

ENGINEERING EARTH'S DEVELOPMENT, PRESERVING EARTH'S INTEGRITY

TECHNICALLY SPEAKING

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FOCUSED ON:

**ENVIRONMENTAL &
SOCIAL IMPACT ASSESSMENT**

EXCLUSIVE:

**WIND AS SUSTAINABLE
RESOURCE**

Gaining Momentum

OFFSETS PROGRAMME

Targets Biodiversity Hotspot in Madagascar

PROPOSED FERTILISER PLANT

Requires Both Land and Marine Assessment

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ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT (ESIA) IS AN UMBRELLA TERM FOR THE DIVERSE BREADTH OF SERVICES NEEDED TO SUPPORT THE DEVELOPMENT OF MANY PROJECTS. THESE ASSESSMENTS PLAY AN INCREASINGLY IMPORTANT ROLE IN INDUSTRIES RANGING FROM ENERGY TO MINING, OIL AND GAS, MANUFACTURING, WATER RESOURCES, WASTE, FORESTRY AND TRANSPORTATION.

This "superset" of services that Golder offers includes:

- Physical disciplines, such as hydrology, water quality, noise and air quality
- Ecological disciplines, including terrestrial and aquatic ecology, biodiversity and ecosystem services
- Social disciplines, including health, cultural sciences/archaeology and socio-economics
- Consultation/stakeholder engagement

The legislative and regulatory requirements for ESIA (or EA, EIA, SIA, SEIA, depending on the country and type of permitting needed) have been rapidly changing for the last several decades. ESIA work is also becoming a leading tool to support the sustainability goals of our clients. If done well, each impact assessment contributes to sustainable development –ensuring a project design that is more effective for our clients, better for the environment, better for local communities and better for project proponents or funders.

Our global ESIA technical network consists of more than 600 professionals who collectively represent one of our biggest client service areas. Our goal is to ensure that our ESIA services are developed and implemented to the highest technical standards, and that best practices and technical expertise are shared globally.

Golder's ESIA protocol is an evolving tool that takes into account a host of management guidance, plus technical topics such as issue scoping, baseline characterisation, impact assessment, mitigation and monitoring. Each project typically requires multi-disciplinary teams of environmental and social scientists plus a project director and manager, as well as information technologists.

Besides directly participating as lead consultants, we have been actively engaged in the evolution of international best practices for ESIA and building capacity of clients and national governments to manage the assessment process. Many times local client staff are developed and trained during an ESIA project to handle field work, plus community outreach and education with affected residents and businesses.

Impact assessments are also key to decision-making when it comes to loans and insurance for projects. The International Finance Corporation (IFC) has standards of practice, some of which Golder helped develop. Most of the world's large corporate banks rely on the Equator Principles, which refer to the IFC standards, to evaluate the worthiness of projects when it comes to environmental and social performance.

An ESIA represents more than the document needed for project permitting or funding. ESIA is a process which, at its best, serves as the basis for building stakeholder relationships, managing risks, avoiding scheduling delays, identifying and solving problems, applying sustainable project solutions and creating a social license to operate.

We are pleased to spotlight some interesting assessment work in this issue.

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A CONVERSATION WITH TREVOR CUTHBERT



Golder continues to be extensively involved with Environmental Impact Assessments (EIA) that are required for oil sands work in northeastern Alberta, Canada. To date, we have worked on about 40 EIAs, going back to 1995, for projects that are now either operating, under construction or in the approval process.

(The crude bitumen contained in oil sands is part of the world's oil reserves, with higher oil prices and new technology increasing activity in developing these resources.)

Trevor Cuthbert, a project manager in the oil sands division of Golder's Calgary office, plays a pivotal role in the essential information and communication flow among Golder, our clients, and the Canadian and Alberta governments in the preparation and review of project applications.

What is entailed in the EIA process?

Getting an EIA ready for submission can take up to two years. We help our client define what their project will look like, and then work with our technical teams to collect the necessary field data. Many areas of Golder's expertise are tapped during the course of an EIA: terrestrial and aquatic biology components; groundwater; air quality; noise; human and wildlife health; and social components, including assisting our client in consultation with local First Nations. EIAs can even get into paleontology because some projects have encountered large fossil sites that have to be excavated.

