination of routes, paths and entrances to provide 10 lux at ground level and 5 lux around the perimeter of the proposed converter station site. Specific task lighting will be required to illuminate particular activities, which will not be frequent.

F10.3 Lighting at lower physical levels should generally be provided by fittings no higher than 6 metres AGL. Lighting at lower levels opposite gaps in the landscape planting zone should be where practicable.

F10.4 Lighting at higher physical levels should be minimal and inconspicuous in landscape views in low light and in dark hours. Care should be taken to avoid unnecessary lighting behind roof parapets which at night might deliver an upward glow.

F10.5 Pole-mounted directional lighting that illuminates the ground is preferable to façade mounted lighting to prevent light spill, glare to areas/receptors outside the site.

CODE PRINCIPLE F10.1:

LOW LEVEL LIGHTING: Lighting for routes and pathways should generally be pole-mounted up to 6 metres AGL. Lighting that might be continuously switched on at higher levels should be avoided.	
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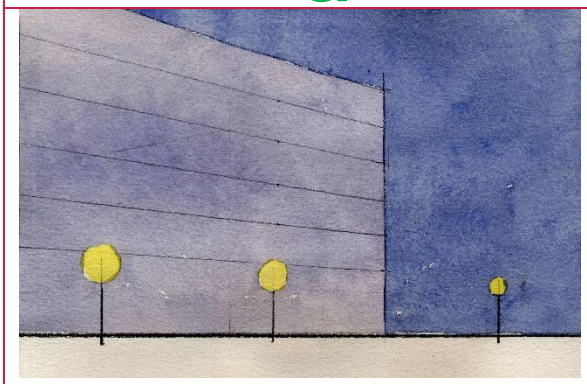
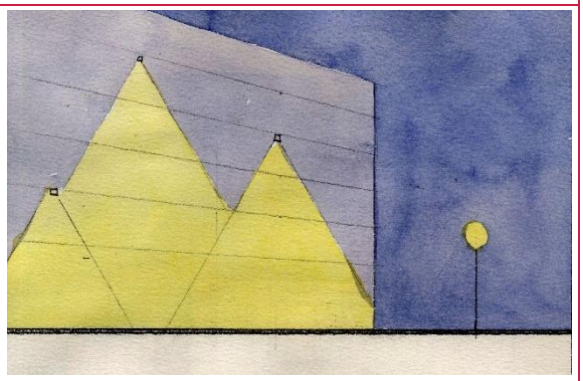
	

(Continued)

CODE PRINCIPLE F10.2:

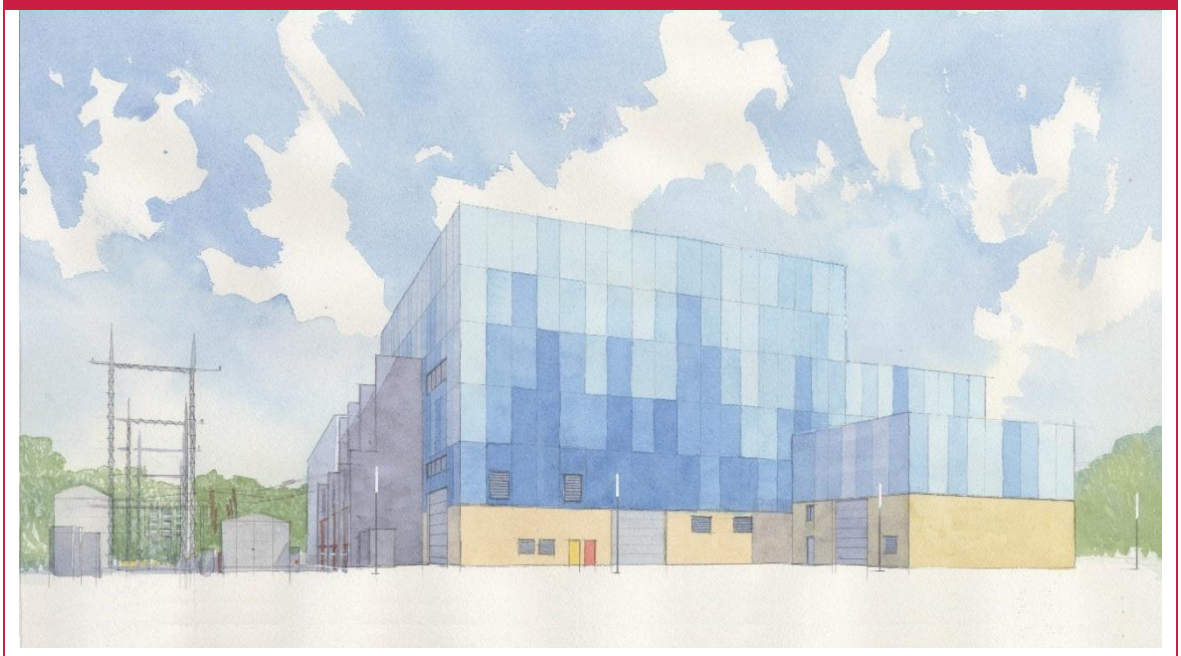
LANDSCAPE PLANTING ZONE GAPS: Lighting for routes and pathways at any level should be avoided opposite or near to gaps in the landscape planting zone, where practicable.

