

CLIENT: GL-GARRAD HASSAN ITALIA Srl
PROJECT: "PETRALIA SOTTANA" Wind Farm, Sicily, Italy
DOCUMENT: Technical Due Diligence -, Foundations Design Review – REPORT-Rev-1
DATE: May 19, 2011

GL Garrad Hassan



EOLICA PETRALIA srl, Palermo, Sicily, Italy
"PETRALIA" Wind Farm, Petralia Sottana (Palermo), Sicily, Italy



TECHNICAL DUE DILIGENCE,
REVIEW OF TURBINE FOUNDATIONS DESIGN

REPORT

Authors:

Dott. Ing. Luigi Cesare Speranza (email: l.c.speranza@scangea.eu)
Dott. Ing. Marco Franceschini (email: m.franceschini@scangea.eu)
Prof. Ing. Claudio Scarponi (email: claudio.scarponi@uniroma1.it)

Document: **scangea_GH5_PETRALIA_REPORT-Rev-01**
Date: **2011-05-19**
Issue: 01

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1. INTRODUCTION

1.1 How to read this document

This document is 'front-loaded', so to speak. Its salient parts are the Executive Summary, Milestones of Review Process and List of Recommended Actions Chapters, which give a succinct but comprehensive overview of the due diligence findings and remedial actions to undertake.

Issues at each stage of the review process are documented in interim reports consisting of Tables (Evaluation Tables, WTG Sites Synoptic Table) and text (Interim Assessment N.1, Interim Assessment N2, etc.). Interim reports are part of this document as annexes.

Finally, GL-GH's independent calculations are also given as separate documents attached hereto as Annexes (please refer to the Table of Contents).

1.2 General

This assessment covers the design for the foundations of wind turbines in the wind farm developed by EOLICA PETRALIA S.r.l. of Palermo, Sicily, Italy, in areas of the Municipality of Petralia Sottana in the Province of Palermo, Sicily, Italy. The project comprised originally 46 no. wind turbines, but was subsequently downsized to 26 no. turbines. Two turbine types are envisaged: GAMESA G52-850 kW and GAMESA G58-850 kW.

1.3 Authors of Proposed Design

The developer is EOLICA PETRALIA S.r.l. (Falck Group), Italy.

The developer's Consultants are:

- INCICO Spa, Via Terranova 28, Ferrara, Italy (Designer);
- GARASSINO Srl, Via Curtatone 25, Milano, Italy (Geotechnical Consultant)

1.4 Authors of Review

- Dott. Ing. Luigi Cesare Speranza, Roma (SCANGEA);
- Dott. Ing. Marco Franceschini, Bologna (SCANGEA, External Consultant);
- Prof. Ing. Claudio Scarponi, Roma (UNIVERSITA' 'LA SAPIENZA', ROMA – SCANGEA).

1.5 Documentation Reviewed

List of documents reviewed constitutes APPENDIX A to this Report.

1.6 Description of Proposed Foundation Design

Proposed foundation design consists of two octagonal plinths of slightly differing dimensions, one for each turbine type, as follows:

- Turbine Type G52: octagonal plinth Type A (side of circumscribing square: 12,2 m);
- Turbine Type G58: octagonal plinth Type B (side of circumscribing square: 11,5 m)

For each turbine type, the same plinth is used for both shallow and deep foundation. When a deep foundation is envisaged, piles are 8 no. of 1000 mm diameter and varying length.

1.7 Method of Review - Guidelines

The aim of GL-GH's technical due diligence review is ordinarily two-fold:

- a) to verify the viability of the proposed foundation structures via independent calculations complying with international standards of calculation (Euro-Codes, IEC 61400-1 and Italian NTC-2008);

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- b) to evaluate the calculations and ancillary documentation of the proposed design so as to assess their compliance with current Italian standards. This in order to foresee potential bottlenecks in the path of approvals from Italian Authorities (Regione, Genio Civile etc.) and ensure that an adequate maintenance plan is drawn up and enforced.

In this particular case, as all permits have been granted to the Developer and construction has already commenced, the second aim of the review is less important.

1.8 Method of Review – Evaluation Tables / Synoptic Table

Itemisation of the review criteria is given in the Evaluation Tables. Checks in these tables are given separately to structure soundness (evaluated with independent calculations) and quality of design documentation. The WTG Sites Synoptic Table (or in short: Synoptic Table) recapitulates the main review issues site by site of the wind farm. Conclusions and remedial actions (if any) are reported in the text documents (Interim Assessments).