



DECARBONISATION

DESIGN PRINCIPLES AND DESIGN CODE: 5.7

Cory Decarbonisation Project

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Revision C

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1. INTRODUCTION

1.1. SUMMARY

- 1.1.1. Cory's Proposed Scheme for a Carbon Capture Facility (CCF) is an ambitious project to decarbonise its waste management processes. The carbon dioxide emitted at its existing and planned EfW facilities at Belvedere, in the London Borough of Bexley, will be captured and stored permanently, potentially in depleted North Sea oil and gas fields. The Proposed Scheme will deliver a vital public good capturing the carbon dioxide associated with Riverside 1 and 2 (providing c.half of London's residual waste treatment capacity).
- 1.1.2. The Project balances the delivery of an operationally efficient Carbon Capture Facility, with the expectations of NPS EN-1 in relation to design ambition, environmental improvement, placemaking outcomes and minimising potential development impacts.
- 1.1.3. The **Design Approach Document (DAD – Document 5.6)** provides a full account of the design process demonstrating good design. The document outlines the main interactions with the natural environment that have informed the design of the Carbon Capture Facility and the nature of mitigation embedded in the design of the Proposed Scheme. The DAD is not intended to be a certified or secured DCO document but is an expression of how the Proposed Scheme could be implemented, when applying the Design Principles and Design Code.
- 1.1.4. The following sections have been extracted from the DAD and outline specific design commitments for approval in the form of **Design Principles** which are structured to align with the National Infrastructure Commission's guidance and a **Design Code** that will guide the preparation and final detailed design of the project, in line with those Design Principles.
- 1.1.5. The DAD document (Section 6) should be referenced for detailed reasoning and accompanying illustrations.

2. DESIGN PRINCIPLES

- 2.1.1. The Design Principles are structured to accord with the National Infrastructure Commission's guidance under the thematic headings of: Climate, People, Places and Value. The Design Principles validated site choice, informed the identification of the preferred indicative equipment layout configuration, the Proposed Scheme design and will guide future detailed design, and delivery.
- 2.1.2. The Design Principles set out in this section are submitted for Approval. Compliance with these Design Principles will ensure a good design outcome is achieved. As the Design Principles will form the basis of design assessment for the development of the Proposed Scheme as the detailed design comes forward through Requirement discharge, a Compliance Statement would be submitted to support the discharge of the detailed design DCO Requirement which will report on compliance with both the Design Principles and the Design Code.

2.2. CLIMATE

- 2.2.1. Deliver resilient habitat mitigation and compensation that is capable of being sustained and ensure that building and infrastructure fabric retains integrity.
- DP_CL 1.1 Direct site drainage from the main CCF operational hard standing areas to support local ground water levels and to enhance grazing marsh and existing and proposed wetland habitat. Attenuate and treat surface run-off from the main operational areas on site before releasing into the local ditch network to support wetland water quality site wide.
 - DP_CL 1.2 Provide for possible flood events ensuring that key operational infrastructure will operate in the event of flood through site levels design.
 - DP_CL 1.3 Provide increased species diversity within defined grazing marsh areas and adjacent habitats to provide further resilience in the face of changing climate.
 - DP_CL 1.4 Deliver a Biodiversity Net Gain through habitat enhancement, creation, and resilience on site in the Mitigation and Enhancement Area, and off site including at the potential Biodiversity Net Gain Opportunity Area.
 - DP_CL 1.5 Minimise, where practicable and accounting for drainage design, the results of ground investigation and assessment, predicted flood levels and a review of the vulnerability of the proposed plant and equipment to inundation in the event of flooding, raising ground levels in the creation of the development platform for the CCF and ensure that the design provides sufficient shelter for workers in a flood event.

2.3. PEOPLE

- 2.3.1. Deliver benefits to people and communities reflecting what the community wants.

