

moray offshore renewables ltd

Developing Wind Energy In The Outer Moray Firth

Environmental Statement

Modified Transmission Infrastructure for
Telford, Stevenson and MacColl Wind Farms

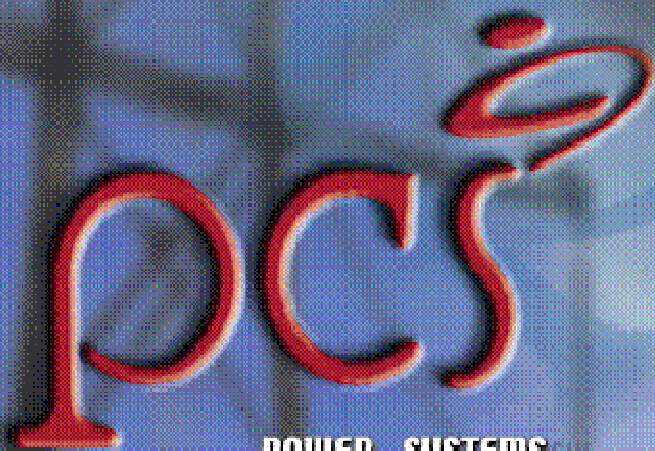
Technical Appendix 2.1 A

Technical Grid Connection Study
(PCS, 2013)



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Report



PCS

POWER SYSTEMS

PROJECT & CONSULTANCY SERVICES LTD

MORL substation Proposed location assessment

5 August 2013

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6132/001/R/LM/01
Issue: A

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REPORT No:	6132/001/R/LM/01	ISSUE:	A
TITLE:	MORL substation support		
SUMMARY			
<p>EDP Renewables requested Power Systems Project and Consultancy Services (PCS) Ltd to undertake an assessment of the grid connection options for a proposed new substation in the vicinity of New Deer for the Moray Offshore windfarm</p> <p>The assessments undertaken by Power Systems PCS has identified a potential area to locate a new grid connection substation based on the information available (though subject to the formal SSE connection application/offer process),</p> <ul style="list-style-type: none"> • A preferred location to consider building a new substation would be close to the existing OHL near Burnside (WSW of New Deer) • The site would be required to accommodate a new 400kV GIS switchroom and a new 400/220kV OFTO substation compound. • Approximate dimensions are estimated as : <ul style="list-style-type: none"> ○ 80m x 80m for the SSE 400kV GIS compound ○ 270m x 190m for OFTO 400/220kV AIS compound (AC option) ○ 340m x 200m for OFTO 400kV converter compound (DC option) 			
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AMENDMENT RECORD			
Issue	Date Issued	Date Effective	Purpose of Issue or Description of Amendment
A	05/08/13		First Issue

TABLE OF CONTENTS

1	INTRODUCTION	1
2	AIM AND OBJECTIVES.....	2
2.1	AIM.....	2
2.2	OBJECTIVES.....	2
3	SCOPE OF WORK.....	3
4	OVERVIEW OF SUBSTATION LOCATION AND DIMENSIONS.....	4
4.1	LOCATION OF PREFERRED SITE.....	5
4.2	PREFERRED CONNECTION VOLTAGE.....	6
5	GRID CONNECTION OPTIONS.....	7
5.1	COMPOUND DIMENSIONS	8
5.2	ROAD ACCESS OBSERVATIONS	10
6	CONCLUSIONS AND RECOMMENDATIONS	10
6.1	CONCLUSIONS	10
6.2	RECOMMENDATIONS.....	10
7	REFERENCE PHOTOGRAPHS.....	11

1 Introduction

EDP Renewables requested Power Systems Project and Consultancy Services (PCS) Ltd to undertake an assessment of potential locations and sites of interest for a new 400/220kV grid connection substation for the MORL offshore windfarm.

Based on proposed 220kV export cable route guidance from EDP (Inverboyndie to New Deer), a number of potential locations were identified on Ordnance Survey maps. These were then visited to establish proximity to the existing 275kV Peterhead to Kintore / Keith tower line. This was advised as being uprated to 400kV with a future 400kV GIS substation being proposed in the area of New Deer.

Typical dimensions for both AC and DC compounds were determined and a general survey was undertaken to note any access restrictions or obstacles that will require detailed heavy load transport route examination to be conducted (swept path analysis, bridges, utility services).

The findings of the assessments are presented in this report

The conclusions and recommendations arising from the assessments are given in section 6 with the reference photographs taken in the course of the assessments listed in section 7.

2 Aim and Objectives

The aim and objectives of the assessments are outlined below.

2.1 Aim

The aim of the assessments was to provide an indication of the potential grid connection sites and proposed the most suitable location able to accommodate the required compound areas.

