

**Year of Birth:** 1971  
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### Academic and Professional Qualifications

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| Chartered Geologist  | 2004 |
| Glossop Award, Engineering Group of the GSL                            | 1999 |
| Fellow of the Geological Society of London (GSL)                       | 1998 |
| Herbert Lapworth Medal, Imperial College, London, UK                   | 1997 |
| Master of Science in Engineering Geology, Imperial College, London, UK | 1997 |
| Bachelor of Science (Hons), Geology, University of Edinburgh, UK       | 1993 |

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### Key Experience

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| GeoRisk Solutions Ltd, Consulting Engineering Geologists   | 2007 – present |
| Fugro (Hong Kong) Ltd, Consulting Engineers                | 2005 – 2007    |
| Scott Wilson Ltd, Consulting Engineers                     | 1997 – 2005    |
| Imperial College, Department of Civil Engineering          | 1996 – 1997    |
| Southern Testing, GI Contractor & Geotechnical Consultants | 1995 – 1996    |
| Glasgow University, Department of Applied Geology          | 1994 – 1995    |

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### Professional Groups & Activities

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| Geological Society of London, Chartered Geologist Professional Assessor  | 2006 – 2012 |
| Geological Society of London, Vice-Chair of the Hong Kong Regional Group | 2006 – 2008 |
| Geological Society of London, Committee Member, Hong Kong Regional Group | 2005 – 2008 |

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### Summary

Jonathan is an engineering geologist with over 18 years experience and co-founded GeoRisk Solutions in 2007. He has extensive experience in the use of engineering geology and geomorphology to develop geological, ground and design models for a wide range of applications and specialises in landslide investigation and stabilisation; developing hazard models for landslide hazard/risk assessments and mitigation design; and, in the application of engineering geology to slope stabilisation and mountain road engineering. He is currently involved with the review of the Design Event Approach (detailed in GEO Report 138) for Natural Terrain Hazard Assessments for the GEO. In 2011 he was part of a team of international specialists under URS Scott Wilson, which carried out a geohazard and georisk study for a proposed gold and copper mine in Papua New Guinea.

Jonathan has worked extensively in both Hong Kong and the Philippines and has also undertaken projects in Papua New Guinea, Laos, China, India, Nepal and Ethiopia. In Hong Kong he has been at the forefront of landslide hazard / risk assessments, forensic landslide investigations, and slope stabilisation projects for the GEO since 1998. He was the expert witness for the Department of Justice in 2007 for a PFA fill slope failure, and was the senior engineering geologist for the forensic investigation of the major Shek Kip Mei Landslide in 1999.

Jonathan was the Resident Geotechnical Engineer on a World Bank-funded rehabilitation of an 84km mountain road in the Philippines between 2002 and 2005, responsible for provision of specialist engineering geological services for the contract duration and construction supervision involving; geotechnical design verification and design of slope and landslide stabilisation and erosion protection works; identification and testing of construction materials; and, the design of road retaining structures. He has undertaken landslide investigation and remediation design, and alignment design for HEP schemes, new and existing mountain roads and residential developments in the Philippines, India, Nepal and Ethiopia.

### **Hazard Assessments**

Landslip Prevention & Mitigation Programme (LPMitP): In 2008 the Hong Kong Government commenced a systematic evaluation of landslide hazards and mitigation. GRS have been involved in 17 out of 34 landslide hazard assessments awarded to date of which Jonathan has either been the technical author or the technical reviewer. Clients include Halcrow (Asia) Ltd., CM Wong & Associates Ltd., Ove Arup and Partners, ESA Consulting Engineers Ltd., Jacobs China Ltd., Hyder Consulting and Fugro (Hong Kong) Ltd.

GRS have also undertaken 17 landslide hazard assessments for private developments in Hong Kong and Jonathan has either been the technical author or the technical reviewer. Clients include Victor Li & Associates, Wong Pak Lam & Associates, CM Wong & Associates, James Lau & Associates, Mott Connell (Hong Kong) Ltd, ESA Consultants Ltd, Canwest Consultants Ltd., Arthur Yung & Associates, Hyder Consulting, JMK Consulting Engineers Ltd. and Hong Kong Playground Association.