- DP_PE 1.1 Improve the local public footpath connections to deliver a recreation and commuting route linking Thamesmead to the Crossness Local Nature Reserve and promotion of local circular route via Thames Path including local enhancements for wayfinding and information.
- DP_PE 1.2 Make provision for new interventions in addition to the retention and enhancement of existing features to improve public awareness of local nature and points of cultural and educational interest.
- DP_PE 1.3 Deliver long term/sustained improvements in the local environment for the benefit of the community and to secure social value outcomes.
- DP_PE 1.4 Work with stakeholders to further their objectives and balance conflicts of interest including the FoCLNR (Friends of Crossness Local Nature Reserve) and existing graziers where practicable.
- DP_PE 1.5 Provide a visually attractive environment that secures a sense of belonging and personal security that is of consistent quality in terms of open space, natural habitat access, landscape design and architecture.
- DP_PE 1.6 Create a new campus workplace and an enhanced visitor experience that is fully inclusive and accessible to the community.
- DP_PE 1.6 Circular economy practices should be identified and considered to prioritise action in the highest tiers of the waste hierarchy to design out wastes, reduce wastes and to divert materials from landfill into other productive uses through recovery, reuse and recycling

2.4. PLACES

2.4.1. Deliver a project that promotes a sense of identity, improves the quality of and access to the natural environment and mitigates changes in the character and visual environment through good design.

- DP_PL 1.1 Deliver a coherent design that is distinct with clear control of quality underpinned by the relevant Design Code. Organise built form and material selection to deliver a visually coherent design and to reduce impact.
- DP_PL 1.2 Provide well organised and well designed and managed boundaries to the operational areas. Control the visual appearance of the operational area in views from adjoining areas to deliver a coherent appearance. Provide planted boundaries appropriate to local character around the CCF site to support the natural character of the CLNR and an organised interface with Norman Road.
- DP_PL 1.3 Extend the extent of the CLNR and improve existing habitats to compensate for the loss resulting from the development.
- DP_PL 1.4 Building massing and structure height should step down from high in the north to low in the south, reflecting the transition from the industrial river corridor to local community. Lower-level development to the south should allow for some intervisibility between buildings responding to the interface with the community.

- DP_PL 1.5 Recognise the Site and surrounding area's historic, cultural, and natural assets through conservation, retention, and enhancement where practicable.
- DP_PL 1.6 Optimise the performance of retained Metropolitan Open Land purposes and secure enhancement through good design and management, improved interpretation, and access.
- DP_PL 1.7 Deliver good design along Norman Road addressing the key public access route to the River Thames and to support the reduction of antisocial behaviour and promote increased user safety.
- DP_PL 1.8 Works to and in proximity of existing watercourses will be sensitively executed avoiding risk of damage and contamination to new and retained features and harm to wildlife. In line with policy and the BNG metric, all removed/adjusted watercourses will be compensated for with newly created equivalent habitat.
- DP_PL 1.9 Allow for a minimum 5m offset, up to 8m or greater where practicable, from the top of bank on existing retained watercourses to allow for maintenance, to protect habitats and for the delivery of flood compensation. The exact dimension for offset to be established during detailed design pursuant to **Appendix 11-2: Flood Risk Assessment** of the **Environmental Statement (Volume 1)**, responding to location specific constraints and giving consideration to achieving the LaBARDS, operational requirements, and process safety for the CCF. To the east side of the CCF, ditch access would be secured via Norman Road without the need for an offset to the west of the existing ditch.
- DP_PL 1.10 Existing points of access and vehicular routes should be maintained in their current locations where practicable, including the Thames Water Access Road to Norman Road. Where temporary diversions or minor changes to alignment are required, full remediation of habitats and compensatory planting should be provided.

2.5. VALUE

2.5.1. Deliver a project that is efficient and secures benefits beyond the immediate CCF site boundary.

- DP_VA 1.1 Enable the provision of district heating to nearby communities resulting from the operational process.
- DP_VA 1.2 Minimise the loss of open land and natural habitat including through a transparent optioneering process focused on efficiency in the final layout and detailed design delivery.
- DP_VA 1.3 Provide benefits to the local community through direct proportionate mitigation and compensation for loss of open land, public access, and access to natural areas.
- DP_VA 1.4 Support the delivery of a more attractive and useable CLNR through any alteration of area or configuration, support to improved management and

provision of improved access, interpretation, and activation recognising the sensitivity of existing habitats.