2.2 Objectives

The objectives of the studies were:

- i) Determine the size of compound required for both AC and DC options.
- ii) Identify potential grid connection sites for the proposed substation.
- iii) Assess the area surrounding the potential grid connection site for transporting heavy loads from Peterhead.

3 Scope of Work

The Power Systems PCS scope of work for the substation support works :

- i) Identify and review potential substation locations.
- ii) Identify potential dimensions for substation compound options
- iii) Based on the preferred location carry out an initial assessment of heavy load route limitations.

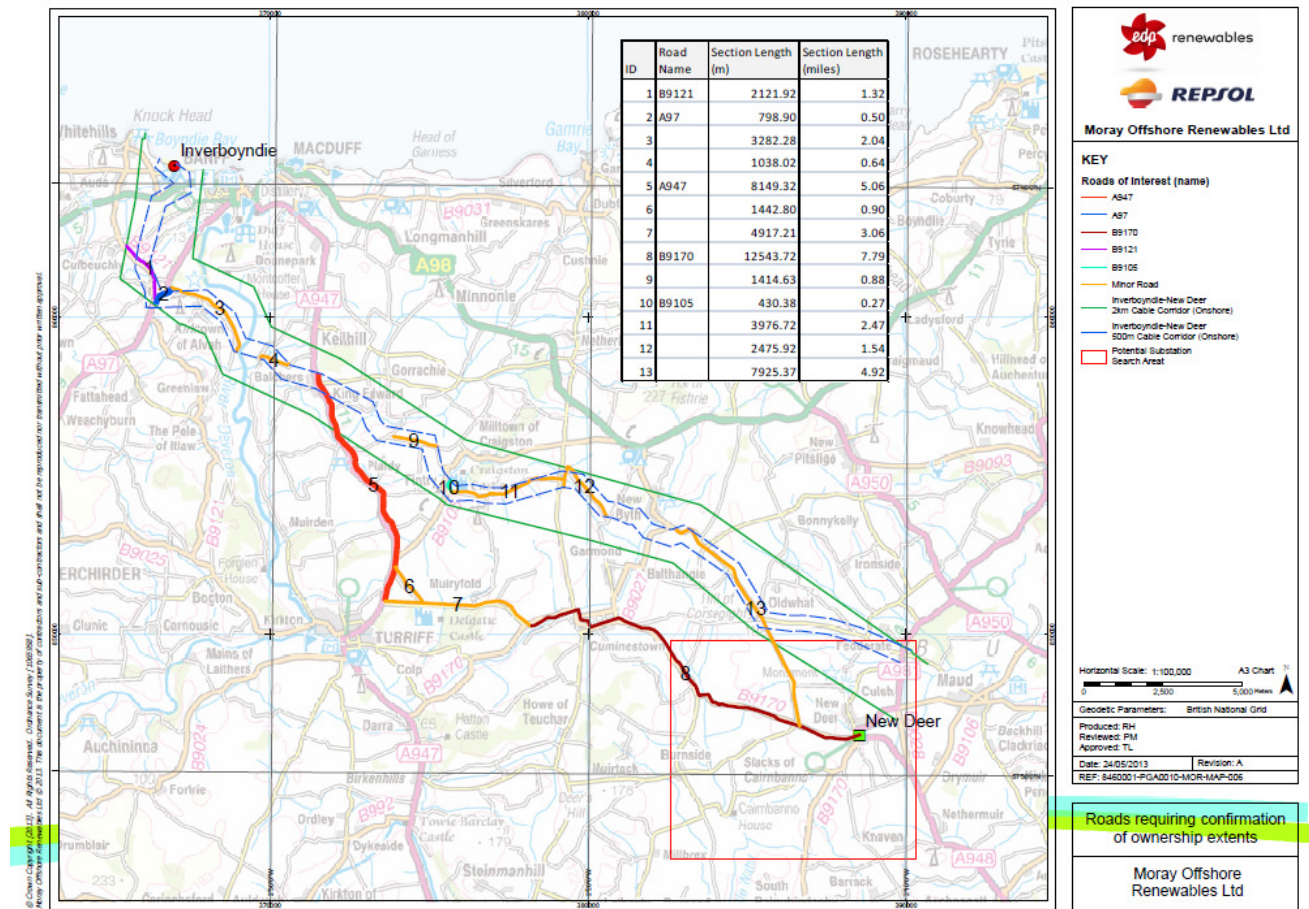


Fig 1

4 Overview of Substation Location and Dimensions

An overview of the potential substation locations is provided below.

