NETWORKS

GENERAL SPECIFICATION FOR CONTESTABLY BUILT UNDERGROUND NETWORKS

Network Assets, Underground Networks

SPEC-301013-AXP

Note: The following document is highly technical in nature and may be complex to understand. If you are having trouble understanding the content of this document, please reach out to ESB Networks and we will assist you to understand their meaning.

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	(ESB Networks Specifications are subject to change, this specification version shall only be used for the purpose/project for which it was issued by ESB Networks to you)
Approved for Issue:	**Specifications Manager ESB Networks**

History of Revisions

Rev No	Date	Revision Content
0	October 2013	New Document
1	Dec 2013	General tidy-up
2	January 2014	Revision of Work Quality and Commissioning requirements
3	March 2021	Updates from RCT comments

Note:

This specification will be reviewed at minimum before the Latest Review Date, but may also be reviewed in the interim. Consequently the “Latest Review Date” does not indicate that this particular version of the Specification is current. Accordingly, only the version of the specification issued by ESB Networks to the user for the particular purpose/project should be used.

ESB Networks Technical Specification Approval

Title	**General Specification for Contestably Built Underground Networks**		
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1.0 Scope

This document specifies the general requirements for the design, construction testing and commissioning of 38kV and MV Underground Power Cable systems/circuits which the Independent Power Producer elects to contestably build for handover to, and for operation by, ESB Networks. It covers the two cases as follows:

1. Installation of cable ducts (and associated civil works structures) plus installation of cable in these ducts and associated joints and terminations and all other associated ancillary items where the IPP undertakes all of these works,

or

2. Installation of cable ducts (and associated civil works structures) alone, where the IPP undertakes only this element of works associated with the cable system.

The design of the circuit and the installation of the Underground Power Cable shall comply with the requirements of:

(a) This Specification and
(b) ESB Networks Specification 18081 – General Equipment Requirements for items supplied by IPP for use on Contestably Built Network.
(c) ESB Networks Specification 18150 – Functional Specification for the Installation of Ducts and Ancillary Structures for 38kV Underground Power Cables and Associated Communications Cables for Contestable Projects.
(d) ESB Networks Specification 18151 – Functional Specification for the Installation of 38kV Underground Power Cables for Contestable Projects.
(e) ESB Networks Specification 18152 – Functional Specification for the Installation of Ducts and Ancillary Structures for 20kV Underground Power Cables and Associated Communications Cables for Contestable Projects.
(f) ESB Networks Specification 18153 – Functional Specification for the Installation of 20kV Underground Power Cables for Contestable Projects.
(g) The individual ESB Networks material Specifications for ducting and cable materials and components and ancillary structures.

The installation of the underground power cable circuit shall be undertaken by the IPP and/or the IPP's contractor in accordance with the manufacturer's and ESB Networks' instructions. The IPP's underground cable components supplier shall provide installation instructions which shall be clear and specific to the components and material being installed and shall cover all aspects of the components and material's installation up to and including putting into service.

The technical schedules and appendices (a) attached to this specification and/or (b) attached to the individual material Specifications for particular items, shall be completed by the IPP and the material manufacturer and signed off by both parties as required and submitted to ESB Networks for review.

2.0 Health and Safety

2.1 Client

The IPP is the Client as defined in safety legislation. The Client shall comply, at all times, with all statutory duties or provisions imposed upon him by any current legislation, new legislation or amendments to legislation which are current during the course of the project. The Client shall ensure that all necessary statutory appointments are made.

ESB Networks relies on the competence of, and compliance with safety legislation by, all parties commissioned to carry out works in the public domain.

2.2 Safety File

When the cable duct installation has been completed and where the cables are to be installed by ESB Networks, a copy of the Safety File shall be submitted to ESB Networks for review. The Original Safety File fully updated with As-Builts drawings shall be provided to ESB Networks for retention no later than the handover of the ducts to ESB Networks.

When the cable duct and cable installation has been completed by the IPP, a copy of the Safety File shall be submitted to ESB Networks for review and comment. The Original Safety File fully up to date with As-Built drawings (including station names and numbers that the circuit is connecting to) shall be provided to ESB Networks for retention no later than 6 weeks prior to the energisation date.

In both cases, as part of the Safety File, the IPP shall provide a risk assessment, method statement (RAMS) and residual risk register indicating the risks identified with the Operation and Maintenance of the cable and duct or duct only system installed by the IPP and how these risks have been and can be mitigated.

3.0 Applicable Codes, Standards and Directives

3.1 Codes and Standards

See ESB Networks Specification 18081, clause 1.03 for applicable standards and precedence of standards.

Materials shall be designed, manufactured, tested and installed according to ESB Networks Product Specifications and ESB Networks Specification 18081.

Works shall be carried out in accordance with this specification with the relevant EN Standards. Where no EN Standard has been issued to cover a particular subject then an IEC standard shall be applied, and in the absence of such a standard, clause 1.03.01 of 18081 shall apply to the standard proposed. The latest edition and amendments shall apply in all cases. In case of conflict between the Specification and any applied Standard, then the Specification shall take precedence.

The IPP shall state in his proposal the standards and codes of practice which he proposes for any items of Plant not covered by EN Standards. The IPP shall submit two English language copies of any standard or code of practice, other than EN or British Standard publications not later than the Initial meeting required by ESB Networks.

3.2 EU Directives

All underground cable system components supplied and also the Design and Construction elements of the project shall all be in compliance with the provisions of all relevant Directives of the European Communities relating to work equipment and its installation and design, i.e. in regard to safety of personnel who operate and maintain the underground power cable system and ancillary equipment. Where appropriate, the underground power cable components and all associated ancillary materials shall carry the CE Mark in accordance with Direction 93/465/EEC.

3.3 System of Units of Measurement

The SI system of units shall be used throughout the project. Temperature shall be in degrees Celsius, electrical energy shall be in kWh and SF6 gas pressure shall be expressed in Mpa.

