There are increasing signs that the very challenging market conditions for the construction industry in Ireland are gradually improving. The past six months have seen a significant increase in projects for GDG with most of the projects based in Ireland and the UK which bodes well for 2016.

GDG has strengthened its team with seven new appointments in January to assist with the increased workload and further appointments anticipated later in the Year. We are confident that our new colleagues will help us continue to deliver value and innovative solutions to our clients. Details on our new team members are on pages 7 and 8.

We are busy on multiple fronts with a welcome revival in the pile and urban basement market in Ireland and the UK. GDG has been appointed geotechnical checkers to Halcrow Barry on the Gort – Tuam (M17/M18) motorway. The project is progressing well in spite of the challenging ground conditions. Our sections of the River Dargle Flood Defence scheme have been completed in time for the recent poor weather and have performed well. GDG is continuing its work on research and development projects with the exciting EU sponsored DEMOGRAVI3 project having recently commenced. The project will culminate with a full scale offshore turbine deployment.

GDG will be hosting a breakfast briefing in February where we hope to share some insights into ground related problems and how to optimise designs and solutions for the foundation market. Details of the event will be made available through the GDG website www.gdgeo.com.

**Paul Quigley**
**Principal Engineer**
NEW PROJECTS

N17/N18 Gort to Tuam PPP scheme in Galway

Earthworks Underway!

GDG is providing Category III earthworks checks to Halcrow Barry for a 4km soft ground section of the N17/N18 Gort to Tuam PPP motorway scheme in Galway, as well as independent checks for foundation solutions for the structures on the northern half of the scheme. The soft ground areas, comprising of peat overlying very soft calcareous and lacustrine silts and clays, are being treated using band drains and staged construction. Checking and certification has involved creating independent ground models of critical design sections and analysing the stability of the ground for each proposed stage of construction, taking account of changes in pore water pressure with time. GDG is also responsible for independent checking and certification of structural foundation solutions for integral bridges on shallow and piled foundations, reinforced earth abutments, box culverts, and signage gantries. One particular challenge encountered during structure foundation checks has been the certification of karst risk mitigation measures for structures founded over or near identified karst features in the underlying Visean Limestone. The 57km long N17/N18 Gort to Tuam PPP scheme will provide 53km of motorway between Gort and Tuam with a dual carriageway bypass of the town of Tuam.

The scheme is currently under construction by a consortium whose members include Roadbridge, Sisk and Lagan Construction with a contract value of €550m and is due to open in early 2018. (Photo: Aidan Stewart, Halcrow Barry).

GDG Appointed Geotechnical Designer of the Innovative Offshore Wind Project DEMOGRAVI3

GDG has been appointed by EDP as the geotechnical designer supporting the engineering of a novel offshore gravity base foundation (GBF) to be deployed off the Portuguese coast. The GBF will be towed to site and lowered to the seabed removing the need for heavy lift vessels, an innovation which will help to reduce the cost of offshore wind energy. GDG will examine the complex soil-structure interaction between the foundation and the seabed.
NEW PROJECTS Continued

Booming Market in London Basement Design

In the last year, GDG has been involved in the design of a number of basements in London. These have ranged from single storey underpinned basements for domestic residents to the design of the secant piled retaining walls and bearing piles for large multi-storey commercial and residential developments.

Residential basement construction in London has received some bad press in recent years with reports in newspapers of leakage, excessive ground movements and even collapse. GDG has worked with a number of reputable contractors and piling companies to design sound and efficient secant and contiguous pile walls for a number of large structures in central London many of which are now complete. In the last six months these developments have included large multi-storey apartment and office blocks, an electricity substation and a retaining wall to protect a railway tunnel. Construction started on two of these before Christmas, with more scheduled to break ground soon. One ambitious project, currently at tender stage, required mammoth 2.4 m diameter bored piles.

The projects have taken GDG on a geological tour of the Thames basin, with London Clay, the Lambeth Formation, the Thanet Sands, and Chalk all encountered. With many projects near the river, both to the west and east, we have also designed solutions within the alluvial silts and gravels that the city has to offer.
ONGOING PROJECTS

LEANWIND

Project Releases October Newsletter
LEANWIND is a four-year project co-funded by the Seventh Framework Programme of the European Union. It will bring cost reductions to the offshore wind energy industry through the application of lean principles to key aspects of an offshore wind farm and supply chain. GDG is leading the work on optimising the offshore foundations which includes designing substructure concepts, associated fabrication methods and installation strategies that will offer the most potential for cost reductions over the coming years. The project’s October Newsletter brings some of the progress and results of the planning work undertaken in 2014, as well as updates on events and on how the project has been disseminated.

