

Application for a New Connection

FOR OFFICIAL USE ONLY

B.P. No: _____

MPRN: _____

Introduction

This application form outlines the information ESB Networks DAC requires to progress an application for connection to the Electricity Distribution System. All applications must comply with the Distribution Code and ESB Networks DAC Conditions Governing Connection to the Distribution System. These can be found on our website: esbnetworks.ie.

Please note that this application form only deals with LV (230/400V), 10kV, 20kV, 38kV and in some cases, 110kV connections. If a higher connection voltage is required the applicant should contact the Customer Relations Team in EirGrid: +353 1 237 0472 or info@eirgrid.com.

ESB Networks DAC reserves the right to request additional data if necessary and the applicant should provide such information promptly during and post the offer process.

It is ESB Networks DAC responsibility to determine distribution connection method. If the applicant has a specific request this will be considered and examined in this process. The selected method will be based on the overall least cost technically acceptable solution **unless the Applicant requests otherwise or ESB Networks DAC requires an alternative method for system reasons.**

This application form must be submitted in **electronic format**. Electronic files must be submitted via email (all electronic files should be a cumulative maximum of 5MB or less).

Definitions of terms used in this form can be found in the glossary of the Distribution Code.

When the application form is fully completed email the form and all relevant documentation to:

DSOGenerators@esb.ie

If any queries arise ESB Networks DAC can be contacted at 1800 372 757 or DSOGenerators@esb.ie

Please note that in accordance with the Commission for Regulation of Utilities, some information from your completed application form will be published on the ESB Networks website: esbnetworks.ie. Please also see CRU's website for more detail: cru.ie.

Please Note: Information contained within this application form may need to be shared with the Transmission System Operator in order to sufficiently assess your application.

The Form NC5 should be used where an applicant has identified their specific generator manufacturer detail and would like their technical study processed using the specified data provided by the applicant. Form NC5A is a shortened version of this form and may be used where the specific generator manufacturer detail is unknown at time of application. Therefore the technical study is completed using assumed data and the applicant is required to provide their specific data a year in advance of energisation. For more detail on which is the most suitable, please refer to our website esbnetworks.ie

Please note: Incomplete applications will not be accepted.

[illegible]

Please visit the Large scale generation section of our website esbnetworks.ie for more information on application and modification fees.
Please refer to our website esbnetworks.ie on payment methods available.
Applications submitted without this fee will be returned.

Noted * Date of EFT Payment

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A 1:50,000 “Discovery Series” Ordnance Survey map, with the location of the connection point clearly marked with an “X” and indicating the site boundary. A plan of the site (in an appropriate scale) of the proposed facility (including any existing generation installation), indicating the site boundary, the proposed location of the connection point, generators, transformers, site buildings etc.

A draft electrical single line diagram of the proposed facility detailing all significant items of plant and their values including:

- Relevant Voltage Levels
- Interlocking
- Earthing and Synchronising Arrangements
- Relay Types
- CT/VT ratios
- Generator Transformer(s)
- Power Factor Correction
- Location of Alternative Connections (e.g. house load)
- Network Connecting Transformer(s) (if applicable)

Please note: we will not be able to process your application without these maps/diagrams

[illegible]

Total Number of Generation Units/Inverters:

For thermal plant only: please provide a functional block diagram of the main plant components, showing boilers, turbines, heat recovery boilers, alternators, any heat or steam supplies to other processes etc. indicating e.g. whether single shaft or separate shaft
Please note: we will not be able to process your application without this.