4.0 Service Conditions

4.1 Environmental Conditions

These are set out in ESB Networks Specification 18081.

4.2 Network Parameters

These are set out in ESB Networks Specification 18081.

5.0 Proposed Design

5.1 Design Requirements

The design shall meet the requirements of this Specification and shall make adequate provision for:

- Performance to the required underground power cable continuous current rating and short circuit rating as per the circuit parameters
- Safety of operations and maintenance personnel
- Safety of members of the Public
- Reliability and continuity in service
- Ease of inspection and maintenance
- Ease and clarity of operation
- Avoidance of spurious alarms
- Ability to withstand the severe service conditions specified
- Freedom from undue vibration and noise
- Exclusion of vermin, birds and animals
- Precautions to minimise fire risk

ESB Networks expects that correctly designed and installed ducted underground power cable circuits will operate satisfactorily for at least 80 years.

5.2 Confirmation of Construction in Compliance with Design

The PSDP for the Contestably built plant shall declare, in writing, to ESB Networks that the construction of the works has been completed in accordance with the Design as approved by the PSDP.

5.3 Property Ownership along Route

It is the policy of ESB Networks to install underground cables in property which is in public ownership or is in the charge of the local government authority.

The route of the underground power cable shall not be on private property insofar as this is physically possible. In the limited number of cases where this is not physically possible and the IPP requires to traverse private property for a section of the underground power cable route, this shall only be acceptable to ESB Networks where the following is the case:

- There is physically no alternative option available
- The underground power cable route shall be formed of level roadway

- Access to all parts of the route from the public roadway, and along the route shall be provided by a level roadway of 3m minimum width capable of being used by construction vehicles of 10 tonne weight
- Durable robust route markers shall be provided at agreed intervals and at all route deviation points, property boundary and line of site
- Development and tree planting shall be permanently prohibited along and adjacent to the route
- The route shall be the subject of a burden registered on the property title as set out in the Connection Agreement
- Free access, in perpetuity is legally provided and guaranteed by the IPP to ESB Networks for maintenance and operations activities related to the operation of the underground power cable, irrespective of the future ownership of the property.
- Residual Risk Register and method statement covering construction and future maintenance of power cable route.

5.4 Interchangeability of Spare Parts

To limit the required stock of spare parts for the underground power cable associated with this project, all underground power cable components and ancillary materials thereof, performing similar duties, shall be compatible with standard ESB Networks cables and components.

5.5 Design Review

The proposed design shall be submitted for review by ESB Networks at the following project stages:

- Route selection and survey (before planning submission)
- Route risk assessment
- Material selection
- Detailed Design

Where a change in the detailed design arises as a result of conflicts uncovered during trench excavation, the revised design for the affected section shall be submitted to ESB Networks for review.

Notwithstanding any review by ESB Networks of any information submitted by the IPP, the IPP's obligations under the Agreement shall not be relieved, absolved or otherwise modified and ESB Networks shall have no liability whatsoever in relation to it's review comments or lack of review comments in respect of any designs or information submitted to it by the IPP.

5.6 Design Log

Issues that arise during the Design Review shall be logged in the Design Log and all such issues shall be addressed and closed before construction. In any event all issues shall be closed before handover of the contestable assets.

6.0 Environmental Issues and Hazardous Substances

6.1 Environmental Law

The IPP shall comply with all aspects of Irish legislation (in addition to the relevant European legislation) in relation to the environment during all phases of the project. A complete list of current environmental legislation is available on the Irish Government's website (http://www.irishstatutebook.ie).

6.2 Planning Permission

Where the IPP seeks to rely on an exemption from planning permission, confirmation of this exemption shall be obtained by IPP from the planning authority and shall be submitted to ESB Networks along with exemption application form.

The IPP shall select the route and consult with ESB Networks, shall prepare the planning permission application, shall apply for planning permission, and shall obtain full planning permission without restrictive conditions for the contestable underground electric power cable circuit.

The IPP shall submit to ESB Networks all planning permission documentation associated with the underground power cable circuit, including all submittals required in connection with protection of the environment.

The IPP shall submit to ESB Networks any documents revised or updated as a result of any change and/or update to any of the required documentation submitted as part of the planning application.

6.3 Environmental Compliance

The IPP shall immediately notify ESB Networks of any prosecution instituted by the Environmental Protection Agency, National Parks & Wildlife Service, National Monuments Service, relevant local authority or any other statutory body including any revocation and/or suspension and/or expiry of any licence, consent, permission and/or permit. In addition, the IPP shall notify ESB Networks of any correspondence and/or statutory notices, non-compliances or observations received from the Environmental Protection Agency and/or National Parks & Wildlife Service and/or National Monuments Service and/or local authorities and/or any other statutory body in respect of any licence, consent, permission and/or permit and/or arising from the construction of the works. Special construction measures maybe required for such works and shall be detailed in design proposal for submission to ESB Networks.

6.4 Post Handover Monitoring of Environmental Impact

Where there is a requirement for ongoing monitoring of environmental impact of an underground power cable circuit, after Handover to ESB Networks, the IPP shall be responsible for this monitoring and the associated costs and shall submit copies of the monitoring results to ESB Networks.

6.5 Declaration of Environmental Compliance

Prior to Handover, the IPP shall submit a declaration from a suitable Professional confirming that the works have been carried out in compliance with all environmental protection requirements of the Specification and of the relevant Authorities and also confirming that no environmental incidents occurred during the project.

6.6 Cable and Duct Components and Ancillary Materials Equipment Manufacturer's Declarations

Where the specifications require manufacturer's declarations, it is the IPP's responsibility to ensure that these declarations are comprehensive and complete. All such declarations shall be submitted with the first design review submission.

6.7 Disposal of Material both Hazardous and non-hazardous

The IPP shall be responsible for the disposal of any hazardous material should it be found that any underground power cable component or ancillary material or its packing contains hazardous substances, not previously declared, at any stage during its life.