West Lantau Landslide Hazard Study, Hong Kong: During a severe rainstorm on 7 June 2008, over 2,400 landslides were recorded on Lantau Island, the largest island in Hong Kong. Numerous road links were severed and many landslides affected villages. Technical author and lead engineering geologist for the natural terrain hazard assessment at Keung Shan Road North study area and technical reviewer for the Wang Hang study area. Client: Arup-Fugro JV.

Geohazard and Georisk Feasibility Study, Frieda River Project, Papua New Guinea. Jonathan was part of a team of international geohazard specialists, which carried out engineering geological and geomorphological investigations for a proposed gold and copper mine in the Central Range mountains, East Sepik province. Client: URS Scott Wilson & Xstrata Frieda River Limited.

Natural Terrain Landslide Identification Study, Hong Kong: Team manager and air photo interpretation (API) specialist for a HK\$19m Natural Terrain Landslide Identification project for the GEO. Managing half of the joint venture project, and specialising in geomorphological mapping and the identification of relict and recent landslides and historic landslide catchments for the compilation of an enhanced natural terrain landslide database for Hong Kong. Client: GEO.

Natural Terrain Hazard Study – Po Shan Road, Mid-Levels, Hong Kong: Completed engineering geological study for Fugro for a historical landslide area above private apartment blocks for the GEO. Study involved API, detailed geological and geomorphological field mapping, logging and interpretation of extensive ground investigation data, slope stability and debris mobility analyses, landslide hazard and probabilistic assessments, and quantitative risk analysis (QRA). Carried out design option review and preliminary design for landslide mitigation works, based on the findings of the NTHS. Client: GEO.

Natural Terrain Hazard Studies – Kwu Tung Development Site and Po Shan Road Redevelopment Site: Senior engineering geologist for Fugro involved in API, detailed field mapping, planning and supervision of ground investigation, slope stability and debris mobility analyses, and landslide hazard assessments for both proposed and redevelopment of existing housing schemes for private developers in Hong Kong. Client: Wu Yee Sun Co. Ltd

Route 10, So Kwun Wat, Western New Territories, Hong Kong: Completed an appraisal of natural terrain landslide and boulder fall hazards by API for Scott Wilson's design of a 6.5km long highway within the Tai Lam Country Park, Hong Kong. Client: HyD.

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## **Forensic Landslide Investigations**

### Expert Witness

Key author of an expert report and expert witness for the Hong Kong SAR Government's Department of Justice, on the cause of a pulverized fuel ash (PFA) fill slope failure.

Landslide Investigation Consultancies, Hong Kong (2005 to 2012 Agreements): Team leader of landslide studies and providing technical engineering geological advice to slope instability problems for the GEO in Hong Kong. Principal engineering geologist providing specialist advice to landslide investigation teams. Team Leader for landslide mapping of debris avalanches, debris flows and debris floods on Lantau Island following 1400 landslides in 2008. Client: GEO.

Landslide Investigation Consultancies, Hong Kong (1998-2001): Team leader responsible for the organisation, management and reporting of detailed investigations of landslides for the GEO in Hong Kong. Also provided engineering geological expertise and specialist aerial photograph interpretations to other project teams. Involvement covered all aspects of landslide investigation including inspections; planning and supervision of ground investigation works; detailed logging, geological and geomorphological mapping and interpretation; API; slope stability analyses; and, interpretative report writing. Provided the main engineering geological input, and planned, co-ordinated and interpreted a large ground investigation for the forensic study of the major 1999 Shek Kip Mei Landslide, which resulted in the permanent evacuation of more than 700 residents from a housing estate. Planned, logged and interpreted detailed ground investigation works, comprising extensive trial trenching and trial pitting works, Mazier sampling, insitu permeability tests and SPTs, downhole geophysical testing, landslide instrumentation (DIVER groundwater and inclinometer monitoring), and extensive laboratory testing for a number of complex landslides in the New Territories of Hong Kong. The results of the landslide studies were used to further understand the causes of slope failures and to improve future design, construction, monitoring and maintenance of slopes in Hong Kong. Client: GEO.

