# Dublin North Fringe 220 kV Reinforcement Project

## Functional Parameters for Site Selection

### Assumptions

Please note the study area falls into two jurisdiction which are Fingal county council and Dublin City Council. As such Dublin North Fringe will refer to the northern part of Dublin City and the area in the southern section of Fingal county council

### 1 Introduction

This report sets out the technical requirements and corresponding functional parameters used to identify a study area for the new Dublin North Fringe 220 kV bulk supply point (BSP) planned for Dublin North Fringe area.

An appropriate study area has been drawn up to assist land and development specialists in the identification of a suitable site in the Dublin North Fringe area for a new interface station between transmission and distribution networks needed to meet new load.

A study area was selected to provide a new station to offload existing infrastructure in the area to accommodate future load growth requirements as forecast for the area by EirGrid.

The study area produced along with the methodology used as well as the justification for the project is set out below.

### 2 Project Justification

Dublin North Fringe 220 kV station is needed because the existing load in the North City area is expected to outgrow the available transformer capacity at the existing Finglas 220 kV station by 2013[1].

There is also the need to supply future load development spreading north from the City because no Bulk Supply Point (BSP) exists for the north Dublin County area where new load is expected to develop and existing load expected to grow.

Prudent network planning, therefore, means that a new station should be developed to supply the immediate overfill but also be located to meet the long-term requirements of future load forecast for the Dublin North Fringe.

### 3 Functional Requirements

Dublin North Fringe is driven by overcapacity at the existing Finglas 220 kV station, the need to accommodate future load in the area and to provide security of supply for new and existing load.

[1] See Appendix – DSO load projections for Finglas Transformer Adequacy 2009/10

3.1 Offload Finglas 220 kV

As of 2010, the existing Finglas 220 kV station supplies the entire load in the north county area of Dublin. Half of the Finglas station capacity is also taken up supplying load in the north city area of Dublin.

EirGrid station policy prevents continuing (permanent) expansion of the existing Finglas station beyond 4x220/110 kV transformers to ensure the system is prudently planned. To feed the load with an appropriate diversity of supply another injection point is required to serve Dublin North Fringe area.

This is the first key function of Dublin North Fringe 220 kV Reinforcement Project.

3.2 Future Load Planning

The second key function of Dublin North Fringe is to support future load development over the long-term.

The transmission network is necessarily designed with components with 40- 50 year asset lives.

Land development in the Dublin North Fringe area is expected which will result in new load over the next 10 – 15 years. The transmission and local distribution network needs to be developed to supply this load.

Dublin North Fringe 220 kV Reinforcement Project is planned for the long-term to feed this new load as well as backing up the existing load.

The new station is intended to serve the new and potential future development of the Dublin North Fringe area. Basic principles of proper planning and sustainable development as well as principles of Transmission System Planning, dictate that the new station should be located proximate to, as opposed to distant from any future new urban development; as such the new station should be north of the M50/N32 corridor.

3.3 BSP Redundancy

Additionally, Dublin North Fringe will provide urgently needed security of supply to the entire North County load. The new BSP is intended to back-up the local networks by providing further connectivity to existing stations and therefore should be in relative proximity to these existing 110 kV stations.

At present the existing Finglas 220 kV station constitutes the single transmission injection point to the distribution network supplying the local area. This network is independent from the rest of the system in that it has no interconnection to any other neighbouring zones fed from any other BSPs. This means that in the event of loss of the Finglas 220 kV station, the load in the north county would be shut down until Finglas 220 kV station could be restored. For a catastrophic event this infers loss of supply for weeks or months.

Dublin North Fringe will provide the redundancy needed to cover the failure of the 220 or 110 kV busbars at Finglas 220 kV station and prevent load shutdowns in North Dublin.

## 4 Technical Requirements

The technical requirements for the station consist of initial and future plans needed to accommodate equipment to supply the immediate overfill at Finglas 220 kV station and for possible future extensions, respectively.

Predicting future equipment requirements is important to determine the overall land take needed for the site even if all of the equipment is not initially installed.