- DP_VA 1.5 Appropriate security and safety measures must be applied across the CCF. Such measures will include: perimeter security fencing and controlled access points; lighting and camera surveillance infrastructure; contiguous operational area uninterrupted by non-Cory land ownership; shut down facilities to support safe storage of CO₂; and provision of adequate offsets from members of the public from the facility and associated infrastructure.

3. DESIGN CODE

3.1. APPROACH AND STATUS

- 3.1.1. The Design Code contains different levels of instruction and prescription. They are a series of rules to be applied to the on-going design of the Proposed Scheme, and thereby help to steer some aspects of the design detail through to implementation. They help provide the next level of detail beyond those set out in the Project Parameters, which reflect Environmental Impact Assessment decisions.
- 3.1.2. The Design Code provides clarity over what constitutes good design quality, highlighting important design matters that will shape the project design outcomes; and provide a level of insight for designers and control for the local planning authority.
- 3.1.3. The Design Code set out in this section is submitted for Approval. Compliance with the Design Code will ensure a good design outcome is achieved. As the Design Code will form the basis of design assessment for the development of the Proposed Scheme as the detailed design comes forward through Requirement discharge, a Compliance Statement would be submitted to support the discharge of the detailed design DCO Requirement which will report on compliance with both the Design Principles and the Design Code.
- 3.1.4. In the DAD (Document Reference 5.6) the codes are shown in blue boxes with each section having a different code prefix. Each code has associated bullet points, describing what the code will do and why it is needed; however, those bullet points do not form part of the Code itself.
- 3.1.5. The Design Code is structured in five sections:
- Campus-Wide
 - Carbon Capture Facility
 - Crossness Local Nature Reserve (CLNR) and Open Land
 - Thames Path and Jetties
 - Norman Road

CAMPUS-WIDE

- 3.1.6. This section comprises codes DC_CW 1.1 to DC_CW 1.15.
- 3.1.7. The design codes in this section either refer to a project ethos, approach or priority that should be applied wholistically to development of the detailed design in subsequent stages or specific approaches to components that are relevant site wide or across numerous zones.

- DC_CW 1.1 Proposals coming forward should prioritise mitigation of impacts on the adjacent MOL and grazing marsh land as well as communities to the south, as opposed to the industrial land to the east.
- DC_CW 1.2 Proposals coming forward should prioritise pedestrian/active travel route safety and inclusivity sitewide (through improved accessibility, lighting, wayfinding, activation, new connections, separation from vehicles, crossings).
- DC_CW 1.3 The aesthetic of designed buildings, structures, landscape interventions, materiality, boundaries, signage/ wayfinding, and branding are to be carefully controlled and consistent across the development.
- DC_CW 1.4 The materials used to construct the hard landscape and boundary treatments will be high quality, robust, and minimal maintenance.
- DC_CW 1.5 Landscape design will deploy modern design and materials alongside local and natural materials.
- DC_CW 1.6 Drainage basins, ditches, and swales are to be designed to accommodate planting and standing water and to be an integrated element of the landscape design.
- DC_CW 1.7 Planting is to consist of native and indigenous species and wherever possible sourced from local provenance.
- DC_CW 1.8 Routing, specification and maintenance for the diversion and improvement of existing watercourses and the creation of new watercourses are to be defined in the full Landscape, Biodiversity, Access, and Recreation Delivery Strategy and Code of Construction Practice.
- DC_CW 1.9 Operational security and safety measures must be sympathetically designed and integrated as part of the overall campus and be proportionate to the defined requirement.
- DC_CW 1.10 Create clear boundaries and security between public and private areas, service areas and access points. The materials, visual permeability, features, and security measures are to be considered and designed as an integral part of the CCF scheme design, and not addressed as after-thoughts or add-ons.
- DC_CW 1.11 Service ducts, access covers, and utility corridors are to be provided consistently and to a pre-determined strategy and spatial arrangement, making provision for installation of additional infrastructure where foreseeable.
- DC_CW 1.12 Structural 'urban' planting is to be large-scale, simple, and limited in variation.
- DC_CW 1.13 Street furniture (lighting, litter bins, bollards, etc.) is to be minimised and located with consistent materiality, location, spacing, and patterns, throughout the development.

