



# West Dublin 220/110 kV Substation and Associated Works Project

## Stage 3: Confirm Design

October 2015

TOBIN CONSULTING ENGINEERS



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**Project:** West Dublin 220/110 kV Substation and Associated Works

**Title:** Stage 3 Report

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<b>TOBIN Consulting Engineers</b>							

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## 1 INTRODUCTION

EirGrid has identified the need to reinforce the electricity network in the Grange Castle area of west Dublin, south of Adamstown, which is evolving as a major centre for hi-tec, power-dependent companies. Consequently, given the nature and activities of these companies, it is critical to ensure a secure, reliable and adequate provision of electricity to the west Dublin area.

Given their substantial electricity requirements, a number of these hi-tec companies depend upon direct connection to the electricity network – these companies are generally referred to by EirGrid as “customers”, and their electricity requirements are known as “demand”.

There is a substantial amount of new demand (144 MVA) currently seeking to connect to the network in the Grange Castle area. This new demand cannot be accommodated by the existing grid network, as it has reached its supply capacity. EirGrid is therefore proposing the West Dublin 220/110 kV Substation and Associated Works project to reinforce the network in the Grange Castle area, and potentially, the wider environs thereof.

### 1.1 PROJECT DESCRIPTION

This project primarily comprises development of a new **220/110 kV Gas Insulated Switchgear (GIS) substation**. The substation will consist of two No. buildings, each with a height of approximately 15 metres, along with four No. 220 kV / 110 kV 250 MVA transformers.

The substation will be constructed on an area of approximately three hectares (3 ha.) which will also allow for landscaping, general civil works and structures, and security measures to be put in place on site. The preferred substation site area is located immediately south of the R134, referred to as “*Site D*” in the Stage 1 and Stage 2 project reports that have been published by EirGrid in respect of the planned development - see <http://www.eirgridprojects.com/projects/westdublin>. Site D is also located on Drawing 7568-1016 presented in Appendix A to this Report.

The substation will connect via **four No. proposed 220 kV underground cables** to the existing Inchicore-Maynooth 220 kV double-circuit overhead line (where two separate circuits travel on a single set of towers), which passes through the north of the project study area on an east-west orientation. The double circuit 220 kV cables will connect to the substation from the northwest via the R120 and R134 roads; the double circuit connection from the northeast will occur via the R136 and R134 roads.

The R136 is currently a wide and high-quality road; the R120 and R134 have Part 8 Approval for significant upgrading.

While approved, the planned R120 and R134 road upgrades may not have occurred at the time of construction of the development (assuming the development obtains its own statutory consent). Therefore, while laying the 220 kV underground cables in the planned upgraded roads remains the preferred option for the project, it has been considered prudent to explore alternative cable route options, which would be utilised only in a scenario where the planned road upgrades have not occurred. The alternative cable routes (each 8m wide) are located as close to these existing roads as possible, but outside the extent of the road upgrades (refer to Drawing 7568-1016 in Appendix A). It is therefore proposed to progress two cable route corridor options:

- Cable Route Corridor Option A (preferred route); and
- Cable Route Corridor Option B (alternative route).

For the avoidance of doubt, the identified route corridors within the planned upgraded roads, i.e. Cable Route Corridor Option A, is the preferred option for this project.

While each cable route option is 8m wide, an approximately 16m wide route corridor **FOR EACH** option (within which the 8m cable route will be laid) will be identified and subject to environmental appraisal. This will ensure a robust environmental appraisal of both cable route options.

The construction of **two separate interface compound sites**, each with an area of approximately 0.2 hectares, is necessary as part of this project. These compounds will facilitate the transition from the existing double-circuit overhead line to the proposed 220 kV underground cable routes. The nearest existing overhead line structure to each interface compound will be replaced with an “end-mast” or “terminal” structure; these are of similar size and character as the existing structures on this alignment. The two circuits of the existing double-circuit overhead line will be dropped into each interface compound, which will contain gantries, and other equipment.