I am constantly coordinating between different disciplines to make sure that information is being provided to the various groups involved, so it is a challenging, but interesting, juggling act. We assemble a pretty big team toward the end to make sure everything is getting reviewed in a timely

manner and our document preparation team is in place. The "live reviews" with the client's senior management can be helpful in incorporating edits on the spot. The actual submission we send to the government could easily be six large three-ring binders, and more if you include all the baseline information and supporting appendices that are on CD – about enough to fill up an entire bookshelf.

How do we look at ways to improve or minimise impacts on the environment?

We can offer clients several project planning tools, including mapping and GIS capabilities, which can help identify constraints that will need to be managed. This can often uncover challenges earlier, to avoid going back to the drawing board later.

On a recent EIA, we recommended more mitigation than would normally be included in an EIA to address sensitive species habitat within the project area and, in this case, we were able to influence our client to accept this advice.

How is client interaction expanding for effective EIA follow-through?

Increasingly, we are making an effort to get people from all divisions of our client companies around the table. Our client contacts typically tend to be the regulatory or environmental managers. But it is also very important to engage engineering and construction personnel so that there is an understanding of what will be needed to properly carry out what is required for the project and what is included in the regulatory application.

Beyond EIAs, what can be envisioned in an oil sands' project life cycle?

We can certainly play an even greater role in helping with the engineering and operational monitoring of these projects, helping put the EIAs into action by making sure the projects comply with the regulations when they actually start production. Also, soil and vegetation reclamation is underway on some of the older surface mining operations, dating from the late 1960s or 1970s, and this is another area where Golder has expertise.

Trevor Cuthbert, who joined Golder in 2006, holds a Masters in Environment and Management and can be reached at tcuthbert@golder.com.

WIND AS SUSTAINABLE RESOURCE GAINING MOMENTUM

New Zealand, like many parts of the world, is increasingly turning to renewable energy sources to reduce reliance on fossil fuels and this has led to a surge of applications for consents for wind farm power generation sites.

information needed for a full assessment of the effects of the construction and operation of the wind farm.

“The ecological assessment of effects drew on the wide range of ecological expertise held by Golder in New Zealand.”

Mahinerangi Wind Farm in Otago, South Island, received a resource consent that enables Trust-Power Ltd. to construct up to 100 wind turbines within a proposed site envelope for a maximum generating capacity of 200 megawatts.

Golder provided planning, air quality and ecological services for the entire project including preparation of the Assessments of Environmental Effects (AEE), which brought together a large range of information from a variety of different disciplines and sources. The planning component also involved the preparation of a Construction Management Plan (CMP), and dust management was the focus of the air quality work.

The ecological assessment of effects drew on the wide range of ecological expertise held by Golder in New Zealand. The ecological surveys included bird surveys, especially for the New Zealand Eastern Bush Falcon, a nationally threatened bird that has been recorded in the vicinity of the wind farm site, as well as extensive vegetation, lizard and invertebrate surveys. These surveys provided

Golder staff developed an ecological constraints map of the proposed wind farm area and recommended the avoidance of significant ecological features. This meant that the potential effects of the turbine sitings were significantly reduced. We also helped present information to local communities and provided expert testimony at the Environment Court that finally approved the project.

The first phase of turbine construction has recently been completed, making it one of the largest wind farms successfully approved in New Zealand to date.



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Continual refinement during project development has helped avoid adverse effects on important visual, landscape, ecological and archaeological values. This approach ensures that the environmental features of the site are not compromised while maintaining necessary flexibility for the detailed engineering design requirements.

OFFSETS PROGRAMME TARGETS BIODIVERSITY HOTSPOT IN MADAGASCAR



Lemurs made their way to Madagascar from the larger African continent millions of years ago and have since adapted and evolved into a diverse number of species.

Madagascar is recognised for its high biodiversity and rich natural resources and ecosystems, so a large-tonnage nickel and cobalt mining operation is taking care to ensure that the project's environmental strategy produces positive conservation outcomes.