The IPP shall remove from site and arrange disposal of all unused material, scrap, and spoil, (hazardous and non-hazardous) in conformance with current waste regulations.

7.0 Quality Assurance

The underground power cable components and ancillary materials to be supplied and installed on all underground power cable circuits shall conform to the requirements of ESB Networks' Specifications. Likewise, the installation of the underground ducts, associated joint bay and termination structures, shall be in accordance with the relevant ESB Networks Specifications. As a means of ensuring these objectives the IPP shall maintain a documented quality control and quality assurance system which shall be in accordance with ISO 9001 or equivalent. The IPP shall ensure that the same requirements are applied to products, systems, and services supplied by Sub-Contractors and suppliers.

The IPP shall file all quality certification documents relating to the products and systems supplied for the project. ESB Networks shall have full access to such files.

The IPP shall submit his Quality Assurance plan to ESB Networks at pre-design stage. The plan shall demonstrate, to the satisfaction of ESB Networks, that the control measures to be adopted in the design and construction of the proposed works will result in successful commissioning and long-term performance of the contestably built network.

The Quality Assurance plan shall address, but be not limited to, the elements in the following list:

- Competence of Civil and Electrical Designers, Contractor, Pre-commissioner and Commissioner. This shall detail the selection criteria used and proven track record of all parties in respect of installation of plant at the voltages relevant to the project.
- Details of Quality Assurance Certification.
- Proposals for compliance with Environmental Legislation and (where applicable) Grant of Planning Permission.
- Material selection, sampling, handling, testing on site and testing off site.
- Site Work Audit and Control plan.
- Pre-commissioning plan.
- Commissioning Plan (where relevant).
- Documentation submittal schedule.
- Legal transactions concerning property transfer and line/cable routes over third party lands.
- Safety File requirements of the Connection Agreement.

A weekly quality report shall be submitted to ESB Networks, see Appendix 1 for quality report template.

The IPP shall nominate the person with responsibility for quality assurance of the IPP's works, who shall engage with ESB Networks on material and installation quality.

All test equipment used for testing and recording test results shall be calibrated for accuracy at regular intervals and shall display the date of next calibration and that of last calibration.

7.1 Audits by ESB Networks

During the construction of the project, on-site audits or inspections may be carried out by ESB Networks or their agents to ensure compliance with statutory provisions and agreed engineering designs and/or specifications. The IPP shall ensure that such representatives have unrestricted access to the project as required to carry out this role.

7.2 Materials and Workmanship

All materials and workmanship shall be of a suitable type and quality to ensure that the underground power cable circuit will operate satisfactorily in accordance with the relevant ESB Networks Specification.

All cable installation works shall be adequately supervised by the IPP and quality control checks shall be carried out by the IPP throughout the works. The construction works shall be in compliance with the design drawings which shall have been submitted to ESB Networks for review. The design drawings shall be comprehensive and detailed and shall be present for inspection at all times on site. For duct and joint bay installation works, the IPP shall use photographs taken at 20-50m intervals along the cable route, date tagged with appropriate GPS, to record the installation works. At all crossings or at all special features of the underground power cable route, additional photographs of special or non-standard construction (with appropriate GPS) shall be taken demonstrating compliance with specific design and Specification. These photographs shall be organised in a systematic manner, and kept in the Safety folder, with access for ESB Networks, to check for compliance with the Specification.

7.3 Reinstatement Finishes

The requirements for the reinstatement of trenches, manholes and joint bays shall be agreed in advance by the IPP with the local authority, relevant public body or private landowner. The agreed reinstatement details shall be submitted to ESB Networks with the design review.

The IPP shall obtain a statement of confirmation from the relevant party that the reinstatement has been completed to their satisfaction. This shall be submitted to ESB Networks before Handover of the completed duct or completed duct and cable installation.

7.4 Disclosure of Defects found

In the event of quality problems, identified by the manufacturer of the ducts, or cables, or the cable components, or prefabricated ancillary structures, which are likely to cause an operational, or safety, or other impact after installation, the IPP shall inform ESB Networks immediately.

This applies to quality issues or defects which may subsequently come to light, either with the specific duct and cable systems and prefabricated ancillary structures used by the IPP, or with similar duct and cable systems and prefabricated structures supplied to other customers.

IPP shall submit manufacturer's declaration of compliance with this quality requirement. ESB Networks as end user reserves the right to audit manufacturers of the duct and cable systems and prefabricated ancillary structures to ensure compliance.

7.5 Product Quality Assessment

If requested during the design review process, the IPP shall make available fully assembled samples of the cable duct and cable systems and prefabricated ancillary services proposed, for inspection by ESB Networks.

8.0 Commissioning, Handover and Energisation

8.1 Handover Agreement

On foot of the provision of a declaration of fitness for the contestably built assets, the IPP shall enter into a Handover Agreement with ESB Networks in respect of the contestably built assets in the format set out in Appendix 2.

Handover of the circuit shall take place at the same time as handover of the station terminating the new circuit.

8.2 Handover Certificate

ESB Networks shall execute the Handover Certificate (see Handover Agreement) confirming it's acceptance of Operational Control of the contestably built assets, when all of the requirements set out in the Connection Agreement, between ESB Networks and the IPP, which are due before energisation, have been met. These include, but are not limited to, the following:

- Safety
  - Receipt by ESB Networks of Original and Up to Date Safety File complete
- Environmental
  - Receipt by ESB Networks of all relevant certificates of compliance
- Civil
  - Receipt by ESB Networks of all relevant design calculations
- Electrical
  - Receipt by ESB Networks of Earth and insulation resistance test results and VLF Test Partial Discharge monitoring.
  - Cable rating reports for all crossing and pinch points and standard cable lay
- Operations
  - Receipt by ESB Networks of agreement to the jointly prepared Operations Procedure
  - Energisation Instructions (Switching plan) drafted and agreed
  - Receipt by ESB Networks of O&M manuals
  - Receipt by ESB Networks of all relevant equipment certificates
  - Receipt by ESB Networks of plant training
  - Receipt by ESB Networks of detailed cable route records, to ESB Networks Specification
- Commercial
  - Receipt by ESB Networks of all invoiced amounts
  - Receipt by ESB Networks of all relevant Bonds
- Satisfactory closure of all issues logged in the Design Log
- Property
  - Completion of all requirements set out in Appendix 1 of the Connection Agreement.