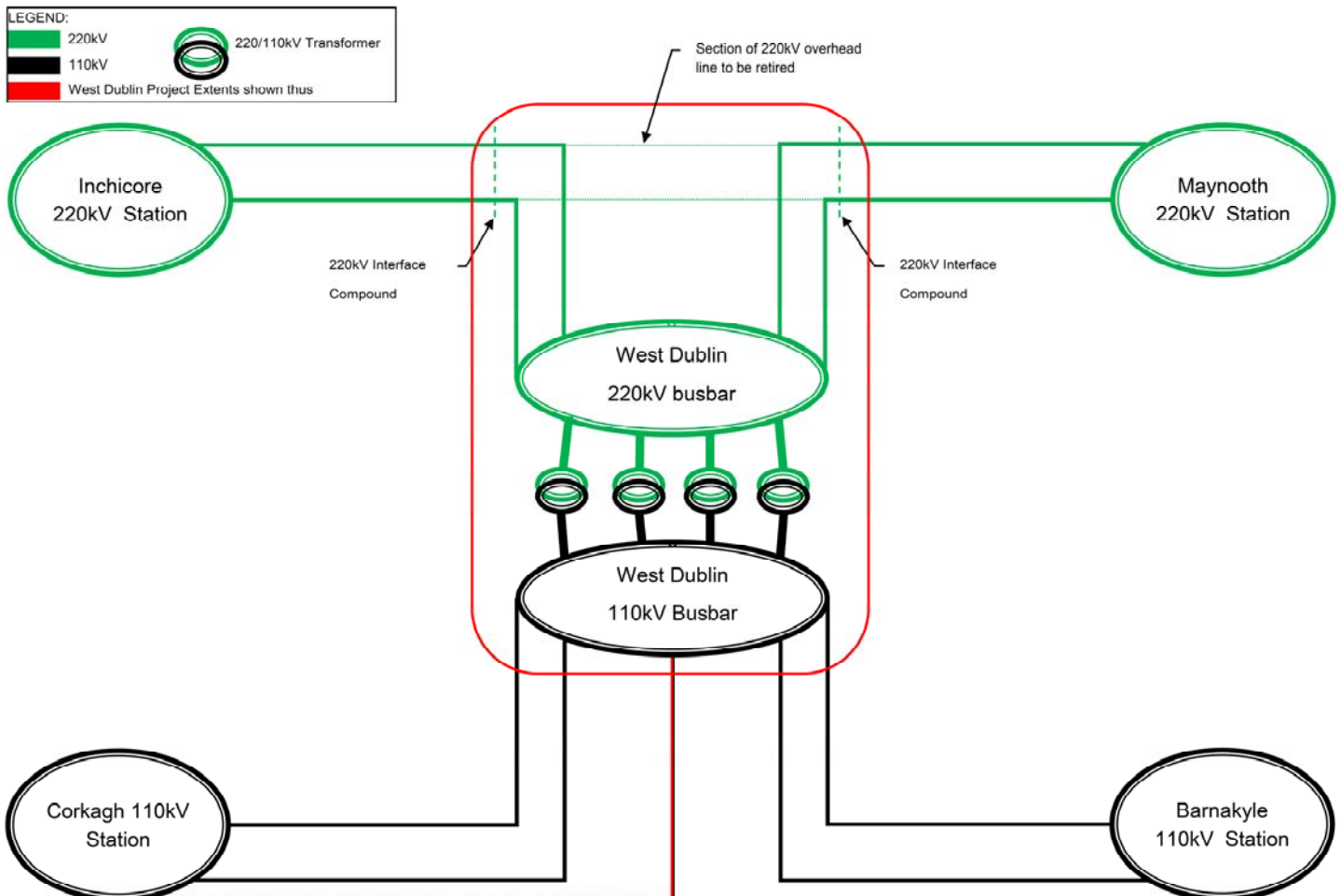
As noted above, connection between the existing Inchicore-Maynooth 220 kV double-circuit, and the proposed 220/110 kV substation will occur in the form of a double “loop-in” (refer to Figure 1-1 overleaf). In other words, the existing two continuous circuits of the existing overhead line within the study area will be severed creating four new line ends (refer to Figure 1-1 overleaf). These line ends will transition to underground cable within each interface compound, at the two separate locations to the north-west, and north-east, of the substation; the circuits will then be laid as underground cables between each interface compound and the substation. The cable connections, from the two interface compound sites to the proposed substation, will involve the laying of approximately 7.5km of 220 kV cables. When energised the existing Inchicore-Maynooth 220 kV double-circuit will continue to operate, but now via the substation. This is the electrical equivalent of creating a new junction node on a

motorway – electricity will still flow on the circuit between Inchicore and Maynooth substations, but provision has been made to take some of that electricity, and to distribute it within this demand area.