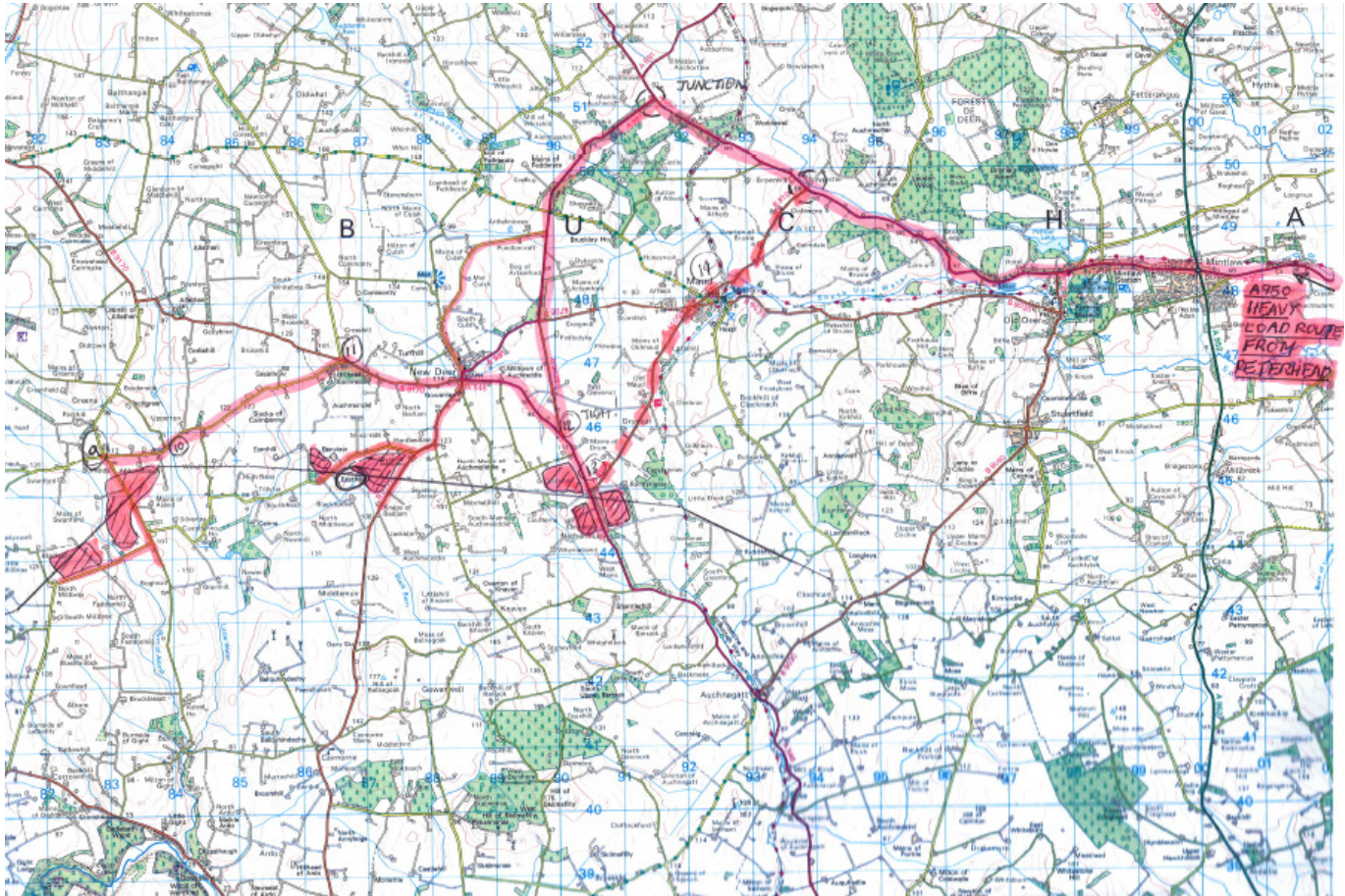


Fig 2

4.1 Location of preferred site

The consensus based on access and proximity to the existing OHL identified the area below as a preferred location to develop further as the grid connection / OFTO substation.