8.3 Pre-Commissioning

Prior to handing over of the cable duct or handover of the duct and installed cable, the IPP shall carry out pre-commissioning tests in accordance with the provisions of the Specification. Such tests shall be carried out at the IPP's risk.

When all pre-commissioning works have been satisfactorily completed, the IPP shall provide certification from a suitable Professional that the works are ready for commissioning by ESB Networks. This certification shall include, inter alia, confirmation of compliance in the following areas:

- Environmental
- Construction to Specification
- Planning Permission
- Route consents
- Property ownership and Cable Easements

Documents shall be handed over at this stage including the following:

- Material certificates and cable commissioning test result sheets
- Pre-commissioning documents including photographic evidence of compliance
- Safety File including 'as built' records and detailed photographic record of civil works installation
- Confirmation of satisfactory reinstatements in accordance with Local Authority and/or Private Landowner requirements and specification

8.4 Pre-Commissioning Test Schedule and Inspection Plan

Before commencement of the tests the IPP shall submit for ESB Networks review a detailed schedule of all tests and inspections to be carried out together with complete sets of the proposed measurement, recording and reporting forms for each part of the Works. Following their review by ESB Networks these submissions shall become part of the Test and Inspection Plan.

The IPP shall be responsible for the measurement, recording and reporting of the Pre-commissioning tests. As each item is completed its completion shall be certified by the IPP.

The IPP shall provide and bear the cost of competent test personnel, instrumentation and test rigs together with all auxiliary personnel, electric power and other services necessary for the completion of the tests.

The IPP shall give ESB Networks written notice of 5 business days after which he will be ready to carry out the Pre-commissioning tests. Proximate notification of each particular test or inspection shall be given to ESB Networks no later than 24 hours prior to the scheduled commencement of the particular test.

8.5 Commissioning Testing

Final commissioning tests shall be carried out by ESB Networks.

The IPP shall provide suitably qualified assistance as required to the ESB Networks commissioner to facilitate the efficient commissioning of the cable. Any outstanding construction work on the cable shall be carried out only under the control of the ESB Networks commissioner. The IPP shall continue to carry out the role of PSCS during the commissioning phase.

9.0 Operation and Maintenance

9.1 Operation of Assets to be Transferred

The contestably built cable circuit assets shall not be energised until ESB Networks accept Operational Control of same.

Following successful completion of the Commissioning Tests and Handover to ESB Networks of Operational Control of the contestably built cable circuit assets, the Operational control shall rest totally with ESB Networks. ESB Networks Safety Rules shall apply from the handover date set out in the Handover Certificate of the Handover Agreement.

9.2 Boundaries

Ownership and Operational Boundaries:

Item	Boundary
Ownership Boundary	The asset ownership boundary between ESB Networks Distribution circuits and IPP Circuits is the termination point of ESB Networks conductor termination on the IPP's plant
Operational Boundary	The system/operational boundary between ESB Networks Distribution circuits and IPP circuits is the ESB Networks HV disconnect or other defined ESB Networks item of HV or MV switchgear.

9.3 Operation

Operational Requirements for ESB Networks equipment:

Item	Requirements
Operations Procedure	Operations Procedure as per ESB Networks operating Policy
ESB Networks Equipment	Operation, Maintenance and Testing to be carried out by ESB Networks personnel only

9.4 Operation and Maintenance – Equipment and Tools

The IPP shall supply a list of tools and equipment required for the operation and maintenance of the contestably built underground cable assets and shall identify which tools are proprietary to the cable system installed. The IPP shall supply such identified tools to ESB Networks and these shall be clearly marked with their size or purpose and shall be new and unused.

9.5 Spare Parts

If non ESB Networks standard cable sizes and components are proposed, these shall be reviewed by ESB Networks. Where such non-standard cable and cable components are acceptable to ESB Networks, and ultimately the ownership of the contestable assets transfers to ESB Networks, the IPP shall be required to purchase and keep the required number of spares, within a weatherproof building on the station site associated with the project and which ESB Networks will have direct access to if required. ESB Networks shall not be liable for any extended outage that results from non-availability of these spare parts for non-standard cable and cable components. The IPP shall pay particular attention to spare parts with "use by" dates. The IPP shall notify ESB Networks of the expiry dates of all spare parts and shall guarantee that these shall be replenished, at the IPP's expense, over the lifetime of the cable circuit.

The spares shall be delivered prior to putting into service of the cable circuit. Spare parts shall be treated and packed to ensure safe transport and a long shelf life without deterioration.

The minimum quantity of spare parts shall be six joints and six terminations and a minimum 200 metres of cable supplied on a special long-life galvanised steel drum.

The IPP shall guarantee to maintain the minimum quantity of spare parts above in the event of depletion due to damage or usage in repairs over the lifetime of the cable circuit.

Complete spare parts shall be separately packed. A drawing which clearly identifies the spare part, quotes the part's serial number and gives a clear reference to the jointing instruction shall be enclosed in each pack. In addition, installation instructions shall be included in all packs containing spares for cable joints and terminations.

Spare parts which are liable to deterioration by atmospheric pollution, humidity or ingress of foreign matter shall be totally sealed in strong polythene bags. Spare parts which are subject to deterioration due to condensation shall be protected by packs of silica gel or other approved desiccant.

Packages shall be crated in robust wooden packing cases. Large items shall be crated separately and shall be securely clamped against movement. Small items shall be grouped by type and/or application, to the approval of ESB Networks. Packing cases shall be suitable for safe transit to ESB Networks' stores and for long term storage without deterioration under the environmental conditions which pertain there, as set out in Section 6.5.