### 4.1 Planning Total Footprint

The station building should be designed capable for the following extensions:

§ 220 kV

- Four (4) 220/110 kV transformers
- Four (4) line bays
- One 220 kV double busbar (4 sections, 3 couplers, 16 bays in total)

§ 110 kV

- Eight (8) line bays and four (4) transformer 110/MV bays.
- One 110 kV double busbar (4 sections, 3 couplers, 22 bays in total)

The new station will initially include the following connections 1 x 220 kV and 4 x 110 kV circuits.

## 5 Outline Methodology for Site Selection

As explained in the previous section, the purpose of the new station is to serve the load in the area stretching from the North Fringe of Dublin towards the North County. Unlike the other areas of Dublin the North County has no dedicated BSP and at present relies on Finglas 220 kV station to supply as far as the Stephentown 110 kV station feeding Balbriggan in North County Dublin.

### 5.1 BSP Service Areas

A map illustrating the approximate service zones in the Dublin area is shown below. These show the existing service zones supplied from existing BSPs. The service zone intended for Dublin North Fringe 220 kV station is shown overleaf.

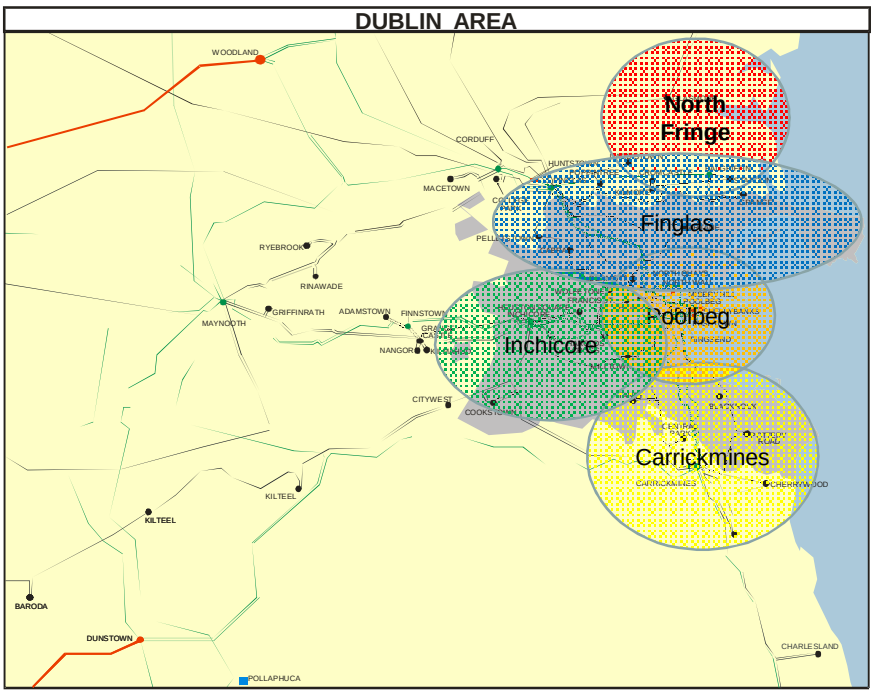


Figure 1: Approximate Dublin North Fringe 220 kV BSP Load Service Zones

A site for Dublin North Fringe station is needed within the red service zone.

## 5.2 Spatial Load Analysis

Spatial Load Analysis was used to estimate the service area covered by the load supplied from the Dublin North Fringe 220 kV station.

Spatial load analysis takes account of future land use development and applies appropriate load growth rates based on the territory available to intelligently locate new infrastructure.

Dublin North Fringe will form part of the transmission network as well as providing another injection point to the distribution network. Being a transmission asset it has to be built for the long-term: 40- 50 years. It must therefore be built to supply the load that will be developed in the long-term and not just to fit the medium term network plans set out by TSO or the DSO.

Cognisance must also be paid, however, to the near-term function of Dublin North Fringe 220 kV station, which is to off-load the Finglas 220 kV station. The Finglas 220 kV station load is well developed and dense already and Dublin North Fringe is required to help serve this load under contingency at Finglas 220 kV station.

This infers the need to locate the new station more closely to the south where the load already exists.