	Unit 1 (or Type 1)	Unit 2 (or Type 2)	Unit 3 (or Type 3)	Unit 4 (or Type 4)
Type of Generation Plant: (i.e. Wind, Solar, CCGT, OCGT, Biomass, etc.)				
If two or more technology types are to be constructed under this MEC, please state what portion of the MEC (as set out in General Details Section) is attributed to each type of generation plant:				
Make/Version of Generator:				
Type of Generator: [synchronous, asynchronous, converter connected, etc.]				
Number of generators of type:				
Installed Generation Capacity (MW) per Unit/Inverter:				
Generator Rated MVA:				
Generator Voltage (kV):				
Please provide details of the expected running regime: (i.e. continuous/peak lopping/peak shaving)				
Are any of the generator units already installed on a non-exporting basis (MEC=0)?	Yes No	Yes No	Yes No	Yes No
For Solar, is the installation Ground mounted?	Yes No	Yes No	Yes No	Yes No
For Solar, please state the total installation of panels (MWs)				

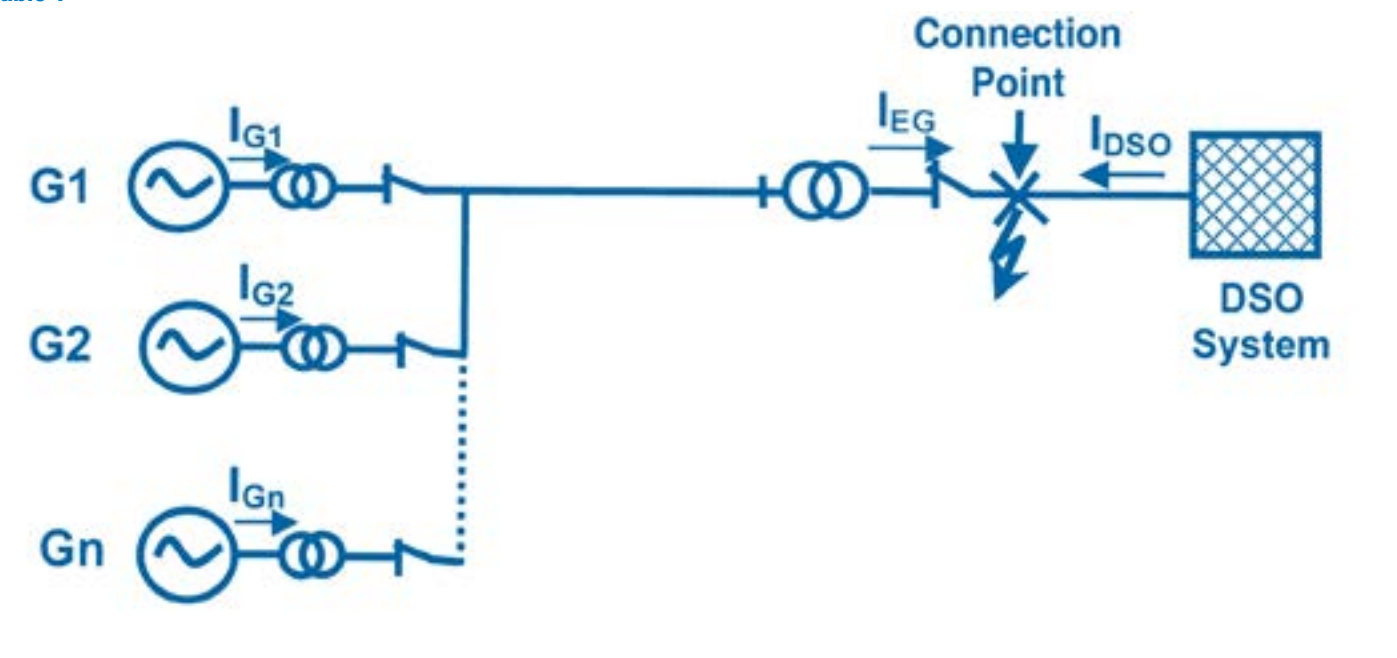
Please provide a calculation sheet (in addition to the fault current figures requested in Table 1) showing the fault current available (r.m.s. value of the a.c. symmetrical component) from the Embedded Generation Facility due to a fault at the Connection Point when all generating sets are operating in parallel with the Electricity Distribution System.

8. TECHNICAL DETAILS: Cont'd (This section must be completed in full. A reference to another document is not acceptable and will be deemed incomplete.)