Each packing case shall be clearly and indelibly labelled. The label shall provide the following information: case number, ESB Networks name, Project number, description and serial number of contents, shelf life and its expiry date, and where appropriate, lifting and storage/stacking instructions. The shelf life shall be at least five years. Where, because of case size, it is not practical to provide the above information on the packing case, the details shall be given in a sealed waterproof envelope which shall be securely attached to the case.

Cases which contain fragile parts shall have the following notice prominently displayed:

"FRAGILE – HANDLE WITH CARE"

10.0 Warranty

The warranty requirements for the contestably built network shall be as stated in the Connection Agreement (the Agreement).

11.0 Documentation

11.1 Design Documentation

11.1.1 Design Submissions General

All designs shall be submitted for ESB Networks' review. A full design pack shall be submitted for review. Any construction work that takes place prior to submission and acceptance of:

1. Full design review by ESB Networks, and
2. Detailed Construction programme

shall be at the IPP's own risk.

A period of 60 working days shall be allowed for ESB Networks' review of any design submission from date of receipt of each submission to date of notification of comments or no comments. The design shall reflect the Connection Agreement and any associated single line diagrams (SLD) provided. If the IPP does not complete the design within 2 years of receiving the work package from ESB Networks, the IPP shall revert to ESB Networks to ensure that there have been no updates to any of the specifications in the interim. Designs reviewed by ESB Networks shall not be altered without written agreement. All symbols used in electrical drawings shall be in accordance with IEC Publication 60617 and the SI system of units shall be used throughout.

Design submissions (two copies) shall be made within the times named in the individual equipment specifications. They shall be made in an orderly and timely manner during the periods shown for design approval in the Works Programme such that ESB Networks shall have adequate time to review them.

In programming submissions, the IPP shall allow for the possibility that a resubmission may be necessary before the start of any part of the Works.

Each design submission to ESB Networks shall be serially numbered and dated and shall refer to one subject matter only. For example, submissions shall serially progress from one end of a circuit to the other and be clearly indexed accordingly. Each submission shall be accompanied by a summary sheet which lists the documents comprising the submission. Where a submission includes revisions of documents previously submitted the summary sheet shall include a reference to the original submission number.

11.1.2 Drawings – General

The Irish Grid co-ordinate system shall be used on drawings.

Drawings relating to vaults and joints positions shall be presented in scale of 1:25.

Drawings relating to the route plan shall be presented in scale 1:5000 with OSI background and 1:50,000 on Discovery Series OSI background.

Drawings relating to plans and elevations of non-standard duct cross section shall be presented in scale of 1:100.

All drawings shall be on international A3 size.

Drawings shall be complete in all respects, accurate numerically and geometrically correct and shall be sufficiently detailed to enable construction to proceed without the need for further supporting drawings, details or interpretation. Drawings and calculation sheets which are not easily legible or present difficulty in interpretation will be returned by ESB Networks to the IPP for resubmission.

All drawings and calculation sheets shall have title blocks which shall be correlated one with the other. They shall be numbered in a logical sequence. The first edition submitted for review shall be Revision 0 (zero) and subsequent revisions shall be referred to a Revision 1, Revision 2, etc. Alternative systems shall be subject to ESB Networks' approval. Each revision shall be recorded in a revision block on the drawing and the subject matter of the revision shall be indicated. The revised portions of the drawings and design sheets shall be highlighted.

Digital Drawing Format

Drawings shall be submitted in one of the following CAD formats:

1. DGN or
2. DWG – with OSI background

and printable on PDF Format

and printed on two hard copies.

11.1.3 Design Drawings

Up to date Vector Ordnance Survey Strip mapping in National Grid Co-ordinates shall be used for the entire route.

The design survey shall determine points on the crown of the top duct(s) and shall record all hard detail (e.g. kerbs, buildings, footpaths, manholes, fences, bottom of banks etc.) along the proposed route of the cable.

Horizontal Accuracy

The cable/ducts shall be plotted on the background mapping in the horizontal plane (Easting and Northing). The same is required for the surveying of all Joint Bays, C2 Communication Chambers, Phase Sectionalising Kiosks, culvert crossings, bridge crossings, service crossings, etc.

The cable shall be represented on the plot by one continuous Smartline/Polyline from Joint Bay to Joint Bay. All bends along the cable route shall be reflected accurately as they will be installed. This shall be in the form of a continuous curve. The minimum number of points necessary for a radius bend is two – more points shall be surveyed where necessary.

Points shall be surveyed at 30.0m intervals or as necessary to record accurately the proposed position the underground power cable ducts and any cable protection cable ducts are to be installed in the ground.

Cross Section Information

Trench cross sections shall be detailed if the formation of the cable ducts deviates in any way from the standard trench cross section in this specification.

Where this arises for e.g. bridges, culverts, and watercourses, major transmission gas mains or drainage pipes, the trench cross section shall include details of these objects.

Any spare ducts for future use shall be recorded also.

Existing Utility Services

The location and depth of all services shall be displayed to the same tolerances as those outlined for displaying the proposed location of the cable ducts.

Information detailing the type and size of the service, e.g. “water main 125mm” shall also be included. Clearances from other services shall comply with the summary shown in the Appendices to this specification.

11.1.4 As-Built Route Drawings

The as-built route record of the installed ducts, depths and dimensions from adjacent landmarks shall be surveyed prior to backfilling.

Up to-date Vector Ordnance Survey Strip mapping in national Grid Co-ordinates shall be used for the entire route.

The survey instrumentation used shall be capable of recording the information within the tolerances set out in this specification.

The survey shall record points on the crown of the centre duct of the trefoil formation and a surface ground level shall be recorded adjacent to this point.

The survey shall also record all hard detail (e.g. kerbs, buildings, footpaths, manholes, fences, bottom of banks etc) along the route of the cable. The hard detail shall be coloured black and shall be suitably annotated.