DESTination RAIL

Work Package Leaders, together with members of their teams, met on 12/13 November 2015 at the Transport Research Laboratory (TRL) near Wokingham, England to review the project progress.
Irish Rail

GDG has recently led an extensive soil investigation campaign on behalf of Irish Rail. The soil investigation was conceived as an add-on to the ongoing Irish Rail Risk Model and Decision Support Tool. The results will provide benchmark values of geotechnical parameters for the most prevalent soil types across Irish rail network. These will be used in probabilistic slope stability calculations that form the core of the Risk Model.

The investigation consisted of a combination of non-intrusive and intrusive testing on three rail earthwork sites in Co. Wexford and Co. Carlow executed by specialist subcontractors. Geophysical investigation consisted of a combination of multi-channel analysis of surface waves (MASW) and electric resistivity tomography (ERT). This was followed by cone penetration tests (CPT) on the same locations. GDG, acting as a main contractor, designed the testing scope, liaised with the client and supervised all tests, while also taking the role of PSDP.

Geophysical Soil Investigation on Waterford – Rosslare Line

Paul Doherty Speaks at GE Slope Engineering Conference in London November 2015

The presentation described a software model specifically developed for the Irish Rail network which provides a holistic framework to predict the risk of slope failure for thousands of cutting and embankment assets.


GDG contributed to the European Wind Energy Association Conference (EWEA 2015), which took place in Paris last November, with a technical paper titled “Comparative Study of the Design Methods for Large Diameter Offshore Monopiles”. The article, published on the conference proceedings, discusses the soil-structure interaction models employed for assessing the lateral capacity of offshore monopiles, with a focus on their applicability to the new generation of large diameter (XL) monopiles. It outlines some of the findings from the ongoing FP7 project, LEANWIND, on the highly debated topic of innovative design methods for XL monopiles.
GENERAL NEWS Continued

GDG was also co-author on the paper “Buoyant Gravity Based Foundations for Offshore Wind - Infrastructure Challenges” (poster presentation*) which reports results from a joint study on the existing logistical challenges facing the deployment of the innovative buoyant gravity based foundations. This research has been conducted in collaboration with the University of Hull, and University of Edinburgh, within the LEANWIND framework, and outlines the technical criteria for infrastructure that can facilitate industrial application of self-buoyant GBFs. A GIS application has been developed, as a decision support tool, to map out the most suitable ports for their industrial implementation and identify the most restrictive bottlenecks. The poster can be accessed on the EWEA 2015 website from: http://www.ewea.org/annual2015/confere nce/allposters/PO052.pdf

GDG Present Insights on Foundation Innovations for the Offshore Wind Sector at LORC International Symposium in Denmark, September 2015.

The 2015 LORC Symposium included a discussion under the general topic of ‘Cost reduction through innovation’ on the 12th of September, where GDG introduced their recent research and design optimisation activities in the field of offshore substructure engineering. Of particular relevance was their role within the European FP7 project “LEANWIND”.

GDG Represented at the XVI European conference on Soil Mechanics and Geotechnical Engineering in Edinburgh

Paul Quigley, Principal Engineer at GDG, presented two papers at XVI European Conference on Soil Mechanics and Geotechnical Engineering In Edinburgh. The conference was the largest ever civil engineer conference hosted in the UK with over 1,200 delegates attending over five days.

The paper ‘Some trends from recent ground investigations in Ireland’ was selected for presentation at a plenary session and highlighted some of the financial aspects and trends from the contracts. Paul also presented a paper on ‘Some geotechnical characteristics of a soft structured soil in Northern Ireland’, highlighting the unusual ground conditions for an Irish context and how the use of a targeted ground investigation greatly improved the understanding for the low strength measurements.

Piezoball being used for determining strength profile of very soft ground
GENERAL NEWS Continued

Paper by GDG in collaboration with Bauer Accepted by the Journal of Petroleum Science and Engineering

The publication, “Estimation of the Compression and Tension Loads for a Novel Mixed-In-Place Offshore Pile for Oil and Gas Platforms in Silica and Calcareous Sands” reports on a Finite Element modelling of the full scale MIDOS piles, and calibration of the results based on multiple laboratory model scales. The calcareous sand behaviour was simulated in Plaxis 3D by examining the stresses in the model and adjusting the soil parameters depending on the crushing threshold of the calcareous sand particles.