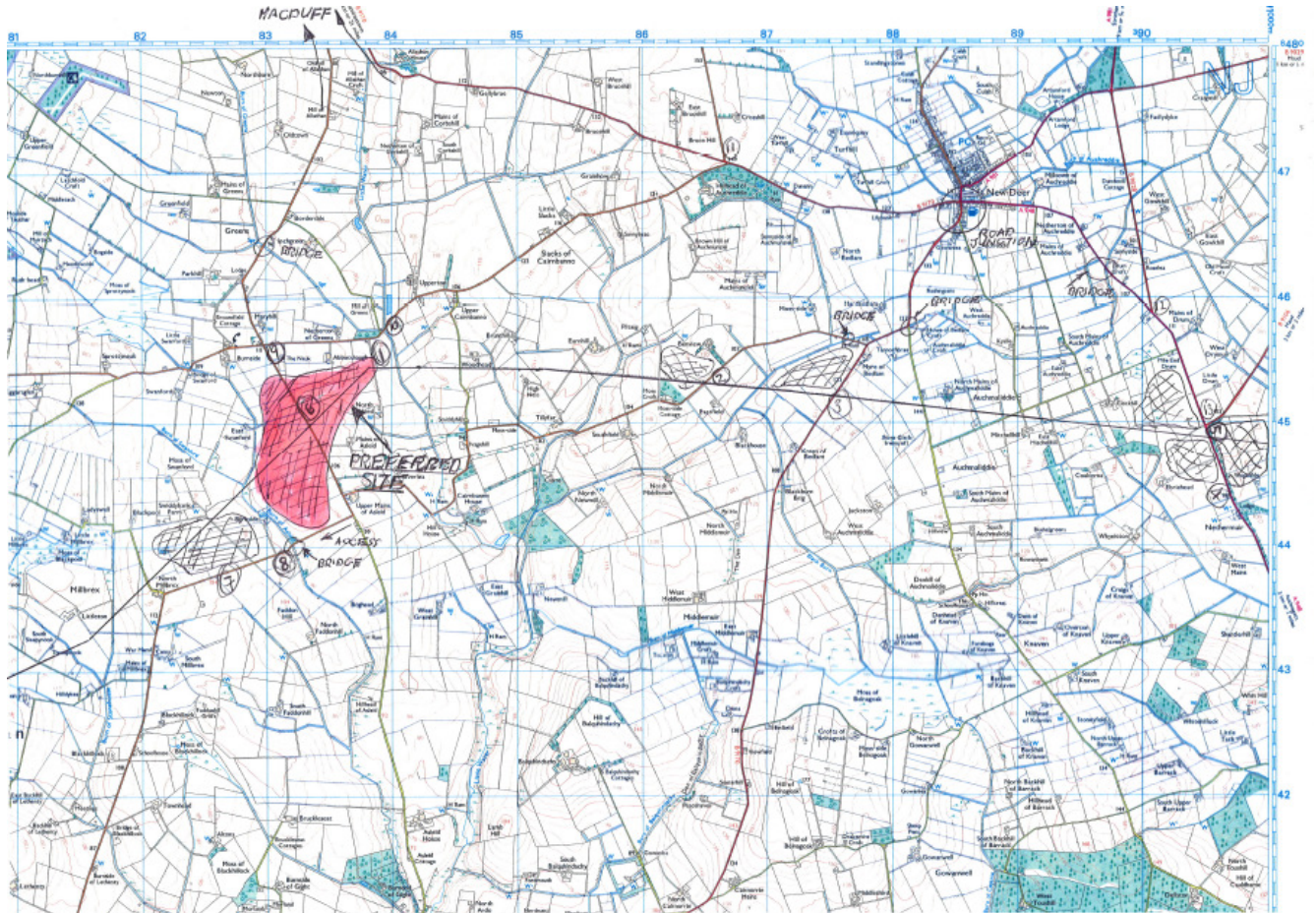


Fig 3

4.2 Preferred Connection Voltage

The preferred grid connection voltage for the generation is taken as 400kV based on proposed upgrades to the 275kV Peterhead line for a new substation at Rothienorman and New Deer