Grid co-ordinates shall be shown for the centre point of all Joint Bays, C2 Communication Chambers, Phase Sectionalising Kiosks, culvert crossings, bridge crossings etc.

Horizontal Accuracy

The cable/ducts shall be surveyed and plotted on the background mapping to an accuracy of +/- 100mm in the horizontal plane (Easting and Northing). The same accuracy is required for the surveying of all Joint Bays, C2 Communication Chambers, Cable Sheath Link Chambers, Phase Sectionalising Kiosks, culvert crossings, bridge crossings etc.

The cable shall be represented on the plot by one continuous Smartline/Polyline from Joint Bay to Joint Bay. All bends along the cable route shall be reflected accurately as they exist on the ground. This shall be in the form of a continuous curve. The use of tangent lines shall not be suitable for recording such information. The minimum number of points necessary to survey a radius bend is three, more points shall be surveyed where necessary.

Points shall be surveyed at 20.0m intervals or as necessary to record accurately the true position of the power ducts in the ground.

Vertical Accuracy

The cable/ducts shall be surveyed and plotted on the background mapping to an accuracy of +/- 50mm in the vertical plane. All reduced levels shall be orthometric heights to OSI datum, mean sea level at Malin Head.

Points shall be recorded at a maximum of 20.0m separation, where the trench installation is as per the standard trench cross section. Where the trench depth deviates from the standard trench cross section, points shall be recorded as often as is necessary to achieve the tolerance as specified above.

Cross Section Information

Cross section drawings shall be provided where the vertical alignment of the cable/ducts deviates from the standard design cross section to avoid an obstruction. The trench cross section shall also include details of these objects.

Photographs shall be taken along the full length of the deviation from standard design, and shall show all stages of construction. These photographs shall be placed on the as-built drawing.

The as-builts shall also include on each drawing details of the standard cross sections used throughout the duct route.

Communication Ducting Cross over of Power Ducts

Any crossing of the communication duct over the power ducts shall be highlighted in the 'as built' documentation with specified accuracy (and with appropriate GPS).

Existing Utility Services

All existing services exposed by the trench excavation shall be recorded and plotted on the as-built record. The location and depth of these services shall be recorded to the same tolerances as those outlined for recording the location of the cable ducts.

The as-built record shall also be annotated with information detailing the type and size of the service e.g. Water main 125mm. Each crossing shall be assigned a unique crossing number.

Single Line Diagram

A single line diagram (SLD) from end termination to end termination shall be provided for the power cable and the communications/fibre optic cable. The SLD for the power cable shall show the phase conductor and screen conductor separately and shall detail all electrical terminations, links and joints. The SLD for the communications cable shall detail all joints. The location of all joints and links shall be referenced with the grid positions of joint bays and chambers.

Submittal

The 'as-built' drawings, Residual Risk Register shall be submitted to ESB Networks in the Safety File 6 weeks prior to the energisation date for review and acceptance.

11.1.5 Deviations from Specification

Where the IPP proposes a deviation from the detailed requirements of the Specification he shall make a written application for approval of such deviation to ESB Networks (in addition to highlighting such deviation in the equipment specification technical schedules) and he shall highlight the proposed deviation on the relevant drawings and design sheets of the submission. Except in the case of a deviation specifically approved by ESB Networks the IPP shall ensure the conformity of the Works with the Specification, notwithstanding any general approval or lack of approval of design submissions by ESB Networks.

11.2 Site Document File

The IPP shall maintain at the site a Site Document File incorporating all changes and modifications as they occur. The file shall include a Drawing/Document List, a Master Drawing File and a Master Technical Instruction File. The IPP's proposals for the Site Document File shall be submitted to ESB Networks for review.

The Drawing/Document List shall be prepared and updated regularly at periods to be decided by ESB Networks. The first issue shall be made within 30 days of the project start up and shall indicate the various types of drawings and documents which will be prepared during the project and the anticipated numbers

thereof. The list shall be updated as necessary and the status of each drawing/document shall be indicated under one or other of the following headings:

- Issued for review
- Reviewed with comments
- Issued for construction
- Issued "as built'

All changes and modifications to the Master Drawing Files and the Master Technical Instruction Files shall be highlighted in red markings.

11.3 Underground Power Cable Route Consents

11.3.1 Design Stage

The IPP may choose the method by which he establishes the entitlement to build and retain and provide access to the underground power cable route through third party lands over the operational lifetime of the cable assets. The entitlements shall be obtained for the benefit of ESB Networks and shall be assigned to ESB Networks as set out in the Connection Agreement.

11.3.2 Pre-Construction

Before commencement of construction and with timing consistent with the requirements of the Connection Agreement, the IPP shall submit documents relating to the consents for the construction of the underground electric line. These shall include:

- Planning permission application and grant of permission documentation
- Confirmation of exemption from planning permission where appropriate
- Wayleave management plans including route and landowner details maps
- Draft wayleave agreements for all of the third party lands traversed
- Proof of title for the third party properties traversed
- Confirmation that all roadways traversed have been taken in charge by the local authority
- Road opening licences from the local authority for roads taken in charge
- Consents from any other relevant authority, e.g. Waterways Ireland, Fisheries Board

Where the IPP is authorised by the Commission for Regulation of Utilities (CRU) to implement the statutory wayleave process, as per the Electricity Acts, to achieve route consents, the IPP shall submit the following additional items in lieu of the Draft wayleave agreements:

- Copies of survey notice
- Copies of wayleave notice
- Proof of service of wayleave notice
- Letters of objection where these were received
- Evidence of withdrawal of objection

11.3.3 Pre Handover

Before Handover and as required by the Connection Agreement the IPP shall submit, sufficiently in advance of energisation to enable satisfactory verification of title:

- Copies of executed Deeds of wayleave for all of the third party lands traversed including copy of map used for registration in PRA
- Details of future access agreements including access route maps.

11.4 Operation and Maintenance Instruction Manuals

Operation and Maintenance Instructions shall be prepared in the form of an instruction manual for use by ESB Networks personnel. Draft copies for ESB Networks comment shall be submitted three months before commencement of construction.