Investigation of Landslides and Slope Instability, Private Highland Development, India: Principal Engineering Geologist for Fugro responsible for investigating massive landslides and slope instability problems at an under-construction highland resort and residential development site in Maharashtra province in India. Recommendations provided to the client regarding further investigation, ground movement monitoring and remediation. Provision of independent, specialist engineering geological advice provided to Indian geotechnical contractor regarding ground conditions, slope instability problems and the design and construction of mechanically stabilized earth retaining structures for slope remediation measures. Client: Sahara

Investigation and Remediation Project for Natural Terrain Landslide Scars Near Tung Chung Service Reservoir, Hong Kong: Responsible for detailed geological and geomorphological mapping, planning, supervision and logging of ground investigation and API of natural terrain landslides below a service reservoir for Scott Wilson. Assisted in design of temporary and permanent slope stabilisation/ remediation measures for the landslide scars. Client: WSD.

Investigation and Remediation Project for a Landslide at Chinese University, Hong Kong: Responsible for detailed geological and geomorphological mapping, planning, supervision and logging of ground investigation and API of landslide affecting a University road for Scott Wilson. Assisted in design of temporary and permanent slope stabilisation/ remediation measures for the landslide scar. Client: Chinese University.

## **Mountain Road Engineering & Construction Supervision**

Kombolcha-Gundewein Road (Contract 2) Project, Ethiopia: provided Engineering Geological / Geomorphological services for road alignment and slope design during the construction of a new mountain

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road between Mekane Selam and Gundewein crossing the Blue Nile River in Ethiopia. Clients: Scott Wilson & Ethiopian Roads Authority.

Supervisory Services for Construction of the Halsema Highway (La Trinidad to Mt Data), Benguet Province, Philippines: Resident Geotechnical Engineer for Scott Wilson responsible for geotechnical design verification, redesign and additional design for slope and landslide stabilisation and protection works, and road retaining structures for 84km of mountain road through the earthquake and typhoon prone Central Cordillera of Luzon. Client: Department of Public Works & Highways, Philippines.

In addition, responsible for investigation and design of mitigation measures for typhoon related landslide damages along the project road. Investigated several massive, active landslides affecting the road and adjacent villages, involving the use of inclinometers and vibrating wire piezometers to determine the depth and nature of the failures and ground conditions.

Also responsible for the supervision and quality control of the Contractors' construction activities. These included controlled earthworks, rock excavation by blasting, embankment, retaining and slope protection walls (up to 20m high), slope protection structures including shotcrete and bioengineering, road subgrade preparation and drainage structures including cross drains, side drains and drainage outfall protection works.

Provided key geotechnical input to the identification and extraction of suitable construction material resources for road and slope/wall protection works.

Baguio-Bontoc-Banaue (Halsema Highway) Road Rehabilitation, Benguet Province, Philippines: Assisted engineering geologists and geotechnical engineers in designing extensive rehabilitation works on a World Bank funded project for the improvement of 180km of National Highway mountain road in Central Cordillera, Philippines. Worked in close liaison with the structural engineer in the design and supervision of ground investigations, geological site categorisation and interpretation of the results for design of retaining walls and bridge foundations. Carried out geomaterial studies to assess potential borrow and rock sources along the alignment. Client: Department of Public Works & Highways, Philippines.

Ilam - Phidim Road Rehabilitation, Third Road Improvement Project (TRIP), Nepal: Responsible for engineering geological and geotechnical considerations in the design of slopeworks and road widening as part of the Asian Development Bank funded rehabilitation of the Ilam to Phidim Road in the foothills of the Himalayas, East Nepal. Combined engineering geological mapping with trial pit and DCP sounding investigation to assess slope and road bench stability through the seismically-active, mountain terrain, for Scott Wilson. Carried out geomaterial studies to assess potential borrow and rock quarry locations along the alignment as part of the review. Client: Department of Roads, Nepal.

### **Quarrying**

Shek O Quarry Rehabilitation, Hong Kong: provided engineering geological services related to rock slope mapping, discontinuity surveys, slope stability assessments, and retaining wall foundation stability assessment for the rehabilitation of the Shek O quarry, Hong Kong Island. Client: SMEC.