Short Circuit Current Contribution from Embedded Generation Facility IEG [kA] [RMS]	Fault types applied at Connection Point		
	Three-Phase	Phase-to-Phase	Single-Line to-Ground (*)
t = 0.00s			
t = 0.02s			
t = 0.04s			
t = 0.06s			
t = 0.08s			
t = 0.10s			
t = 0.12s			
t = 0.14s			
t = 0.16s			
t = 0.18s			
t = 0.20s			
t = 0.30s			
t = 0.40s			
t = 0.60s			
t = 0.90s			
t = 1.30s			
t = 1.70s			
t = 2.00s			
t = 3.00s			

(*) Not necessary for connections at 10kV or 38kV.

Table 1



- Legend:
- EG: Fault Current Contribution from Embedded Generation Facility
 - DSO: Fault Current Contribution from DSO System
 - IGn: Fault Current Contribution from Individual Generation Unit

Figure 1 Embedded Generation Facility and Fault Current Contributions

9. NETWORK CONNECTION TRANSFORMER DATA (if applicable):

There are many types of transformers. This application specifies two winding transformers. All impedances should be stated in % on transformer rated MVA and kV.

Please note that the connection voltage is determined by ESB Networks DAC in accordance with normal standards, as outlined in the Distribution Code, taking into account the particulars of each application. If the connection voltage is different to that assumed in the application, ESB Networks DAC will request new data corresponding to the new voltage level and the process will stand suspended until such reasonable data is obtained.

Please note that a full manufacturers test report may be required at a later stage. Noted

State number of transformers proposed at the network connection point
(at the connection voltage level i.e. not transformers associated with individual generators): _____

Transformer Rated MVA: _____

Transformer Voltage Ratio HV/LV [kV]: _____

Transformer Winding Configuration: _____

Transformer positive sequence resistance (R_1 %): _____

Transformer positive sequence reactance (X_1 %): _____

Transformer zero sequence resistance (R_0 %): _____

Transformer zero sequence reactance (X_0 %): _____

Please provide details of Tap Changer. Nature of tap changer (off load/on load/ off circuit)

Tapped Voltage Winding: _____ kV + _____ Steps - _____ Steps _____ % Step Size

10. GENERATOR TRANSFORMER DATA (i.e. transformers associated with individual generators):

	Unit 1 (or Type 1)	Unit 2 (or Type 2)	Unit 3 (or Type 3)	Unit 4 (or Type 4)
Generator Transformer Rated MVA:				
Generator Transformer Voltage Ratio HV/LV kV:				
Generator Transformer Winding Configuration:				
Generator Transformer positive sequence resistance (R_1 %)				
Generator Transformer positive sequence reactance (X_1 %)				
Generator Transformer zero sequence resistance (R_0 %)				
Generator Transformer zero sequence reactance (X_0 %)				
Please provide details of Tap Changer. Nature of tap changer (off load/on load/ off circuit)				

Tapped Voltage Winding: _____ kV + _____ Steps - _____ Steps _____ % Step Size				

11. POWER QUALITY

Please note that questions regarding power quality will be included with the Connection Agreement and MUST be completed at that stage for the Connection Agreement to be valid.

Noted

12. INDEPENDENCE OF CONTIGUOUS GENERATORS:

A Generator Power Station will be deemed to be unrelated to and independent of the other Generator Power Stations already present in a Contiguous Generator Site ("Independent Generator Power Station") if:

- the Applicant, where a body corporate, is not a related undertaking of another Generator Power Station already present in the Contiguous Generator Site or in respect of which an application for a Connection Agreement has been made to the DSO or the TSO;
- no person or body corporate holding 50% or more of the equity or voting rights in the Applicant is a person connected with any other person or body corporate holding 50% or more of the equity or voting rights in another Generator Power Station present in the Contiguous Generator Site ("Connected Person").