Final Operation and Maintenance Instruction Manual shall be submitted to ESB Networks three months before the Handover Date.

Two hard copies and one soft copy shall be submitted in each case.

The preparation of the manual shall be carried out by personnel who are trained and experienced in the operation and maintenance of the plant described and who are skilled as draughtspersons/CAD operators competent to prepare the required drawings.

The format of the manual shall be on A4 size white paper with neatly typed text and similarly sized manufacturer's printed data sheets. Drawings shall be provided with durable punched reinforced plastic edge and shall be folded to A4 size. They shall preferably not exceed 297mm in height and shall be arranged such that they may be easily unfolded and refolded as required. The text, printed matter and drawings shall be placed in commercial, durable four-ring binders with cleanable plastic or metal covers. The number of volumes shall be adequate for the material to be bound and the instructions shall be correlated into consistent related groupings. Each volume of the manual shall be clearly identified on the front and on the spine of the binder with the title "Operation and Maintenance Instructions", the title of the project, the name of the substation, the volume number and identity of the general subject matter covered in the manual. In addition, suitable provision should be made on the spine and front for the reference number of ESB Networks.

Each volume shall contain a summary table of contents for the entire manual and a detailed table of contents for that particular volume. Pages shall be numbered sequentially. The IPP's name, address and telephone number shall be given. Where the volume refers to Sub-Contractors plant, the name, address and telephone number of the Sub-Contractors shall be given with a clear reference to the items of plant supplied.

Only the manufacturer's printed data which is pertinent to the specific plant supplied shall be included. The manuals shall be free from irrelevant matter such as might be contained in manufacturers' general brochures. Each sheet of the manufacturer's instructions shall be annotated to identify clearly the specific item or part installed and the instructions applicable to such installation and where they are located. All inapplicable instructions shall be deleted. Plant data shall be supplemented with drawings as necessary to illustrate clearly component parts, systems and control diagrams. Manufacturers' printed instructions shall be supplemented with typed text setting out particular aspects of the installation.

12.0 Tests

12.1 Test and Inspection

In accordance with the agreed programme the IPP shall submit for review by ESB Networks a Test and Inspection Plan for all items of the Works whether at the Site or elsewhere up to the date of certification of completion in accordance with the provisions of the agreement and ESB Networks specification. Such a plan shall be in two parts covering factory tests and site tests respectively. The plan shall include a description of the item or part of the Works to be inspected or tested, the nature and frequency of the inspection and testing, the type and size of samples to be taken (if any), the means of recording the test and inspection data, the name and specific responsibilities of any proposed test and inspection agency and all other information necessary to describe the test or inspection to be performed.

Not later than two months prior to the commencement of any particular test full details of the proposed method of test, test parameters and test circuits shall be submitted for ESB Networks' review and following such review shall become part of the Test and Inspection Plan.

Such a plan, as reviewed by ESB Networks, shall be used for the inspection and testing of the Works and shall be revised and resubmitted for ESB Networks review if the IPP desires to change the sequence, method or nature of the test or inspection or if such a change is required by changes in the Works Programme or scope of the Works.

Measuring equipment shall be subject to the ESB Networks' review and if required by ESB Networks it shall be calibrated at such independent laboratory as may be agreed. The cost of any such calibration shall be borne by the IPP.

The cost of all tests required by the Specification, including the cost of providing samples where needed, shall be borne by the IPP.

No approval of tests or inspection of the Works or portions of the Works by ESB Networks shall not relieve the IPP of his responsibility to complete the Works according to the Specification, including the satisfactory execution of all necessary site inspections and tests nor shall it relieve him of his duties and obligations under the Agreement.

12.2 Factory Tests

Sample, Routine and Type tests shall be performed on all underground power cable system components and cable ancillary equipment as set out in ESB Networks' Specifications.

If an IPP wishes to obtain an exemption from Type Tests, he shall submit to ESB Networks certified copies of Test reports, performed on identical underground power cable components, proving that the underground power cable components concerned, meet the requirements of particular ESB Networks' Material Specifications.

Type test certificates submitted with the design review shall show proof of independent witness where ESB Networks Material Specifications require it.

In the case of cable system components, for which specific type tests or routine tests are not called for in the particular Material Specification, such as precast vaults or joint bays, the IPP shall include in the Test and Inspection Plan details of all tests proposed prior to delivery. Certificates of all such tests shall be submitted to ESB Networks.

All tests shall be carried out to the satisfaction of ESB Networks and no underground power cable system components shall be dispatched from the IPP's supplier's production facilities prior to ESB Networks' written acceptance of the test results.

The IPP shall provide adequate notice of factory tests/inspections for underground power cable system components to allow ESB Networks to witness the tests if so desired. Witnessing of tests shall not relieve the IPP of any responsibility with respect to conforming to this specification. If tests are not witnessed by ESB Networks, then factory tests certificates shall be forwarded to ESB Networks for review before the IPP approves dispatch of any underground power cable system components from the IPP's supplier's production facilities.

12.3 Construction Monitoring

12.3.1 Site Tests

During the course of duct installation and cable installation, ESB Networks may require, in addition to photographic evidence taken at 20-50m intervals, site tests, including test excavations and in-duct camera investigation, to be carried out on the Works to confirm compliance with ESB Networks specification and

with IPP's design. These tests shall be undertaken by, and at the expense of, the IPP and shall be witnessed by ESB Networks.

Records of cable pulling and duct proving tests shall also be recorded using the ESB Networks approved form, winch print out for review by ESB Networks in all cases.

In-duct camera equipment shall be capable of travelling from any joint bay to the next joint bay.

Cables shall not be installed or energised (if already installed) where such tests reveal the works are not compliant with specification.

12.3.2 Duct Test Witnessing

ESB Networks reserves the right to witness duct proving at completion stage. Adequate notice shall be given for these proving tests.