Hui Dong County Quarry, Shenzhen, China: provided an engineering geological review and highlighted engineering geological uncertainties of a proposed quarry and aggregate processing area in Shenzhen, China on behalf of a private quarry developer. Client: SMEC.

### **Slope Investigation/Design & Rock Engineering**

Quarry Slope Failures Review, Laos: provided specialist engineering geological review of large slope failures

affecting quarry slopes in Laos for loss adjusters. Client: GCG Asia Ltd.

Rock slope assessment, above Intake Shaft C for Lai Chi Kok Drainage Transfer Tunnel, Leighton Asia: Principal engineering geologist for detailed engineering geological mapping of a potentially unstable rock slope identified during construction of drainage tunnel intake shaft. Recommendations made concerning potential rock block failure and overall slope failure modes and slope stabilisation measures. Client: Leighton Asia

Rock slope assessment, Lai Yiu Estate, Wan Chung Construction Co. Ltd.: Technical reviewer for the detailed engineering geological mapping of a rock slope during construction. Recommendations made concerning potential rock block failure and overall slope failure modes and slope stabilisation measures. Client: Wan Chung Construction Ltd.

Rock Slope Surveys, Proposed LNG Terminal, Soko Islands, Hong Kong: Provision of specialist engineering geological services to survey existing rock outcrops and rock cut slopes for site characterisation in association with site formation and development of the South Soko Island for the proposed LNG storage terminal and facilities. Client: Fugro Geotechnical Services.

Landslip Preventive Measures, Hong Kong (LPM Agreements Nos. CE 18/99, CE 24/2004): Provision of specialist engineering geomorphological and geological services for slope investigation and design of LPM works for Scott Wilson on selected, high-risk man-made slopes in Hong Kong, including detailed API to identify relict and recent instability, and assessing local and regional geomorphology and photogeology. Responsible for planning, supervision and detailed logging of ground investigations, field mapping and interpretation, and subsequent slope stability assessment and geotechnical design of upgrading works in areas associated with massive relict and recent landsliding. Client: GEO.

Anderson Road Site Development, Kowloon, Hong Kong: Completed the preliminary geotechnical appraisal and design of 30 soil/rock and fill slopes for a 58 hectare housing development site, for Scott Wilson. The design concerned new features and existing slopes that required upgrading works. Client: CEDD.

Foothills Bypass, South of Area 19, Tuen Mun, Hong Kong: Provided engineering geological and geotechnical input to embankment redesign completed during the construction of the 3km bypass in an area of historic slope instability. Involved with the logging of debris flow deposits and sheared, decomposed volcanics in deep trial trenches excavated along the route; the interpretation of the results; slope stability analyses for embankment design; and assessing the implications for design and construction. Client: HyD.

### **Ground Investigation**

Tolo Highway Widening, Hong Kong: supervised and reviewed the logging and ground model development for a cost-saving design of noise barriers and retaining walls. Clients: GCG (Asia) Ltd & China State Construction.

Engineering geologist responsible for ground investigation planning, scheduling, supervision and interpretation on all previous contracts including all landslide studies (in Hong Kong and the Philippines), and design and construction stages of mountain road construction in the Philippines and Nepal. Completed GI for the pile foundations for a pedestrian walkway flyover system in the densely populated urban environment of Tsuen Wan in Hong Kong's New Territories. Clients: various.

Engineering geologist for a GI contractor (Southern Testing) in southeast England. Responsibilities included management and supervision of fieldwork projects, as well as scheduling and supervision of laboratory materials tests, factual and interpretative reporting. Carried out field tests such as dynamic probes, CBR, Schmidt hammer, permeability tests. Laboratory tests included gradings, plasticity, permeability, density, triaxial

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shear strength, shear box tests and proctors. Clients: various.

### Reclamation

Penny's Bay Land Reclamation (Phase 2): Responsible for desk studies and planning of ground investigation works for Scott Wilson, comprising soft sediment sampling and contamination testing, for large reclamation scheme adjacent to the Disney theme park on Lantau Island, Hong Kong. Client: CEDD.