- DC_CW 1.14 The materials used for hard landscape and boundary elements will be as sustainable as possible regarding origin, embodied energy, maintenance requirements, and durability.
- DC_CW 1.15 Create a consistent approach to planting and landscape features along the length of the boundaries.
- DC_CW 1.16 The height of Flue Gas Supply Ductwork, LCO₂ Above Ground Pipelines, other elevated process pipes, duct bridges and racking shall be of sufficient height to allow the safe and unimpeded access of all necessary vehicular traffic requiring access under these structures, depending on the location this may include HGVs, mobile cranes, other mobile plant, and emergency services vehicles. The LCO₂ Above Ground Pipework should be no higher than the minimum that is necessary to fit technical requirements, including meeting connection points to the Carbon Capture Facility and the Proposed Jetty (including the Access Trestle).

CARBON CAPTURE FACILITY

- 3.1.8. This section comprises codes DC_CCF 1.1 to DC_CCF 1.33.
- 3.1.9. Design codes relating to the core CCF are in the main grouped into three types: codes that control layout and form; codes that are concerned with appearance, visual impact and aesthetic character; and codes that reinforce the Proposed Scheme's environmental goals.
- 3.1.10. Key to the success of this project is the ability to elevate the industrial architecture beyond functional engineered solutions, creating a unique and legible new place, through controlled palettes of materials and organisation of technical equipment into consistent forms/rhythms.

Form and Layout

- DC_CCF 1.1 Development of the operational Carbon Capture Facility layout should prioritise efficiency of layout (land take).
- DC_CCF 1.2 Taller structures are to be located in the northern parts of the Site.
- DC_CCF 1.3 Roof shapes to minimise the visual impact of buildings with flat or low-pitched roofs, potentially in combination with simple traditional roof forms.
- DC_CCF 1.4 The roof cladding systems will be robust, easily maintainable, and should be appropriate to support the installation of rooftop photovoltaics.
- DC_CCF 1.5 Where feasible utilise permeable or granular hard surfaces within the core Carbon Capture Facility.

- DC_CCF 1.6 The buildings within the CCF will be built to high standards of sustainability where practicable. Factors such as embodied energy, provenance, and whether a material is renewable, should be considered during selection.
- DC_CCF 1.7 The reusing of resources should be explored at construction as well as operation and, later-on, decommissioning phases. Circular economy practices should be identified and considered to maximise action in the highest tiers of the waste hierarchy practicable to design out wastes, reduce wastes and to divert materials from landfill into other productive uses through recovery, reuse and recycling.
- DC_CCF 1.8 Measures should be put in place to mitigate the impact of noise and emissions generated from on site plant, and any inherent hazard risk, including minimum offsets and barriers.
- DC_CCF 1.9 Back-up generators should be distanced from noise sensitive receptors.
- DC_CCF 1.10 Provide attenuation and treatment for surface run-off on site through open landscaped features where possible, before releasing treated water to the grazing marsh ditch network.
- DC_CCF 1.11 Development platform embankments should be a maximum of a 1:3 gradient where planting/ tree planting is proposed.
- DC_CCF 1.12 Fencelines should be located inbound of buffer zones wherever possible.
- DC_CCF 1.13 Minimise, where practicable and accounting for drainage design, the results of ground investigation and assessment, predicted flood levels and a review of the vulnerability of the proposed plant and equipment to inundation in the event of flooding, raising ground levels in the creation of the development platform for the CCF and ensure that the design provides sufficient shelter for workers in a flood event.
- DC_CCF 1.14 Buildings to be located to match predominant orientation of buildings and road infrastructure of the adjacent retail distribution estate.
- DC_CCF 1.15 The use of highly reflective materials should be avoided.
- DC_CCF 1.16 Ventilation louvres and external plant or ducting to be avoided on visually sensitive sides of buildings and restricted to northern and eastern facades wherever practicable.
- DC_CCF 1.17 Location of rooftop equipment should be where visual impact is lowest; size of equipment to be minimised and where possible, rooftop equipment to be clad in wall cladding or concealed behind parapet roof edges.
- DC_CCF 1.18 External wall cladding/ finishes will be robust, easily maintainable, and replaceable materials appropriate for the environment.