Sherritt International and its partners, the developers of the Ambatovy project, which is located in the central part of this island nation off the eastern coast of Africa, are committed to designing and sustaining a Biodiversity Management Plan (BMP). The plan aims to achieve no net loss on biodiversity and minimal impacts in the flora, fauna and aquatic resources in the region. Priority species found at the project site include 16 lemurs, 62 birds, 123 reptiles and amphibians, five fish, 24 insects and up to 376 plants.

As part of the creation of a multi-faceted offsets program, the project proponents are working with the government of Madagascar to designate an off-site area of endangered tropical forest for long-term protection of humid forest and

associated species. The area to be designated for protection is about four times larger than the area to be disturbed. The developers are also arranging for conservation of other areas around the mine footprint to help offset the impacts and establish a nearby forest corridor to help increase habitat connectivity.

The BMP also includes a detailed radio collaring exercise to track movement of lemurs (primates endemic to Madagascar) during mine and pipeline construction, as an aid to improving mitigation.

The BMP is seen as a critical next step to build upon the initial environmental and social impact assessment (ESIA), which involved baseline data collection, impact analyses and reporting for physical, biological and social disciplines. Golder has been actively involved in the project over the last six years, first in conducting the ESIA and then helping to design and provide technical assistance with the biodiversity planning.

These efforts to realise a net gain in biodiversity conservation through both onsite mitigation and offsite biodiversity offsets have helped the Ambatovy project become a leading case study and one of several pilot projects for the Business and Biodiversity Offset Programme, a partnership between companies, governments and conservation experts that sets best practice for biodiversity offsets.

The mine is scheduled to begin operation later this year.



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PROPOSED FERTILISER PLANT REQUIRES BOTH LAND AND MARINE ASSESSMENT

A nitrogen complex to be located at a remote site six hours' drive south of Lima is one of many projects that the Peruvian government would like to see developed in the coming years to use plentiful supplies of natural gas found in the country to help produce fertilisers, explosives for mining and other needs, and ethylene for plastics.

The CF Industries' project, which will have extensive landside and port facilities, would be the company's first plant in the Southern Hemisphere and a key addition since there currently is no nitrogen capacity on the west coast of South or North America. This new capacity will enable production of pelletised urea and liquid ammonia for Peru and other markets.

One of the necessary first steps is conducting an Environmental and Social Impact Assessment (ESIA) to assess the potential impacts of the project on the environmental and socio-cultural conditions of the area.

Golder's role began with a multi-disciplinary team from Peru, US and Canada providing environmental and baseline studies regarding soils, biology, geology, traffic, air and noise. Our work also included leading the public consultation plan and workshops with affected stakeholders including local fishermen, as well as completing impact evaluations to support the preliminary engineering design for both the onshore and offshore construction.

Characterising the marine habitat in the proposed development area involved a variety of field sampling programmes. Marine mammal surveys were conducted to document whales, seals and sea lions that frequent this productive section of the Peruvian coast. The field programmes were done in winter and summer seasons. Chemical analyses related to water quality and sediments were also completed. Underwater acoustics surveys were carried out in the vicinity of the marine terminal.

The ESIA is now being reviewed by the environmental affairs office of the national Ministry of Energy and Mines, in accordance with International Finance Corporation (IFC) and Peruvian standards. Once in production, the plant will be a significant boost to the growing market for fertiliser in South America.



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“One of the necessary first steps is conducting an ESIA to assess the potential impacts of the project on the environmental and socio-cultural conditions of the area.”

The project will be located in Bahia San Juan in the District Marcona, Province of Nazca in Peru, with inland facilities on a site of approximately 152 ha (376 acres) and marine facilities within an aquatic area of 80 ha (198 acres).

EUROPEAN UNION-COMPLIANT LANDFILL SITES IN WESTERN ASIA

Environmental and Social Impact Assessment (ESIA) work can be a necessary step in the development of solid waste landfills. As a major step toward improving the waste management system in the southeastern portion of Georgia, two new non-hazardous landfills in the local municipality of Rustavi have been permitted for construction, the first in accordance with European Union (EU) Directives.