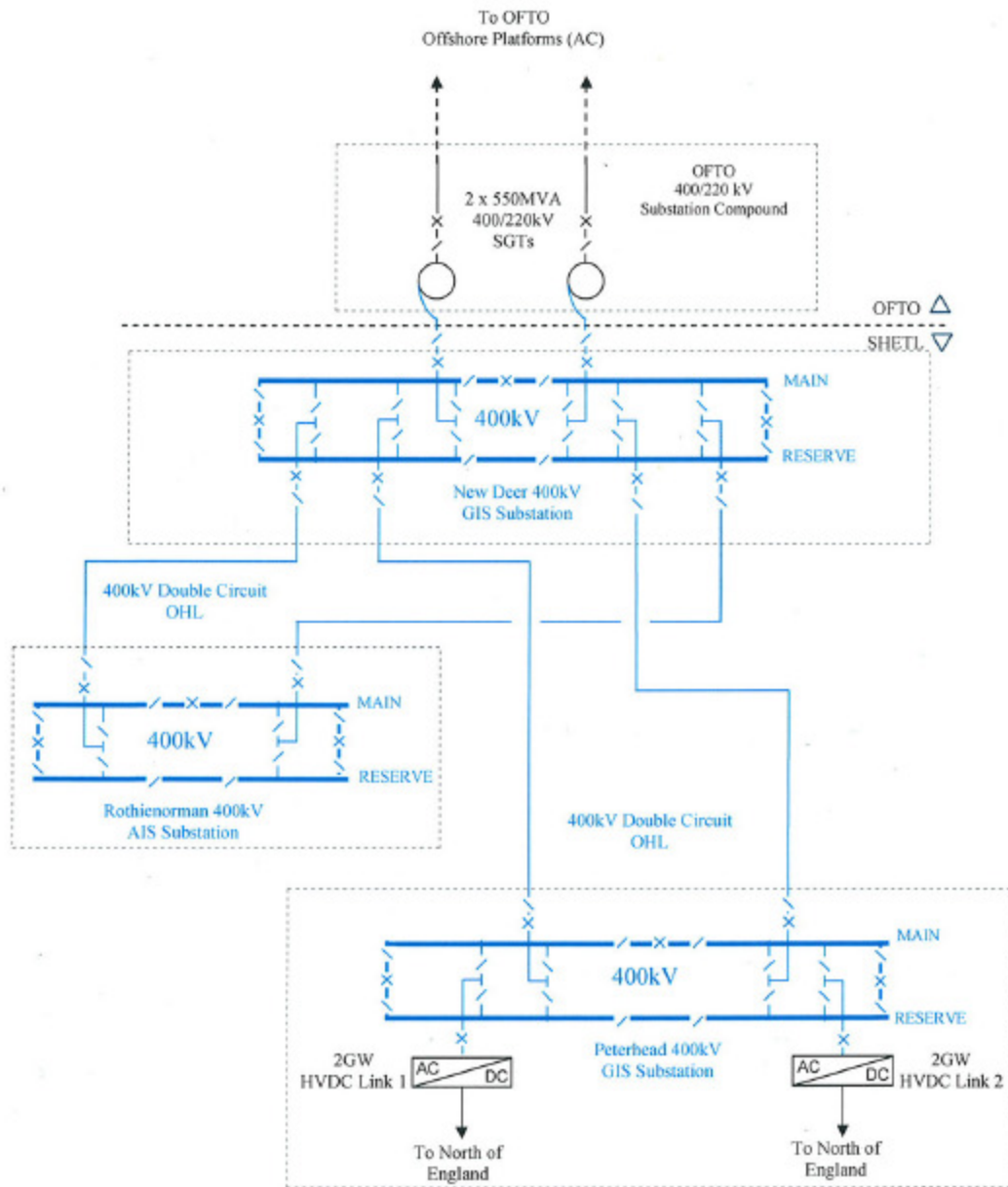
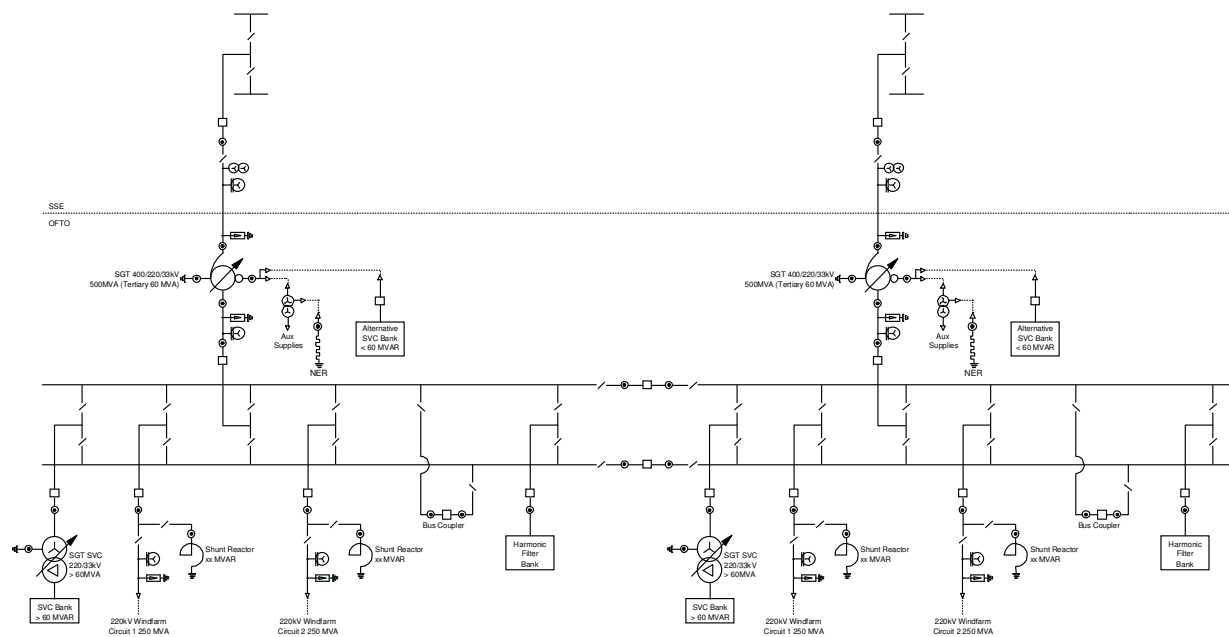