- DC_CCF 1.19 Minimise window and door openings on western and southern elevations of CC process buildings, where internal lighting may spill out of openings.
- DC_CCF 1.20 Glazing on upper levels to be restricted to elevations not subject to sensitive long-distance views.
- DC_CCF 1.21 Locate windows for occupied/office buildings to face towards the CLNR.
- DC_CCF 1.22 Overhead ducts connect into R1, R2 and link CCF site with the export Jetty. Duct routes to these locations should minimise span over public space where practicable. Ducts and trestles should be located development-side of fence lines, ditches, and watercourses.
- DC_CCF 1.23 Overhead duct routes should connect components of the development at a consistent datum where practicable, with minimum number of vertical steps and neat turning radii. Legs, connections, and bracings should be equally spaced where practicable.

Materiality and Colour

- DC_CCF 1.24 The key architectural/engineering components of the CCF should comprise a consistent palette of high quality, robust and minimal maintenance materials.
- DC_CCF 1.25 Design of buildings closer to/facing the CLNR boundary to have appropriate façade treatments in response to the semi-natural/natural landscape.
- DC_CCF 1.26 The materials will be carefully selected to support the overall architectural design approach and to offer contrast in texture, finish, and colour.
- DC_CCF 1.27 Where practicable proposed materials will be consistently applied across the CCF site.
- DC_CCF 1.28 Built form to be visually structured/ organised and treated systematically as component parts.
- DC_CCF 1.29 Location of roller shutter doors and personnel doors to be considered and matched in colour; multiple doors should be equally spaced.
- DC_CCF 1.30 For buildings closer to the CLNR boundary consider use of biodiverse green or brown roofs where practicable.
- DC_CCF 1.31 Colour of materials, applied colour, and coated finishes should be in line with a coherent palette of colours which will be subject to approval.
- DC_CCF 1.32 Lighting within the CCF site to be kept to a minimum as viewed from the LNR, Thames Path and open land, where practicable utilising low

impact colour tones and bollard lighting distributed as required for functional purposes.

- DC_CCF 1.33 Lighting central to the CCF and facing on Norman Road should improve the quality and safety of Norman Road and facility entrances, and seek the opportunity to enhance the appearance of architectural forms and equipment.

CROSSNESS LOCAL NATURE RESERVE AND OPEN LAND

- 3.1.11. This section comprises codes DC_LNR 1.1 to DC_LNR 1.17.
- 3.1.12. The design codes herein intend to protect the special character and qualities of the open land as experienced by its users, and coastal flood plain grazing marsh habitats for the benefit of the sites ecology, to be delivered by establishing a framework for mitigation and enhancement for this land and the CCF edges /boundaries.
- 3.1.13. Further the code seeks to establish a new attractive 'sense of place', promoting quality design and materiality, enhancing access routes and by providing facilities for new user groups.
- DC_LNR 1.1 Proposals coming forward should ensure the land is suitable for continued existing use, including by graziers, whilst delivering biodiversity enhancement.
 - DC_LNR 1.2 Land adjacent to the CCF should contribute to visual mitigation /screening of the development through low density tree planting, without the loss of coastal floodplain grazing marsh habitat.
 - DC_LNR 1.3 Landscape structure should reflect characteristic Thames Estuary flood plain landscape and local landscape patterns integrating vegetation and drainage.
 - DC_LNR 1.4 Vertical retaining walls should be positioned away from the CLNR boundary or with sufficient screening in front as a visual buffer. Landscaped gradients to be used where practicable instead of retaining walls.
 - DC_LNR 1.5 Watercourses must be accessible on one side as a minimum with a clear 5m width, up to 8m or greater where practicable, as offset for a working zone provided from top of bank.
 - DC_LNR 1.6 Materiality should be largely natural or of natural colour tones experienced within the landscape, including natural timber, gravels, concrete, oxidised steel. Re use of recycled materials is to be considered.
 - DC_LNR 1.7 Architectural forms should be contemporary but utilising natural materials and referencing typical forms seen across the landscape, such as

bird hides or screens, sheds etc. Structures should appear low and hunkered down into the marsh for minimal visual disturbance.