The development consequently includes **removal of a section (approximately 2.9km in length) of the existing Inchicore-Maynooth 220 kV double-circuit overhead line** - comprising that section of overhead line between the two interface compound sites which is made redundant.

The substation will serve major industrial customers in this evolving high-technology industrial area, by means of transforming the power entering the substation at 220 kV down to 110 kV, and then utilising multiple connections to a number of existing/permitted lower voltage distribution substations in the area, via 110 kV underground cable circuits. These substations and associated cable circuits are being separately developed by ESB Networks, the Distribution System Operator (DSO). Five 110 kV circuits will be connected to the new substation; this comprises four existing or permitted 110 kV circuits, as well as a **new 110 kV cable connection connecting to Corkagh Substation**, located within Grange Castle Business Park, refer to Figure 1-1.

**Figure 1-1 Schematic of the connections to the new substation**



## 1.2 PURPOSE OF THIS REPORT

The evolution of this project has occurred in accordance with EirGrid’s *Project Development and Consultation Roadmap* (refer to Figure 1.2 below). This ensures a structured process of project development, from the early stages of *Information Gathering* – identifying the project study area, environmental and other constraints within that study area, and potential project options, through the stage of *Evaluate Options* – considering and evaluating options and identifying a preferred option, to confirmation of the proposal, and ultimately submission of an application for statutory approval.

This report comprises Stage 3 of the roadmap: *Confirm Design*. It details an evaluation of the different locations within the identified preferred substation site, Site D, to determine the optimum specific location within the site in which to locate the new 220/110 kV substation.

**Figure 1-2 EirGrid’s Project Development and Consultation Roadmap**





## 2 SITE D – EVALUATION

### 2.1 EVALUATION CRITERIA

During Stage 1 of the project a number of criteria were developed to appraise each of the eleven identified feasible substation site options (Sites A-K) for the development of the 220 / 110 kV substation. These criteria were chosen to best represent the identified constraints within the study area while also considering the technical requirements of the project. These criteria were again used in Stage 2 of the project for determining the preferred substation site.

These criteria are:

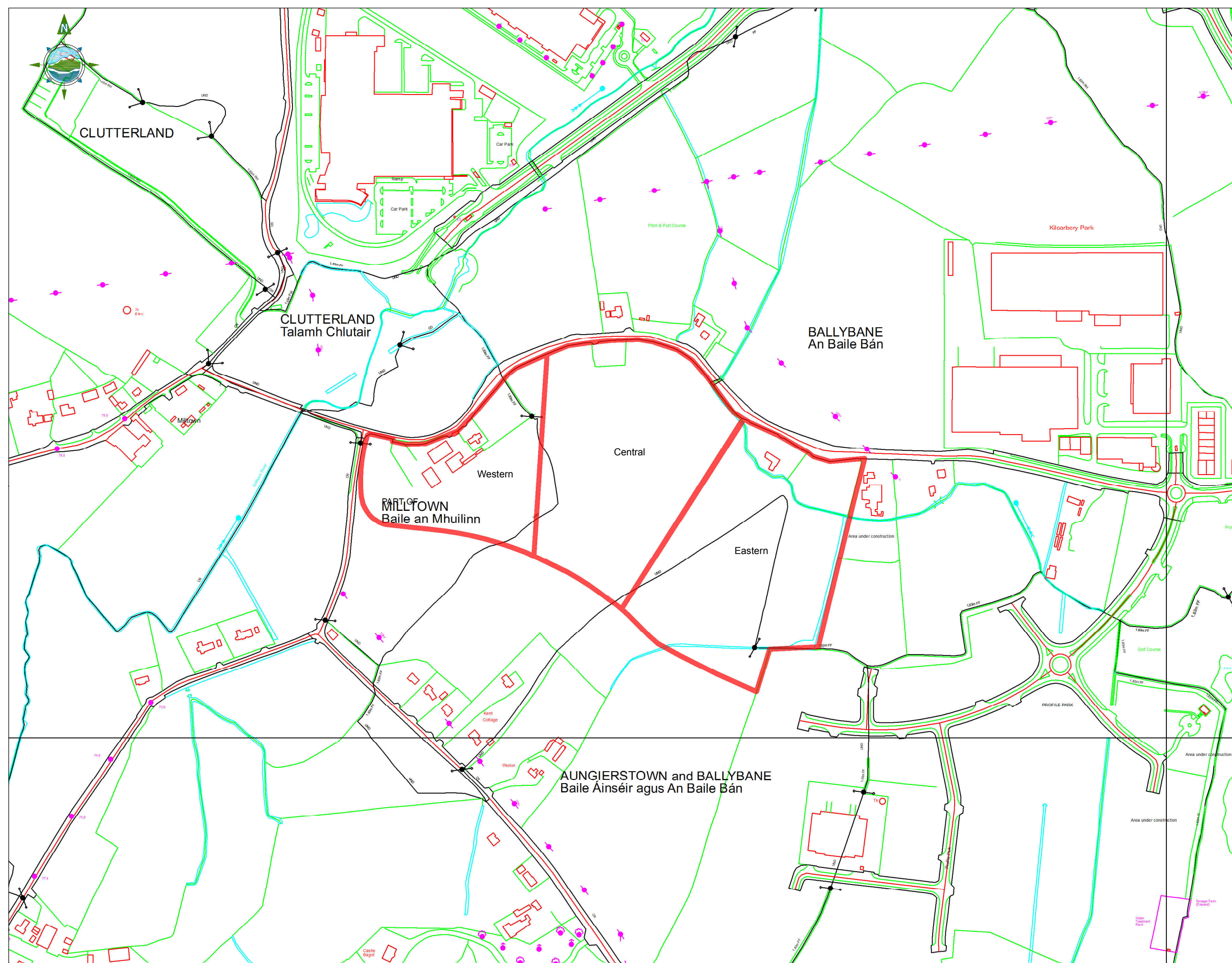
- Land Availability
- Land Zoning
- Landscape
- Biodiversity (flora and fauna)
- Cultural Heritage
- Contaminated Land
- Water / Flooding
- Human Beings / Proximity to Housing
- Road Access
- Proximity to existing 220 kV Infrastructure
- 220 kV Circuit Access
- Impact on 110 kV connections to customer site
- Future extensibility