One landfill is intended for industrial and construction waste from the Baku-Tbilisi-Ceyhan (BTC) Pipeline operation to allow disposal within the country, and the other within the same land parcel is planned to be a mixed waste municipal landfill for the benefit of the local community.

Golder prepared the ESIA and design by obtaining significant information and submitting the necessary proposals and applications to allow construction on a tight timescale. The ESIA was undertaken to satisfy Georgian legislation, EU Standards and any relevant policies of the client. Environmental and social baseline data were assessed for impacts in light of the agreed standards and mitigation measures and to develop an environmental and social monitoring plan for the life cycle of the landfills. The main components of the ESIA comprised



The landfills are on a greenfield site in the Rustavi District of Georgia.

air quality and meteorology; geology; hydrogeology and hydrology; traffic and infrastructure; noise and vibration; landscape and visual; cultural heritage; terrestrial and aquatic ecology; and socio-economics.

The attention to detail and close partnership with the client's project team enabled a quality submission to gain the necessary permissions for construction and operation of the new landfills.



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COMMUNITY RELATIONS PLAN IS IMPORTANT TO PERUVIAN PROJECT

Recent government approval of an environmental impact assessment has paved the way for final permitting and a construction start later this year of a copper mining operation in what is slated to become a major copper-producing region in southern Peru.

A significant milestone in the Environmental and Social Impact Assessment (ESIA) process was a public hearing, following a series of informational workshops, that was attended in July 2010 by several thousand representatives from neighboring communities, municipal authorities and regional officers, as well as representatives of the local mining bureaus. At this occasion, presentation of the Environmental Impact Study for the 35,000-hectare (~87,000 acres) project was met with very favorable support.

Golder helped develop the community relations plan and citizen public participation plan – both of which are part of the extensive ESIA that Golder conducted. The scope covered baseline studies in physical, biological and social-economic components; an impact assessment on hydrology, water quality, air and noise; and the environmental management plans.

The community outreach efforts have been effective in demonstrating a strong commitment to work with local stakeholders to ensure the project provides sustainable benefits to the entire region.

The developer has undertaken more than 50 sustainability efforts to address water and sanitation, agriculture and livestock breeding, health, education, electricity provision and transportation. Two examples are a programme to train more than 900 teachers to work in the region, as well as a

scholarship programme to help young students pursue higher education at universities or technical institutes. A social improvement aspect involves sponsoring the recovery and relaunch of traditional craft textile technologies in the region.

Increasingly, projects such as this planned mining operation are identifying and properly managing complex social and environmental issues in partnership with local communities.



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ENVIRONMENTAL IMPACT IS PART OF TRANSMISSION LINE STUDY

Large infrastructure projects such as high-voltage transmission lines are needed to serve growing energy loads due to population changes, the growing reliance on air conditioning and the need to transmit power from renewable energy facilities. Various public and private utilities have been proposing transmission improvements, including the regional system provider in the US Pacific Northwest, the Bonneville Power Administration (BPA).

Golder was selected by BPA to assist in the evaluation of, and regulatory compliance for, a 75-mile-long (121 km), 500-kilovolt (kV) transmission line and associated substations proposed for southwest Washington State. The line crosses the Columbia River to a new substation in the state of Oregon. If approved, the I-5 Corridor Reinforcement Project would be the largest 500kV transmission line constructed by BPA in this area in 40 years.

An Environmental Impact Statement (EIS) is required under the US National Environmental Policy Act (NEPA) to evaluate the project and its possible routing alternatives. The process started in 2009, with Golder studying four alternative alignments totaling approximately 300 miles (483 km). The Golder team has started preparing a NEPA Draft EIS for public release before the end of this year, which will be followed by a round of public meetings and comment.

Potential environmental and social issues identified include land use, cultural resources, aesthetics, public health and safety, sensitive plants and animals, soil erosion, wetlands, floodplains, fish, wildlife and water resources, and environmental justice issues (potential impact on low-income and minority populations). Project aspects to be addressed include construction activities, right-of-way clearing, and impacts of construction and operation of towers, access roads, substations and related facilities.