13.0 Project Milestones

Submittal of documents from IPP to ESB Networks shall be consistent with the project milestones identified below. Construction monitoring by ESB Networks, as provided for in the Connection Agreement and in the Specification, shall be carried out to demonstrate that the installed cable system complies with the Connection Agreement and Specification.

1. Offer Acceptance/Route selection for the underground power cable submission to ESB Networks for review and comment
2. Submission of Planning Application to planning authority
3. Design submission to ESB Networks for review and comment
4. ESB Networks' review of comments on IPP's design
5. Cable system ordering including ducting and thermal backfill materials
6. Cable System Test certification
7. Duct installation and reinstatement in accordance with Specification
8. Duct proving Certification
9. Wayleaves/Cable Easements to be executed between IPP and ALL third-party landowners and Authorities e.g. Waterways Ireland etc. prior to energisation of the cable circuit
10. Provision of spares
11. Pre-commissioning completion/certification
12. Draft Safety File submission
13. Commissioning Test Certificates
14. Execution of the Handover Agreement
15. Issuing of the Handover Certificate
16. Final Safety File submission
17. Energisation of Works

Appendix 1. Weekly Quality Report

NETWORKS Weekly Quality Report

Project Name:

PSCS:

ESB Networks Rep on Site:

Monday	Tuesday	Wednesday	Thursday	Friday

Location XY coordinates:

Monday	Tuesday	Wednesday	Thursday	Friday

Pictures of works to include: templates, compaction, duct installation, measurements from other services, material used, crews, duct storage, sample copy of delivery dockets, trench build up covering each step etc.

Example of Picture dimension, also clarity required so user can zoom in to assess trench construction and quality.

Drawing Number Used:

Appendix 2. Form of Handover Agreement of the Scheduled Contestable Components

THIS HANDOVER AGREEMENT is made the [ ] day of [ ] 20[ ]

BETWEEN:

(1) ESB Networks Ltd whose registered office is at Clanwilliam House, Clanwilliam Place, Dublin 2 (hereinafter called the "Company"); and

(2) [ ] (the "Customer"), whose registered address is [ ] and Company Registration Number is [ ] (hereinafter called the "**Customer**")

(hereinafter collectively referred to as the "Parties")

WHEREAS:

A. This Handover Agreement is made to facilitate the Company's operational control of the Contestable Components that are more particularly shown on the single line diagram attached at Schedule 1 hereto (the "Scheduled Contestable Components") after the Commissioning phase and pending the formalisation of the property transfer from the Customer to ESB in accordance with the provisions of the Connection Agreement entered into on the [ ] day of [ ] 20[ ] relating to [insert name of Windfarm] (hereinafter referred to as "the Agreement") and in accordance with the terms and conditions contained therein between the Company and the Customer and the terms and conditions of this Handover Agreement.

B. The references and definitions used in this Handover Agreement shall have the meaning assigned to them in the Agreement unless otherwise stated herein or where the context otherwise requires.

THE PARTIES HEREBY AGREE in consideration of the Company paying the Customer the sum of €1 the Parties hereby agree that the following terms and conditions shall apply to this Handover Agreement:-

1. Without prejudice to its rights under Clause 3 hereof, the Company confirms that the Scheduled Contestable Components are substantially complete following the conclusion of the Commissioning phase, in accordance with Appendix 3 of the Agreement with the exception of the Snag List attached at Schedule 2 hereto.

2. The Customer hereby certifies that he has taken-over the Scheduled Contestable Components from his contractor/supplier (which means in practical terms that risk and title in the Scheduled Contestable Components have passed to the Customer).

3. The Parties agree that the Company shall assume operational control of the Scheduled Contestable Components on the time and date recorded on the executed Handover Certificate subject to the principle that any faults arising from or discovered pursuant to Commissioning, Commissions Tests,, Energisation and/or all defects covered by the warranties set out in the Agreement or otherwise caused by breach of the agreement by the Customer and/or negligence of the Customer shall be rectified by the Customer in accordance with the provisions of the Agreement. It is agreed and accepted that it is intended that the target handover of the Scheduled Contestable Components shall occur on the [ ] day of [ ] 20[ ] and confirmation of the precise timing of actual handover shall be certified by the Parties in the same format as the Handover Certificate set out in Schedule 3 attached hereto.

4. Subject to the terms of Clause 1 above occurring, the Parties agree that access to the Scheduled Contestable Components for the Customer shall be subject to agreement from the Company. Further, at the request of the Company, the customer shall complete outstanding items on the Snag List and shall resolve all faults arising from or discovered pursuant to Commissioning, Commissioning Tests, Energisation and/or all defects covered by the warranties set out in the Agreement, or otherwise caused by breach of the agreement by the

Customer and/or negligence of the Customer. The access route to the Scheduled Contestable Components shall be maintained by the Customer until the formalisation of the property transfer from the Customer to ESB in accordance with the Agreement, as appropriate.

5. The Parties agree that ESB Safety Rules shall apply to the Scheduled Contestable Components.
6. This Handover Agreement shall be read as supplemental to the terms of the Agreement and in the event of any inconsistency between the terms of this Handover Agreement and the Agreement, insofar as any inconsistency exists, the Agreement shall prevail.
7. For the avoidance of doubt, this Handover Agreement shall terminate on the formalisation of the property transfer from the Customer to ESB in accordance with the Agreement.

Signed for and on behalf of [ ] (the "Customer")
In the presence of:-

Signed for and on behalf of
ESB Networks LtD
In the presence of:-

Schedule 1

Single Line Diagram showing the Scheduled Contestable Components

Schedule 2

Snag List

Schedule 3

Form of Handover Certificate

To: [the Customer]
[Address]

It is hereby certified that the Handover of the Scheduled Contestable Components as defined in the Handover Agreement for [insert name of Windfarm] took place at am/pm on the [ ] day of 20 .

Signed for and on behalf of
ESB Networks Ltd
In the presence of:-

Schedule 4

Checklist of Project Milestone Documentation for completeness in accordance with Section 13.