Following a process which included significant public and stakeholder engagement and in particular focussed on the content and conclusions of the Stage 1 and Stage 2 Reports, EirGrid has concluded that Site D is the preferred substation site.

In Stage 3 of the project, Site D has been divided into three land areas for the purpose of identifying the most appropriate location for the new substation within the overall preferred site. Each land area has been evaluated using the criteria listed above to determine the optimum substation location within Site D, (refer to sections 2.2 and 2.3 below). These three land areas are (refer to Figure 2-1):

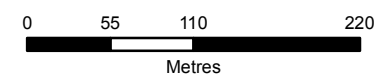
1. Western area;
2. Central area; and
3. Eastern area,





**Legend**

Proposed Substation Site (site D)



- NOTES**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
  2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
  3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
  4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	SEP-15	Issued	M.K.	D.C.

Client:

Project:  
West Dublin 220/110 kV  
Substation and Associated Works

Title:  
Site D

Scale @ A3: 1:5,000

Prepared by:	Checked:	Date:
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Figure 2.1

## 2.2 EVALUATION METHODOLOGY

The impact and effect of the evaluation criteria on each area of Site D (i.e. western, central and eastern) has been classified in terms of significance and ranges from 'More Constrained' to 'Less Constrained' depending on the level of significance of each criteria to the site identification. This is displayed using a simple colour coding as such:



Project team members, including engineers and environmental specialists, have assessed each of the areas against the criteria listed above in section 2.1, from a technical and environmental perspective, while also taking into account all public and stakeholder feedback received to date, and in particular during the Stage 1 and Stage 2 consultation periods.

Project specialists carried out an evaluation of each of the three areas within Site D and gave it a colour coding following the key above. The project team carried out a workshop to review specialist work and evaluate each of the areas against the evaluation criteria detailed in section 2.1.

## 2.3 SITE D EVALUATION

The key findings of the Site D evaluation are summarised in Table 2-1 overleaf and in the subsequent commentary.

There are a number of criteria considered in this evaluation which do not result in a distinction between the three options. These are:-

- Land Zoning;
- Biodiversity (flora and fauna);
- Road Access;
- Proximity to Existing 220 kV Infrastructure;
- Impact on 110 kV Connections to Customer Site; and
- Future extensibility

These criteria are therefore not considered further in this report.