Fig 4

5 Grid Connection Options

It is assumed that the existing 275kV OHL will be upgraded to 400kV and in turn will connect to a new GIS substation located adjacent to the MORL 400/220kV substation compound. The single line diagram below has been used as the basis to determine the outline dimensions required

Outer Moray Firth Windfarm Double Circuit 220kV - Double Busbar Configuration



PCS
Moray Firth Array Windfarm
Single Line Diagram / 2
04/06/2013

Fig 5

5.1 Compound Dimensions

5.1.1 It is anticipated that a 400kV GIS switchroom building would be approximately 40m x 25m. To allow for downloads and gantries from the 400kV towers, an area of 50m x 80m would be reasonable at this stage, giving an overall compound of 80m x 80m (subject to detail design and specific GIS, GIL or cable sealing end equipment and layout options).

5.1.2 It has been assumed that a typical AC solution for the OFTO compound will be required to accommodate:

- 2 x 500MVA SGTs
- 220kV main and reserve busbar AIS switchgear arrangement
- 4 x windfarm export cable feeder circuits (250MVA each)
- SVC and harmonic filter bank equipment

Subject to a more detailed design assessment, the preliminary dimensions are estimated as 270m x 190m

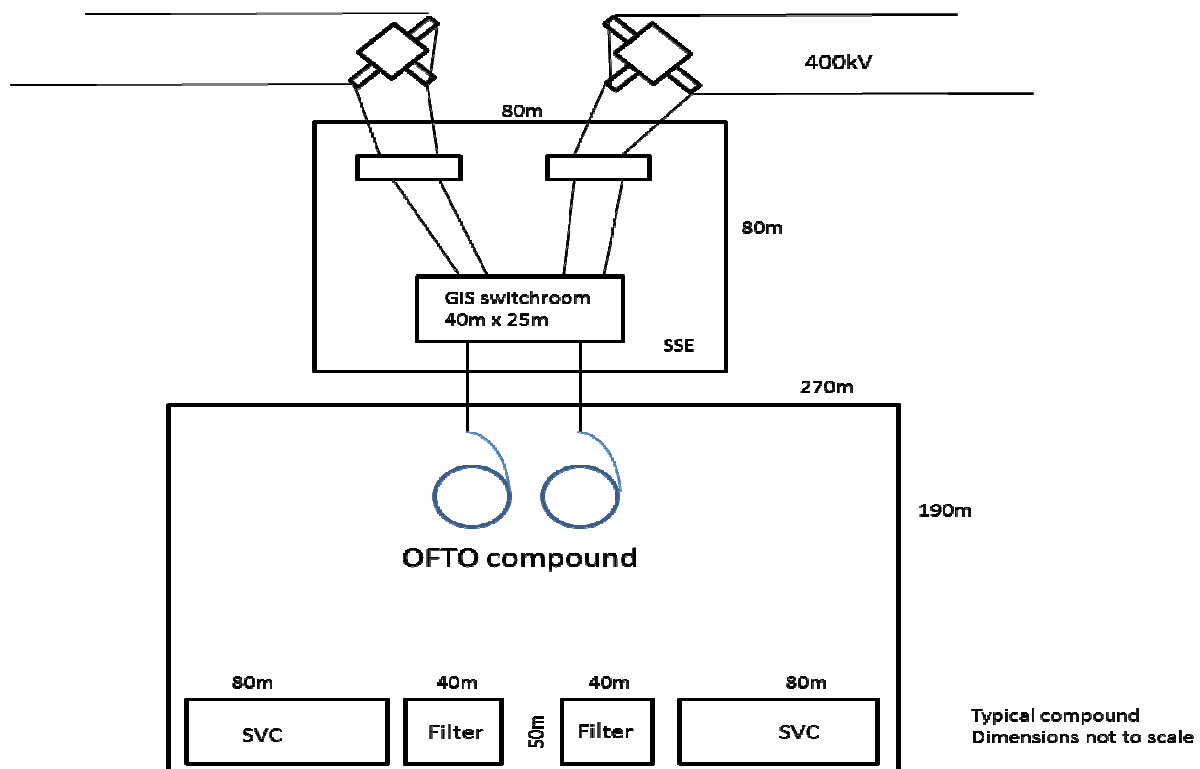


Fig 6

5.1.3 It has been assumed that a typical DC solution for the OFTO compound will be required to accommodate:

- 400kV switchgear
- Valve / converter halls
- Filter halls
- SVC reactors and auxiliary services equipment