The Generator Power Station is/will be independent from contiguous Generators Yes No

PART 2 - ALL SYNCHRONOUS GENERATORS ONLY

13. GENERATOR DATA FOR FAULT STUDIES

QUESTIONS APPLY TO SYNCHRONOUS GENERATOR APPLICANTS ONLY	Unit 1 (or Type 1)	Unit 2 (or Type 2)	Unit 3 (or Type 3)	Unit 4 (or Type 4)
X_d^1 - Generator Direct Axis Transient Reactance (saturated): (pu on machine MVA base)				
X_d^{11} - Generator Sub-transient Reactance (saturated): (pu on machine MVA base)				
X_2 - Generator Negative Phase Sequence Synchronous Reactance: (pu on machine MVA base)				
X_0 - Generator Zero Phase Sequence Reactance: (pu on machine MVA base)				
X_d^1 - Generator Direct Axis Transient Reactance (unsaturated): (pu on machine MVA base)				
X_d^{11} - Generator Sub-transient Reactance (unsaturated): (pu on machine MVA base)				
Generator Direct Axis Positive Phase Sequence Synchronous Reactance: (pu on machine MVA base)				
Generator Quadrature Axis Positive Phase Sequence Synchronous Reactance: (pu on machine MVA base)				

14. GENERATOR DATA FOR DYNAMIC SOLUTION

QUESTIONS APPLY TO SYNCHRONOUS GENERATOR APPLICANTS ONLY	Unit 1 (or Type 1)	Unit 2 (or Type 2)	Unit 3 (or Type 3)	Unit 4 (or Type 4)
Generator Quadrature Axis Transient Reactance (unsaturated): (pu on machine MVA base)				
Generator Sub-transient Reactance (unsaturated): (pu on machine MVA base)				
Armature Leakage Reactance				
Generator Direct Axis Transient open circuit Time Constant: (pu on machine MVA base)				
Generator Direct Axis Subtransient open circuit Time Constant: (pu on machine MVA base)				
Generator Quadrature Axis Transient open circuit Time Constant: (pu on machine MVA base)				
Generator Quadrature Axis Subtransient open-circuit Time Constant: (pu on machine MVA base)				
Inertia of complete turbogenerator (MWsecs/MVA) (pu on machine MVA base)				

PART 3 - ALL NON-SYNCHRONOUS GENERATORS ONLY

15. MAINS EXCITED NON-SYNCHRONOUS GENERATORS ONLY:

State how the generator is run up to synchronous speed (prime mover, separate motor, generator operated as a motor).

Magnitude and duration of inrush/starting current: _____ Amps at _____ kV for _____ ms

Starting/ paralleling frequency (i.e. times per hour): _____

Power Factor on starting: _____

Reactive power demand at zero output ('no load') : _____ kVAr and maximum output : _____ kVAr

Details of reactive power compensation to be installed & the charging current available from cable circuits within the Embedded Generation Facility:

Please provide the below specified currents or submit a short circuit current decrement curve (current vs time) representing your generators:

I_p - Peak short circuit current

I_k - Steady state short circuit current

Unit 4 (or Type 4)

17. NON-SYNCHRONOUS GENERATORS:

(fixed speed stall regulated; fixed speed pitch regulated; fixed speed pitch regulated with variable rotor resistance; variable speed with doublyfed induction generator; variable speed with synchronous generator and fully-rated converter or other specified type)

Unit 4 (or Type 4)

Please note: we will not be able to process your application without this

Further, if the appropriate model has already been provided to EirGrid by the manufacturer then the same model does not need to be provided again as long as the applicant explicitly advises the following for the model in question:

The remaining questions in part 4 are only to be filled in if the applicant is not submitting a dynamic model