Golder will work with BPA to finalize the EIS by the end of 2012 to support a final decision on the project. The line would help to ensure reliability and increase capacity for the overall transmission grid and support local and regional needs in the Northwest and beyond.



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Extensive study and analysis must be done by law before a final decision is made on whether and where to build new transmission lines and substations. Involvement by stakeholders helps provide the input needed to make the best-informed decision.



A few of the residents at Rhotia Valley Children's Home in Tanzania.

NEWS FROM GOLDER

ACCOLADES



We have extended our lead as the most awarded firm in the history of the Australian BRW / Beaton Client Choice Awards, recognised in four categories and bringing our grand total of awards to 16. Golder in Australia won Best

Consulting Engineering Firm (revenue \$50-\$200m) for the sixth consecutive year and was also named: Best Provider rated by the Property and Construction Sector; Best Provider rated by the Mining Industry; and Best Provider rated by the Government and Community Sector. Golder was a finalist in a further seven categories as well. Each year, Beaton Consulting undertakes the largest study of clients of professional services firms in the world, asking buyers of professional services to rate firms' performance across a broad range of attributes, including service, value for money, commerciality and innovation over the past year.



Two Golder projects were recently recognised at the Ground Engineering (GE) Awards in Australia, receiving 'Highly Commended' (runner-up) and 'Commended' in the prestigious category of 'International Project of the Year'. The Port Botany Expansion project in Sydney for the Sydney Ports Corporation received 'Highly Commended' and 'Commended' went to the Dudley Ward Rock Fall Protection Works project in Gibraltar. Recognition at the GE Awards for two vastly different Golder projects from different sides of the globe is testament to our global commitment to technical and service excellence. The GE

Awards are organised by Ground Engineering magazine and is part of Emap Inform. For more information, please contact Daniel Garland at dgarland@golder.com.

COMMUNITY

In 2010 the Golder Trust for Orphans donated \$55,000 USD for the construction of a bakery at Rhotia Valley Tented Lodge and Children's Home in Tanzania. Revenues generated from the bakery will provide housing for an additional six children, who have been orphaned as a result of the AIDS pandemic. The new equipment recently arrived and the bread will start to be sold soon. For more information about the Golder Trust for Orphans or to make a donation, visit www.goldertrust.org.



New bakery equipment at Rhotia Valley, Tanzania.

GEOGRAPHIC EXPANSIONS

As part of our managed growth strategy in the Asian region, we have opened a new office in Mongolia. The office, located in the capital Ulaanbaatar, will be an important asset in helping us deliver our services to existing and prospective clients that operate in the Central Asian nation. Mining is one of the largest industries in Mongolia, along with agriculture. For more information, please contact Chris Swindells at cswindells@golder.com or James Wang at jjwang@golder.com.

HEALTH & SAFETY

For the fourth year in succession, Golder in Finland has been recognised for performance in health and safety by the Zero Accident Forum. The Zero Accident Forum is an organisation, promoted by the Finnish Institution of Occupational Health, with 274 member companies, representing some 300,000 employees. Only 15 of those member companies – including Golder – have been recognised as reaching the highest level of health and safety performance. In addition, Golder's Finland operations were also recognised for their exemplary approach to new or seasonal employee orientation and training.

LEADERSHIP CHANGES



Jean-François Bolduc has been selected as Corporate Vice President for Golder in Europe. He will assume his new role on a full-time basis in July 2011 and will be

based in Lyon, France. Jean-François joined Golder in 1997 as the President and Founder of Golder Associates Innovative Applications (GAIA) Inc., a construction firm specialising in contaminated site remediation, mining properties rehabilitation and ground engineering works. Since 2003, he has served as the National Construction Leader for Golder in Canada; most recently, he has been instrumental in building the connections to establish our North American construction operation, working closely with colleagues in Canada and the United States to operate the construction business on a continental basis. Jean-François assumes this role from Roberto Mezzalama who has shown great leadership over the past several years.