The logic used to create the study area followed three stages:

1. The first stage was to calculate the size of the zone that can be served by the station;

2. The second stage was to develop the serviceable area across an appropriate location with respect to the various constraints and boundaries;

3. The final part was to locate the station as close to the centre of the zone as possible taking into account cable lengths and existing road access. This reflects the need to develop the smallest volume of new circuits possible;

## 6 Study Area

The Study Area selected is as outlined in the map below.

It is appropriate to ensure adequate separation from the existing Finglas 220 kV station. The new station has to be located north east of the existing Finglas 220 kV station. The Dublin Airport complex comprises a significant constraint to development of a new station anywhere to the west of the M1 corridor; however it should still facilitate an appropriate connection to the existing Finglas 220 kV station without undue connection length. As the area around the airport is precluded from development this draws the area in towards the junction of the M50 and M1.

As highlighted above the new station is intended to serve the new and potential future development of the Dublin North Fringe. The new station should be located proximate to, as opposed to distant from any future new urban development; as such the new station should be north of the M50/N32 corridor.

There are existing points and areas of natural and cultural heritage interests in the Dublin North Fringe area, including Kinsealy Village and the Abbeyville Demesne, and the Portmarnock coastal area and Baldoyle Bay designated conservation area. In addition, the existing Dublin Belfast railway line crosses this area in a North – South direction.

The Study Area was chosen around existing roads and existing land development. It is bound by road ways necessary for access routes as well as the existing built environment.

Beginning in an eastwards direction into the load service zone from the junction of the M50 and M1 the study area would seem to be bound by the N32 to the south. The N32 marks the boundary of the Finglas service zone. The development south of the N32 will primarily be served by the network branching out from Finglas 220 kV station but supported by Dublin North Fringe station. Since the North Fringe area is where the load is already heavily developed it is prudent to locate closer to this area than the other main area in the service zone deemed for development around Swords.

Having regard to these and other issues, not at least including the existing built development that has occurred in this area, the study are has been generally identified as follows;

- An area north of the M50/N32 corridor;
- An area east of the M1 corridor;
- An area generally south of the line formed by Baskin lane and Kinsealy;
- An area generally west of the Dublin – Belfast mainline rail corridor.


Figure 2: Dublin North Fringe 220 kV Reinforcement Study Area

# Appendix A

## DSO Load Growth Projections (in 2009/10) for North County & North City Dublin

| 110kV Transformer Loadings Winter Peak (Transfers Growth New Load) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Dec-09 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| **Finglas City** | **MVA** | **MVA** | **MVA** | **MVA** | **MVA** | **MVA** | **MVA** | **MVA** |
| Artane | 22 | 24 | | | | | | |
| Cabra | 17 | | | | | | | |
| Dominic St (2013) New Load ONLY | - | - | - | | 8 | | | |
| Finglas T141/McDermott T141.North Wall (11) | 80 | 78 | 76 | | | | | |
| Finglas T142/McDermott T142 (10) | 85 | 83 | - | 79 | | | | |
| DART Interconnector | - | - | - | - | - | - | - | 22 |
| North Quays(Supplied from Finglas) | - | | | | 18 | | | |
| Pelletstown (2009) | 4 | 12 | | | | | | |
| Wolfe tone | 35 | | | | | | | |
| ***Finglas City Totals*** | 243 | 249 | 247 | 244 | 270 | | | 301 |
| | | | | | | | | |
| | Dec-09 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| **Finglas County** | **MVA** | **MVA** | **MVA** | **MVA** | **MVA** | **MVA** | **MVA** | **MVA** |
| Balgriffin | - | | | | | | | |
| Cromcastle | 20 | | | | | | | |
| Dardistown | 18 | | | | | | | |
| Finglas Loops T143 + T144 | 87 | | | | | | | |
| Glasmore | 84 | | | | 70 | | | |
| Grange | 59 | | | | | | | |
| Kilmore | 23 | | | | | | | |
| Poppintree | - | 4 | 6 | 10 | | | | |
| Stephenstown | - | | | | | | | |
| Metro Park (Metro North) | - | | | | 20 | | | |
| Bealistown (Metro North) | - | | | | 20 | | | |
| Swords 110/MV | - | - | - | - | 14 | | | |
| ***Finglas County Totals (College Park and Macetown not included)*** | 291 | 295 | 297 | 301 | **341** (330 MVA limit) | | | |