Subject to a more detailed design assessment, the preliminary dimensions are estimated as 340m x 200m

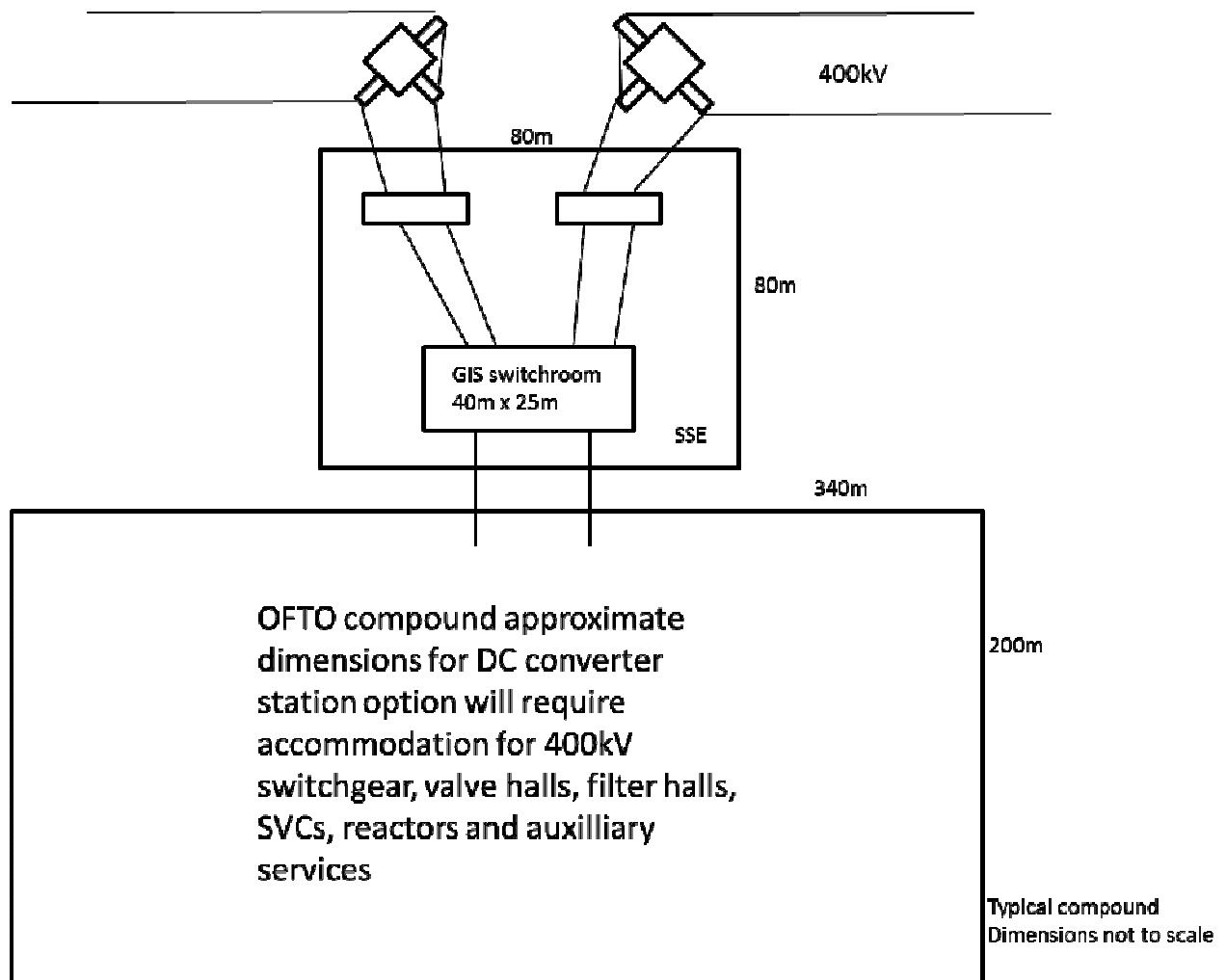


Fig 7

5.2 Road Access Observations

With reference to the Fig 2 on page 4, it is assumed at this stage that the A950 will be the heavy load route from Peterhead. This road was driven along from Mintlaw to the proposed site at Burnside with the options of the B910 via Maud and the A981 toward New Deer being checked. No major concerns or restrictions were observed up and including New Deer.