18. DYNAMIC SIMULATION DATA: Cont'd

	Type 1	Type 2	Type 3	Type 4
Generator				
Base voltage (kV)				
Base MVA				
Maximum power (MW)				
Minimum power (MW)				
Stator Resistance (pu)*				
Stator Inductance (pu)*				
Magnetising Reactance (pu)*				
Frequency Protection Scheme (if it exists)				
Rotor Resistance (pu)*				
Rotor Inductance (pu)*				
Inertia constant H of the entire drivetrain [MW.s/MVA]				
Voltage protection scheme (if it exists)				
Under voltage limit (pu)				
Under voltage pick up time (seconds)				
Under voltage breaker time (seconds)				
Over voltage limit (pu)				
Over voltage pick up time (seconds)				
Over voltage breaker time (seconds)				
Under frequency limit (pu)				
Under frequency pick up time (seconds)				
Under frequency breaker time (seconds)				
Over frequency limit (pu)				
Over frequency pick up time (seconds)				
Over frequency breaker time (seconds)				

PART 5 - NON-SYNCHRONOUS GENERATORS WITH AN MEC GREATER THAN 5MW

19. NON-SYNCHRONOUS GENERATORS

State the generator type: (fixed speed stall regulated; fixed speed pitch regulated; fixed speed pitch regulated with variable rotor resistance; variable speed with doubly-fed induction generator; variable speed with synchronous generator and fully-rated converter or other specified type)

Unit 1 (or Type 1)	
Unit 2 (or Type 2)	
Unit 3 (or Type 3)	
Unit 4 (or Type 4)	

Please attach the approved power curve

Please note: we will not be able to process your application without this

20. INTERNAL NON-SYNCHRONOUS GENERATOR NETWORK STRUCTURE AND CORRESPONDING DATA:

Please describe how the non-synchronous generators internal network structure (collector network) will be laid out. The description should include a breakdown of how the individual generator units are connected together as well as how they are connected back to the generator substation. Please specify different cable sizes and individual lengths of cable.

Name of internal network structure attachment

[illegible]

20. INTERNAL NON-SYNCHRONOUS GENERATOR NETWORK STRUCTURE AND CORRESPONDING DATA: Cont'd

	Type 1		Type 2		Type 3		Type 4	
Generator								
Conductor cross section area per core (mm ²)								
Conductor type (Al, Cu, etc)								
Type of insulation								
Charging capacitance (μF/km)								
Charging current (Ampere/km)								
Positive sequence resistance (R ₁ Ohm/km)								
Positive sequence reactance (X ₁ Ohm/km)								
Zero sequence resistance (R ₀ Ohm/km)								
Zero sequence reactance (X ₀ Ohm/km)								
Please state the power factor ranges of the generators at the specified active power percentages and then specify the equivalent MVar capability	10%		50%		100%			
	Ind	Cap	Ind	Cap	Ind	Cap		
Power Factor of Generators								
Equivalent MVar								

Please provide reactive power capability curve for the generator site as measured at the LV side of the grid connected transformer. The capability curve should specify MVar vs MW for the entire range of MW output. The curve should be consistent with the answers given in the following questions. Please note that the generator site must comply with the Distribution Code.

Number of inductive devices

Indicate for each device the inductive MVar. If the device has more than one stage please indicate the number of stages and the MVar capability switched in each stage.

MVAr in	Steps	MVAr in	Steps	MVAr in	Steps
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Number of capacitive devices

Indicate for each device the Capacitive MVar. If the device has more than one stage please indicate the number of stages and the MVar capability switched in each stage.

MVAR in Steps MVAR in Steps MVAR in Steps

Please indicate the inductive MVar contribution of the internal non-synchronous generator structure (i.e. 20kV cable)

Provide details of start-up regime. (Number of simultaneous starts, use of control system etc.) TECHNICAL DETAILS REQUIRED

Age Group	Percentage
18-24	10%
25-34	15%
35-44	20%
45-54	25%
55-64	30%
65-74	35%
75-84	40%
85+	45%

21. DYNAMIC SIMULATION DATA:

In the connection offer process the dynamic impact of the generator on the transmission and distribution systems is examined. To be able to carry out dynamic simulation the applicant needs to submit a dynamic model of their generator. This dynamic model should be available from the manufacturer.