**Table 2-1 Site D Evaluation**

Evaluation Criteria	Feasible Substation Sites		
	Western Area	Central Area	Eastern Area
Land Availability			
Land Zoning			
Landscape			
Biodiversity (flora and fauna)			
Cultural Heritage			
Contaminated Land			
Water / Flooding History or Potential			
Human Beings / Proximity to Housing			
Road Access			
Proximity to existing 220 kV Infrastructure			
220 kV Circuit Access			
Impact on 110 kV connections to customer site			
Future extensibility			

**More Constrained**

**Less Constrained**



In terms of land availability, all three land areas in Site D could facilitate the substation building and associated landscaping and civil works. However, due to the shape of the landholding, the western area of Site D is physically more constrained. The western area of the site is also bordered by a T50 cable (a high speed fibre cable) on three sides, potentially leading to more disruption of this T50 route from cable works crossing into this location.

Following consultation with South Dublin County Council, the central area of Site D is identified as the least preferred location for the substation, as this is a large, strategically important and currently undeveloped parcel of land which is considered to have significant potential for large scale industrial and commercial development, consistent with that currently occurring within the Grange Castle Business Park and surrounding evolving development areas.

In terms of landscape, bearing in mind the flat nature of the lands, and the existence and planned development of large buildings in the surrounding landscape, and the potential for screening of the

substation, there is no significant difference between the three options. In terms of visual amenity, the eastern area is marginally less constrained due to it being slightly further away from nearby residences, bounded to the north by slightly denser existing vegetation and closer to established business areas, which it is assumed will also be developed in the future for large-scale industrial activity.

In terms of Cultural Heritage, there is an archaeological monument (Concentric Enclosure SMR No. DU021-108) located within the western and central areas of Site D. The eastern area of Site D allows the substation to be sited at the greatest distance from this archaeological monument.

In terms of Contaminated Land, a site visit to the existing farm buildings by project team specialists confirmed potential low level contamination risks in this area, having regard to the need to remove an existing septic tank, fuel tanks and an asbestos roof.

In terms of Flooding, the potential sources of flood risk were reviewed using mapping produced by the Eastern Catchment Flood Risk Assessment and Management (CFRAM) Study. The Eastern CFRAM Study flood maps show that potential flood zones occur along the eastern and northern site boundary.

In terms of Human Beings/Proximity to Housing, the western area is in closest proximity to neighbouring dwellings. Development in this area would involve the removal of the existing farm house and outbuildings.

In terms of 220 kV Circuit Access, the preferred cable route for the 220 kV cables entering Site D from the east is via the existing internal access road of Profile Business Park. The eastern area of Site D is closer to Profile Business Park, and therefore less cable would have to cross over the lands of Site D.

### 3 CONCLUSION

The three land areas within Site D were evaluated from a technical and environmental perspective, while also taking into account the public, landowner and stakeholder feedback received during the Stage 1 and Stage 2 consultation periods.

Following an evaluation of the three land areas, the eastern area of Site D has been evaluated as less constrained in terms of land availability, land zoning, landscape, biodiversity, cultural heritage, contaminated land, human beings/ proximity to housing, road access, 220 kV circuit access and impact on 110 kV connections to customer site.

The eastern area of Site D will therefore be progressed as the preferred location for the new substation.

The western interface compound site (T1) and the eastern interface compound site (T5) will be progressed as the preferred locations for the interface compound sites.

The 220 kV underground cables between the interface compounds and the substation, and the 110 kV underground cable between the substation and Corkagh substation, will be along (or adjacent to) the existing and planned upgraded local road network in this area.

The overall development is set out on Drawing 7568-1016, in Appendix A of this report.

#### 3.1 NEXT STEPS:

The project team will continue to engage with South Dublin County Council as landowners of Site D, as well as with all landowners along the cable routes, and of the interface compound site locations.