This Second International Conference will be held on 23-25 February 2016 in London. The main objective of the conference is to identify the future situation of the UK offshore wind market to prepare for upcoming developments.

Paul will cover the following topics during his speech about Managing Ground Risk:
• How much data is enough for site investigations?
• The misnomer of “Design Conservatism”

• Probabilistic based design used to quantify risk
• Geotechnical failures and how they can be avoided

GDG Submission, in Collaboration with Open Hydro, is Nominated for Engineers Ireland Annual Excellence Geoscience Ireland Award for 2015

The Geoscience Ireland Award recognises exceptional achievement in design and/or delivery of projects requiring significant geo-scientific expertise e.g. involving geological, geochemical, geophysical, geotechnical or hydrogeological studies or projects in the development of natural resources, infrastructure and water services in international markets.

GDG has become a member of Geoscience Ireland (GI)

Commenting on GDG’s membership, GI’s Chairman Koen Verbruggen said “I am delighted to welcome GDG which extends the excellence offered by GI in geotechnical engineering, especially in offshore structures and risk assessment. I am particularly pleased to see the strong links GDG have with latest Irish research in this field”.

• Probabilistic based design used to quantify risk
• Geotechnical failures and how they can be avoided
Karlo Martinovic Presents in the Final of NCE Dragon's Den Competition

GDG's engineer Karlo Martinovic competed in the final stage of the Dragon's Den competition for young engineers organised by New Civil Engineer. His presentation outlined the innovative risk model and decision support tool for transport network earthworks being developed by GDG, together with the ideas for its enhancement in alignment with the Construction 2025 programme objectives.

GDG is delighted to announce seven new appointments this year and the opening of offices in Edinburgh, Belfast and London.

Strong growth in Infrastructure and commercial property development in the UK has been a focus for GDG in recent years. As such GDG are delighted to announce a series of seven new appointments for 2016 and the opening of new offices in Edinburgh and Belfast. We look forward continued growth and expansion in these markets.
New Appointments Continued

David Igoe
Senior Engineer

David has over six years of experience as a Geotechnical Engineer undertaking a broad range of design projects in foundation engineering and soil-structure interaction. He has completed a PhD on the topic of offshore piling in 2010 and has published widely in the areas of deep foundations. David was a key member of the PISA (Pile Stability Analysis) project aimed at improving design methods for offshore monopiles. He is currently the Irish representative for the European Technical Committee on piling (ETC3).

Juliana deOlivera Vasconcelos
Graduate Engineer

Juliana graduated from École des Ponts ParisTech - ENPC, France and Federal University of Minas Gerais – UFMG, Brazil in 2014 with a B.E. in Civil Engineering. She has experience as intern, trainee and researcher with a focus on structural engineering, including structural analysis and design of foundation, driven piles and retaining walls; the design of bridges and reinforced concrete structures, and calculations.

Elisabetta Feudale Foti
Graduate Engineer

Elisabetta is an Italian trained geotechnical engineer with experience across a wide range of activities including desk studies, interpretative reporting, data management, engineering analysis and laboratory testing. She graduated from University of Messina (Italy) with a M. Sc. Civil Engineering in 2013.

Yeganeh Attari
Graduate Engineer

Yeganeh completed her undergraduate degree in Civil Engineering at Ferdowsi University of Mashhad (FUM), Iran. In 2014 she came to Dublin to pursue her Masters at University College Dublin. Yeganeh has joined GDG since submitting her Master’s thesis on the subject of testing a novel gravity base foundation for offshore wind.

Henry Jones
Intern

Harry, an intern here at GDG since Jan 2016 is a 4th year Civil, Structural and Environmental undergraduate student from Trinity College Dublin. He joined GDG as part of his MAI degree. His interests are in the fields of Renewable Energies and Geotechnical Engineering.
GDG Events

GDG wrapped up a busy and successful 2015 with a Cocktail Party and Christmas outing to Marios in Ranelagh

While a game of Secret ‘Greedy’ Santa added a twist to the festivities, the real highlight of the evening was the Capirinha cocktail so skilfully administered by Carla!