Please submit a dynamic model and all data and parameter values required for the dynamic model. The dynamic model should be suitable for software program PSS/E and specific to the type of generator unit to be installed. This should be submitted in electronic version.

Please note: we will not be able to process your application without this. However, if the appropriate model has already been provided to EirGrid by the manufacturer then the same model does not need to be provided again as long as the applicant explicitly advises the following for the model in question:

The version number of the model

A horizontal number line with 20 tick marks, labeled from 0 to 19. The line is blue and the labels are black.

The sender (i.e. name & company) of the model:

A horizontal number line with 20 evenly spaced tick marks, labeled from 1 to 20.

The (EirGrid) recipient of the model

Specify by what method the model was sent (e.g. email, CD etc):

[illegible]

The date the model was sent to EirGrid

Please submit a written statement, preferably from your manufacturer, detailing confirmation of commitment to “meaningful engagement” to progress the level of modelling to an appropriate validated model. “Meaningful engagement” shall be interpreted as:

- a.** commitment on the part of the applicant to deal with and respond to issues raised by EirGrid with regard to the generator and generator modelling in a timely manner and
- b.** the applicant providing details of a specific contact(s) to deal with issues and queries relating to the performance and modelling of the generator, the overall performance and modelling of the generator and the operation of the PSS/E dynamic model.

Please note: we will not be able to process your application without this.

PART 6 - DS3 APPLICANTS ONLY

22. DS3 TECHNICAL DETAILS REQUIRED¹:

Please indicate which services can be provided

FFR	POR
0.85	0.85
0.80	0.80
0.75	0.75
0.70	0.70
0.65	0.65
0.60	0.60
0.55	0.55
0.50	0.50
0.45	0.45
0.40	0.40
0.35	0.35
0.30	0.30
0.25	0.25
0.20	0.20
0.15	0.15
0.10	0.10
0.05	0.05
0.00	0.00

Fast Frequency Response

What level of FFR can be provided? (MW)

For how many hours per year can the service be provided? _____ Hrs

Service at low MW outputs

Can the service be provided at 0MW output levels?	Yes	No
Can the service be provided at 0MW output levels?		

Can the service be provided while operating below 20% of MEC? Yes No

Primary Operating Reserve

What level of POR can be provided? (MW)

For how many hours per year can the service be provided? Hrs

Service at low MW outputs

Can the service be provided at OMW output levels?	Yes	No
Can the service be provided at OMW output levels?		

Can the service be provided while operating below 20% of MEC? Yes No

¹If an applicant makes a false, misleading or inaccurate declaration in respect of DS3 eligibility requirements, this will be deemed to be an "event of default" under any resulting connection agreement.

23. PLANNING PERMISSION CONFIRMATION¹: (This section applies to all applicants)

Yes: go to **A: Planning status**

A: Planning status

Acknowledged/validated

OR

Extension applied for?	Yes	No	N/A
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Applicant Signature: _____ **Date:** | | | | | | | | | |

Signed: _____ **Date:** | | | | | | |

Response	Percentage
U.S. should take action	71%
U.S. should not take action	27%

²As per the Law Society of Ireland (www.lawsociety.ie). ³As per the Irish Planning Institute (www.ipi.ie) or Royal Town Planning Institute (www.rtpiconsultants.co.uk)

24. LANDOWNER CONSENT CONFIRMATION¹:

I, (Name in Block Capitals):

Position:

on Behalf of (Company Name in Block Capitals as specified in Applicant Details of this application form)

confirm that all necessary landowner consents are in place for the substation at the coordinates as specified in Site Details of this application form and the generation site.

Applicant Signature: **Date:**

and verified by Solicitor (Name in Block Capitals)

Signed: **Date:**

Solicitor Number:

Solicitors Address

Please note the application will be returned to the applicant if submitted without a solicitors stamp and / or solicitor number.