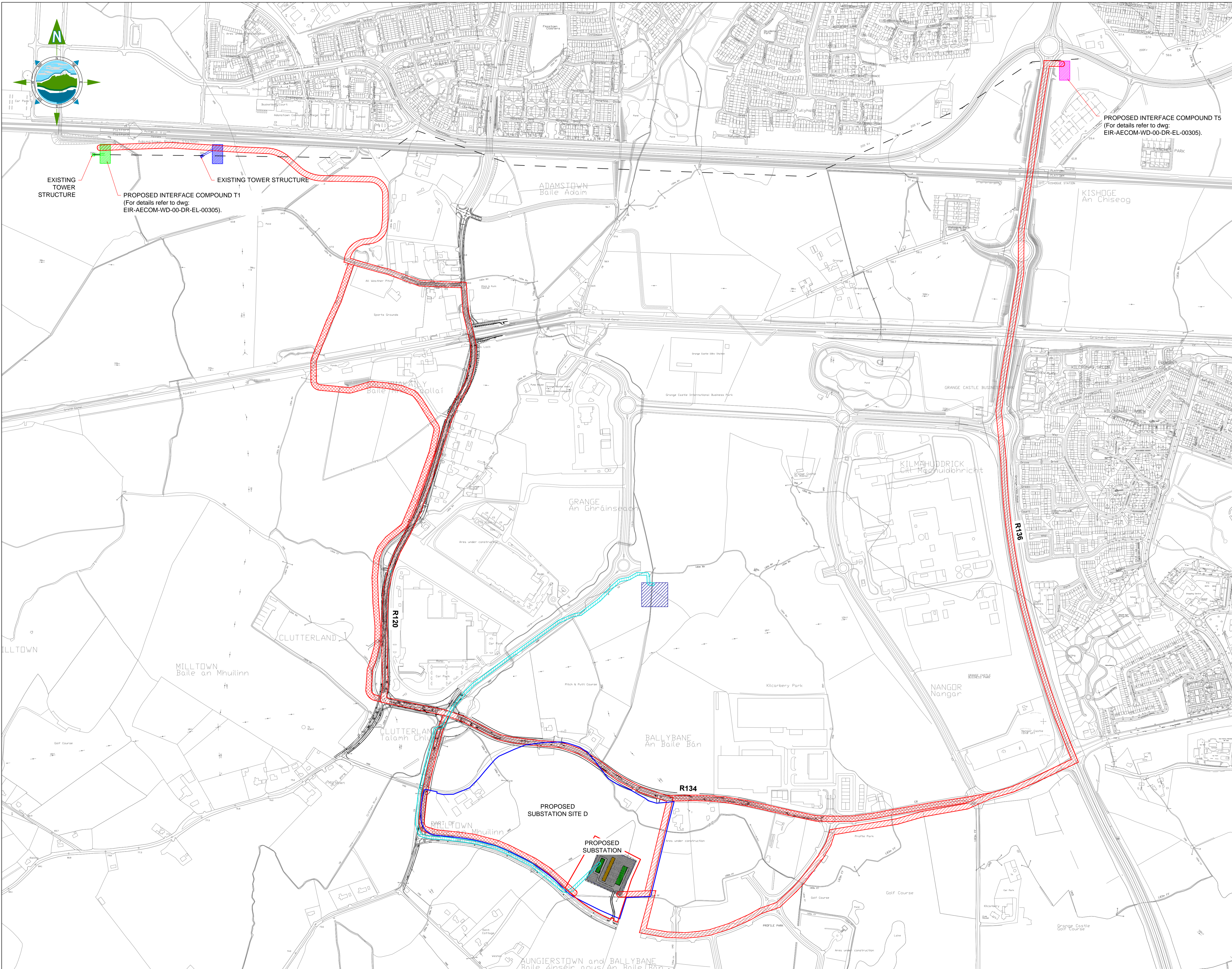
This engagement will enable the project team to gain ongoing feedback on project designs and to undertake further technical and environmental surveys. This will assist in establishing the final project design and in moving the project forward towards preparation of an application for statutory consent.

The application for statutory consent will include a completed planning application form, site and newspaper notices, plans and drawings, and a Planning and Environmental Considerations Report.



# Appendix A





**LEGEND:**

- PREFERRED 220 kV DOUBLE CIRCUIT
- ALTERNATIVE 220 kV DOUBLE CIRCUIT
- PROPOSED 110 kV SINGLE CIRCUIT CONNECTION TO CORKAGH
- PROPOSED SUBSTATION SITE D
- PROPOSED INTERFACE COMPOUND T1 (Option 1)
- PROPOSED INTERFACE COMPOUND T1 (Option 2)
- PROPOSED INTERFACE COMPOUND T5
- EXISTING 220kV OVERHEAD LINE TO BE REMOVED
- PROPOSED 220kV SUBSTATION BOUNDARY
- PROPOSED 110kV SUBSTATION LOCATION

**NOTES:**

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE.
3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES.
4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES.
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD.

Rev	Date	Description	By	Chkd.
A	20.10.15	INFORMATION ISSUE	MN	DC

Client:

Project: **WEST DUBLIN  
220 / 110 kV SUBSTATION  
& ASSOCIATED WORKS**

Title: **CABLE ROUTE  
CORRIDOR OPTIONS**

Scale @ A1: **1:5,000**

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Drawing Status: Information

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