8 Testing the Codes

8.1 The codes have been tested to provide an indication of how they might be applied, and how a part of the building and outdoor electrical equipment zone (Rochdale Envelope) could appear rather than how it should appear.

8.2 The testing sketches shown below in Figure 8.1 are of a part view from within the proposed converter station site, and from outwith it, where the proposed landscape buffer zone will appear in the foreground. The sketches below show what might result from the application of the code principles to a notional assembly of key elements of the building and outdoor electrical equipment zone (Rochdale Envelope). This is part of a hypothetical design and does not represent a design proposal, but instead shows how the key elements might relate to each other, and be applied from the Design Code. The first and second sketches show a part view with and without the landscape planting zone.

Figure 8.1 Building and outdoor electrical equipment zone (Rochdale Envelope) – Indicative testing sketches



Sketch 1: A sample view of code principles applied to key elements of the proposed converter station building and outdoor electrical equipment zone (Rochdale Envelope).

Figure 8.1 Building and outdoor electrical equipment zone (Rochdale Envelope) – Indicative testing sketches

Sketch 2: A sample view of code principles applied to key elements of the proposed converter station building and outdoor electrical equipment zone (Rochdale Envelope) from beyond the landscape planting zone.

Glossary and Abbreviations

Glossary of Terms	
Term	**Meaning**
Above Ground Level (AGL)	Above Ground Level means above the re-profiled/finished ground level within the proposed converter station site.
Alternating Current (AC)	Electric power transmission in which the voltage varies in a sinusoidal fashion. This is the most common form of electricity transmission and distribution.
base scheme design	The design of the UK Onshore Scheme comprising the Limits of Deviation (on the AC and DC cables) and the Rochdale Envelope (for the converter station).
connection point	This is the point on the GB electricity transmission system existing (Bicker Fen 400 kV Substation) where Viking Link connects to the network.
converter station	Above ground facility containing specialist equipment to convert electricity from AC to DC or DC to AC.
converter station site	The proposed site encompassing the converter station operational area and associated landscaping, drainage as well as land required temporarily for construction.
converter station zone	The proposed zone containing the converter station, buildings and outdoor electrical equipment and associated hardstandings within a security fence.
Direct Current (DC)	Electric power transmission in which the voltage is continuous. This is most commonly used for long distance point to point transmission.
Limits of Deviation (LoD)	These set the maximum limits within which installation of underground cables (AC and DC) will be undertaken.
Rochdale Envelope	This establishes the maximum dimensions of the buildings and outdoor electrical equipment which make up the converter station as well as layout of the site.
UK Onshore Scheme	The Scheme comprising the proposed converter station, access road and AC and DC underground cables, including all land temporarily required during construction.

List of Abbreviations	
Abbreviation	**Meaning**
AC	Alternating Current
AGL	Above Ground Level
CCTV	Closed Circuit Television
DC	Direct Current
EIA	Environmental Impact Assessment
ES	Environmental Statement
GB	Great Britain
HVDC	High Voltage Direct Current
IPC	Infrastructure Planning Commission
km	Kilometre(s)
kV	Kilovolt(s)
LoD	Limits of Deviation
m	Metre(s)
NGVL	National Grid Viking Link Limited
UK	United Kingdom

References

Ref 1.1	Department for Communities and Local Government (March 2014) Planning Practice Guidance: Design, ID: 26-036-20140306
Ref 1.2	Infrastructure Planning Commission (February 2011) Advice Note Nine: Rochdale Envelope
Ref 1.3	National Grid Viking Link (August 2017) UK Onshore Scheme: Planning Statement
Ref 1.4	National Grid Viking Link (August 2017) UK Onshore Scheme: Landscape Masterplan & Planting Schedule
Ref 1.5	National Grid Viking Link (August 2017) UK Onshore Scheme: Outline Drainage Strategy
Ref 1.6	National Grid Viking Link (August 2017) UK Onshore Scheme: Converter Station Operational Phase Site Plan

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Visiting our website at:
www.viking-link.com

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