- DC_LNR 1.8 Structures should tread lightly on the ground, avoid need for large hard landscaped areas and large foundations. Place structures and boardwalks on legs floating above the marsh where necessary due to ground conditions.
- DC_LNR 1.9 Fences, gates, and furniture should be characteristic of the grazing marsh and environment and built for durability/longevity with minimal maintenance.
- DC_LNR 1.10 All built forms should have visible identifiable character or mark unmistakably of this place, including parking, entrances gates, boardwalks, benches, and signage.
- DC_LNR 1.11 Woodland/buffer planting and understorey to be entirely native species and reflect local grazing marsh scrub woodland type.
- DC_LNR 1.12 Hedgerows to be entirely native species and reflect local hedgerows particularly historic hedgerows.
- DC_LNR 1.13 Wetland planting to be naturalistic and comprise native species.
- DC_LNR 1.14 Wildflower and riparian extensive planting to be entirely native species and where possible use seed from local provenance.
- DC_LNR 1.15 Parking and improved access through the MOL/enhanced grazing marsh areas should be provided where practicable. This should create new links to nearby footpath network and all-weather routes including causeways, bridges, and boardwalks.
- DC_LNR 1.16 New facilities for public, school groups, training and FoCLNR should be provided in the extended CLNR (such as outdoor classrooms, interpretation boards, wildlife hides, forest schools, shelters, dipping ponds etc)
- DC_LNR 1.17 Retained and any diverted public rights of way to be complemented by additional paths.

THAMES PATH AND JETTIES

3.1.14. This section comprises codes DC_TP 1.1 to DC_TP 1.6.

3.1.15. The Thames Path and Jetty codes are primarily concerned with uplift to quality of place and furthering the experience of a Riverside Campus, it also moves to promote better orientation/legibility through wayfinding/interpretation.

- DC_TP 1.1 Public Realm along the Thames Path within the Site Boundary should be enhanced to signify arrival alongside the Riverside site, through

materiality, signage, furniture, planting, art, interpretation, and level of care/maintenance.

- DC_TP 1.2 Links between the Thames Path and its vicinity, including the existing CLNR, Norman Road Field and PRow, should be improved where practicable to provide clear wayfinding and safe accessible connections.
- DC_TP 1.3 Fencelines should be rationalised and where practicable set-back from routes.
- DC_TP 1.4 Where practicable, the upper foreshore should be enhanced and maintained for its value as a wildlife habitat (including management of colonising vegetation).
- DC_TP 1.5 Lighting frequency to be kept to the minimum practicable, distributed as required for function, at regular intervals. Lighting to be a mix of low level and taller fittings, avoiding upward light spill.
- DC_TP 1.6 Lighting should improve the safety and legibility of routes and seek opportunity to enhance the appearance of architectural forms and equipment where practicable.

NORMAN ROAD

3.1.16. This section comprises codes DC_NOR 1.1 to DC_NOR 1.7.

3.1.17. These codes establish the specific enhancements required for improvement and activation of the Norman Road environment in line with Riverside Campus objectives and for the benefit of staff, wildlife and other user groups.

- DC_NOR 1.1 Improve activation of Norman Road to enable passive surveillance.
- DC_NOR 1.2 Norman Road requires good visibility at CCF entrances and separated pedestrian routes with designated crossings associated with pedestrian flow desire lines.
- DC_NOR 1.3 Frontages onto Norman Road will have consistent and organised fence lines, gates, entrances, and access/arrival signage.
- DC_NOR 1.4 Lighting along Norman Road and route linking to the Thames Path to be organised in a linear and regular sequence highlighting facility entrances and seeking opportunity to enhance the appearance of architectural forms and equipment.
- DC_NOR 1.5 Norman Road drainage ditch network to be enhanced and extended, however no water should pass from these ditches into the grazing marsh network without prior attenuation and treatment on site.

- DC_NOR 1.6 Frontages onto Norman Road will have consistent and organised arrangement of planting and allow intermittent approach views towards Riverside 1 and Riverside 2, and into the CCF site.
- DC_NOR 1.7 Norman Road margin planting to comprise native species, including the grasses/wildflowers alongside the mown road verge.



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