The route from New Deer consists of the B9170 then onto the unclassified road heading South West signposted for Greens. No immediate issues were identified in terms of junctions or major restrictions till the area close to the proposed site near Burnside where there is a narrow bridge over the Littler Water Burn, and a tight left hand turn onto the South signposted for Fyvie. This junction also has over sailing 11kV wood pole conductors which could restrict height.

6 Conclusions and Recommendations

The conclusions and recommendations from the grid connection assessments for the proposed substation site are :

6.1 Conclusions

The area close to Burnside and existing angle tower on the 275kV Peterhead to Kintore / Keith OHL would be the preferred location to develop for the MORL substation location.

6.2 Recommendations

It is recommended that a detailed heavy load transport study is undertaken to confirm swept path requirements for the supergrid transformer deliveries together with structural assessment of the small bridge on the potential delivery route.

6 Reference photographs

1. Preferred site area looking NE toward angle tower
2. Tight junction with wood pole OHL at Burnside
3. Narrow Bridge on unclassified road looking SW to angle tower

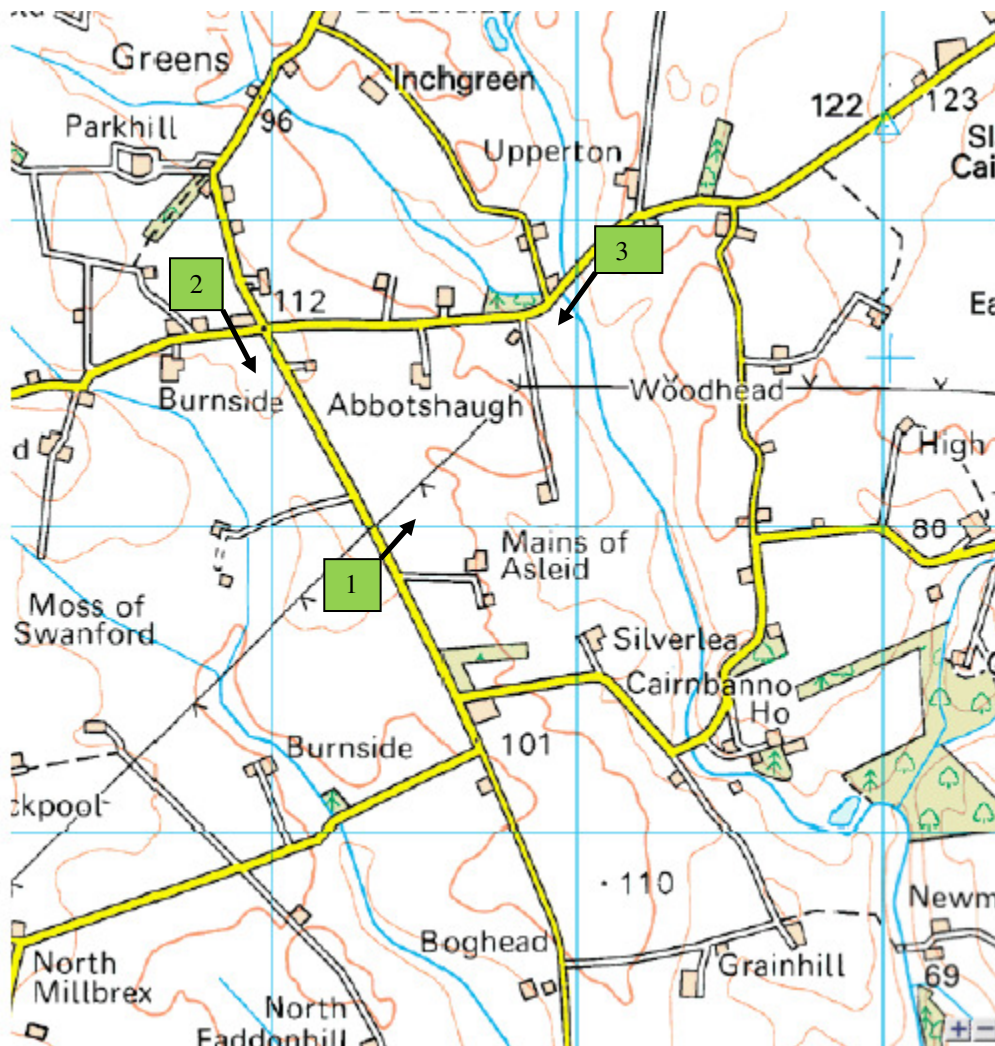


Fig 8

Preferred site area looking NE toward angle tower



Tight junction with wood pole OHL at Burnside



Narrow Bridge on unclassified road looking SW to angle tower