MERGERS / ACQUISITIONS

Golder recently acquired the Marston group of companies, a full-service mining consultancy that specialises in mine planning and geologic services for open pit and underground coal, metals, oil sands, and industrial mineral mines. The acquisition boosts our capabilities as a global leader

in mining by expanding our mine planning and resource evaluation capabilities in energy minerals, particularly coal and the Alberta oil sands. It also expands opportunities to provide our traditional services -- including geotechnical engineering, mine waste management, environmental services and permitting, and reclamation and closure -- to new clients in the world's major coal-producing regions. Culturally, both companies focus on technical excellence and working closely with clients. For more information, contact Patty Kamysz at pkamysz@golder.com



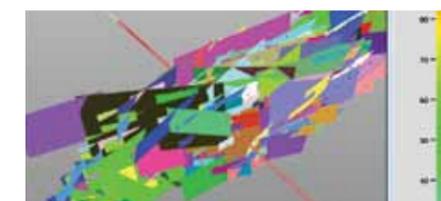
Golder has merged with HB Lanarc Consultants, a full-service "green solutions" consultancy that specialises in planning and design for sustainability. Adding to our core services in earth and environment, HB Lanarc brings long-established expertise in planning, design, and engagement efforts for urban, suburban, and rural settings. The union boosts Golder's market position in the Real Estate, Transportation, Waste, and Power sectors by enhancing planning capabilities in urban communities, sustainable development, energy management and development, and consultation/facilitation. The new team delivers an integrated service package built around the "eight pillars of sustainability", which responds to the critical trends of our time. HB Lanarc will retain its existing locations in Nanaimo, BC and Vancouver, BC.



A Member of the Golder Group of Companies

OTHER NEWS

FracMan 7 software generates 3-D fracture network models to provide a realistic description of the pattern of faults, fractures, solution features, and stratigraphic contacts in fractured rock. The software provides a range of approaches for generation of fracture patterns to suit every geology, including stochastic models, fault and fold geological models, geocellular models, and stress tensor models. FracMan 7 adds improved flow and hydraulic fracture simulations, a host of new file formats, new display types, and improved editing capabilities making it the premiere fracture modeling solution. Visit fracman.golder.com.



KNOWLEDGE EXCHANGE

UPCOMING CONFERENCES

21st International Conference on Port and Ocean Engineering under Arctic Conditions (POAC 2011)
July 10-14 2011, Montréal, Québec, Canada

Iron Ore 2011
July 11-13, 2011, Perth, Western Australia

Diggers and Dealers
August 1-3, 2011, Kalgoorlie, Western Australia

Australian Mine Rehabilitation 2011
August 16-19, 2011, Adelaide, South Australia

AfriWater 2011
September 13-15, 2011, Johannesburg, South Africa

Recycling and Waste Management (RWM) and Chartered Institution of Wastes Management (CIWM) in Partnership for 2011
September 13-15, 2011, Birmingham, United Kingdom

Mine Closure 2011
September 18-21, 2011, Lake Louise, Alberta, Canada

Meeting of the Minds
September 21-23, 2011, Boulder, Colorado, USA

Canadian Brownfields 2011 Conference
October 3-4, 2011, Toronto, Ontario, Canada

AIHA 2011 - Asia Pacific OH+EHS Conference and Exhibition
October 11-13, 2011, Singapore

COP17 Durban
November 28-December 9, 2011, Durban, South Africa

Questions?

E-mail TechnicallySpeaking@golder.com or visit www.golder.com for more information.

TECHNICALLY SPEAKING

Technically Speaking is published for valued clients, employees and friends of Golder Associates. This quarterly newsletter includes articles showcasing innovative and technically challenging projects that Golder professionals have worked on throughout the world.

Please contact Erin Johnson, Managing Editor, at + 1 651 697 9737 or erjohnson@golder.com if you have any questions or comments.

ADDRESS & SUBSCRIPTION CHANGES

Email TechnicallySpeaking@golder.com to inform us of any mailing changes or subscription requests.

GOLDER ASSOCIATES

At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and the related areas of energy. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organisational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth, now employing more than 7,000 people who operate from more than 160 offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

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