Solicitors stamp:

¹Landowner consent is the responsibility of the applicant. ESB Networks DAC accepts no responsibility for checking details of landowner consent. If an applicant made a false, misleading or inaccurate declaration in respect of landowner consent, this will be deemed to be an "event of default" under the connection agreement.

25. SIGNATURE OF APPLICANTS:

I/We accept ESB Networks DAC General Conditions relating to the connection and all amendments, which ESB Networks DAC may make from time to time. I/We agree to grant ESB Networks DAC all necessary access to bring the network to the premises. I/We acknowledge that ESB Networks DAC shall be entitled to connect other customers to the network.

Signature of Applicant: **Date:**

If signing on behalf of a Partnership, Limited Company, or other Legal Entity, or as a duly Authorised Agent.

Full Name in Block Capitals:

Position:

[ESB Networks DAC may require the signatory to produce evidence of authority to bind the applicant by his/her signature].

Signature of Witness: **Date:**

Full Name in Block Capitals:

Address of Witness:

DATA PROTECTION

ESB Networks DAC may use your personal data to the extent necessary (a) to set up and manage your connection agreement (b) for compliance with its licence and other legal obligations; and/or (c) for its legitimate interests (provided those interests do not conflict with your fundamental rights and freedoms) Personal data provided by you in this application form may be disclosed to other parties in the following circumstances:

- In performing its functions, ESB Networks DAC may utilise the services of contractors or other suppliers. ESB Networks DAC may disclose your data to these parties to the extent necessary to perform their functions and provided they are only permitted to use your data as instructed by ESB Networks DAC. They are also required to keep your data safe and secure.
- ESB Networks DAC may make available the existence, location and/or technical aspects of your connection to licensed electricity supply companies and other parties involved in your electricity supply. In the case of new connections, ESB Networks DAC will make available your telephone contact number to licensed electricity supply companies in order to facilitate energisation of the connection.
- ESB Networks DAC may be required by law, or our license obligations, to provide data that ESB Networks DAC holds about you, your electricity supply or connection, to government agencies or departments, the Commission for Regulation of Utilities or other third parties.
- Contact details may also be provided to a professional third party market research company for the purposes of researching your satisfaction with the services provided by ESB Networks DAC. This information may also be used to enhance our services as the Distribution System Operator.

NOTE 2

Safety Message

- If there are any overhead electricity lines on the site these may need to be diverted or put underground before any construction works commence. Requests for line alterations should be made to ESB Networks DAC at an early stage - see www.esbnetworks.ie for advice on how to initiate such requests.
- Refer to the HSA Approved “**ESB Networks Code of Practice for Avoiding Danger from Overhead Electricity Lines**” for safety guidance in relation work in the vicinity of overhead lines - available on the HSA and ESB Networks DAC websites or order free printed copies from ESB Networks DAC. Tel. 1800 372 757 or 021 2386555.
- Refer to “HSA Code of Practice for Avoiding Danger from Buried Services” for safety guidance in relation to underground electricity cables - available on the HSA website.
- ESB lines/cables map records are available from Central Network Mapping - Telephone: 1800 928 960, or by email: dig@esb.ie.

PLEASE REMEMBER!
DON'T BUILD UNDER OR NEAR ELECTRICITY WIRES
STAY SAFE STAY CLEAR
OF ELECTRICITY WIRES
ESB NETWORKS DAC



Note: ESB Networks DAC reserves the right to request additional data if necessary and the applicant agrees to provide such information promptly. The connecting party will be required at the relevant time to comply with Connection Agreement and the Distribution Code and provide information in accordance with these documents. ESB Networks DAC regrets it cannot accept responsibility for delays or mistakes if this application is completed incorrectly. If this application is incomplete the form will be returned to you.

ESB Networks DAC

Directors: Marguerite Sayers (Chairperson), Nicholas Tarrant, Caroline Spillane, Ian Talbot, Michael Nolan.

Registered Office: ESB Networks, Leopardstown Road, Dublin 18, D18XN80, Ireland.

Registered in Ireland No. 465172