### Technical Reviews

Landslide Investigation Consultancy - Agreement No CE 12/2011 (GE) Study of Landslides Occurring in Hong Kong Island and Outlying Islands in 2012 & 2013: Principal Engineering Geologist involved in the review of the Design Event Approach (detailed in GEO Report 138) for Natural Terrain Hazard Assessments. Client: GEO.

### Training

Jonathan has given several technical presentations on mountain road engineering and slope instability to the Geological Society of London (Hong Kong Regional Group), IOM3 (Hong Kong Branch), HKIE (Geotechnical Division), Philippine Institute of Civil Engineers, and to the Earth Science Department, University of the Philippines. Jonathan lead conference delegates on a technical 3-day field excursion of the rehabilitation of the Halsema Highway in the Philippines in 2000. Assisted in the organisation of an engineering geology conference in Hong Kong in 2009, including provision of technical reviews and liaising with international speakers. Assisted with undergraduate geology laboratories and field excursions, and presented revision lectures to final year undergraduate geology students at the University of Glasgow, UK.

### Research

Circulation of Diagenetic Fluids Through Oceanic Islands: Geology researcher for a Natural Environment Research Council (NERC)-funded project for the University of Glasgow's Department of Geology and Applied Geology, with field studies conducted in carbonate and volcanic rocks of Almeria Province, South East Spain. Used cathodoluminescence techniques to analyse thin sections of carbonate rocks to study the diagenetic history of Tertiary reef limestones.

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### Publications

- Parry, S. & Hart, J. R. (2012). Engineering Geomorphological mapping for landslide hazard assessments in Hong Kong. Proceedings of the 11th International Symposium on Landslides (ISL) and the 2nd North American Symposium on Landslides.
- Jack, C. D., Parry, S. & Hart, J. R. (2012). Structural geological input for a cavern project in Hong Kong. The Hong Kong Institution of Engineers Geotechnical Division 32nd Annual Seminar, 2012.
- Parry, S., Hart, J. R. & Jack, C. D. (2011). Science, Engineering Geology and the Landslip Preventative Measures Programme. The Hong Kong Institution of Engineers Geotechnical Division 31<sup>st</sup> Annual Seminar, 2011.
- Jack, C. D., Parry, S. & Hart, J. R. (2011). Engineering Geology and Rock Engineering. Proceedings of the Joint Hong Kong Institution of Engineers – Hong Kong Institution of Planners' Conference on Planning and Development of Underground Space.
- Parry, S. & Hart, J.R (2010). Engineering geology & the reduction of geotechnical risk: challenges facing the profession. Quarterly Journal of Engineering Geology and Hydrogeology.
- Parry, S., Hart, J.R. & Moore, A.J. (2009). Reducing Uncertainty in Natural Terrain Hazard Studies: the Role of the Engineering Geologist. Proceedings of the 29<sup>th</sup> Annual Seminar, Geotechnical Division, Hong Kong Institution of Engineers. pp 61-70.
- Dias, A., Hart, J. & Fung, E. K. S. (2009). The Enhanced Natural Terrain Landslide Inventory. Proceedings of the 29<sup>th</sup> Annual Seminar, Geotechnical Division, Hong Kong Institution of Engineers. pp 71-78.
- Hearn, G.J., Hart, J.R. & Tiwari, S.C. (2003). Social and engineering management of landslide hazards in road corridors. Proceedings of the PIARC, Royal Kingdom of Nepal.



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- Thorn, M.R., Hart, J.R., and Cheung, H. (2003). Relict Instability and Implications for Slope Stability. Procs. of the International Conference on Slope Engineering, Hong Kong University, Hong Kong SAR.
- Hart, J.R., Hearn, G.J. & Chant, C. (2002). Engineering on the precipice: mountain road rehabilitation in the Philippines. QJEGH, Geological Society of London, Vol. 35, pp 223-231.
- Hughes, M.P., Hart, J.R. & Ho, K.K.S. (2002). Slope deterioration and relict instability in natural terrain: case studies and practical implications. Proceedings of IMM (Hong Kong Branch) Conference, Natural Terrain - A Constraint to Development, Hong Kong.
- Hart, J.R, Ho, K.K.S & Koo, Y.C. (2001). The significance of massive relic landslides on recent slope failures in Hong Kong. Proceedings of the 14<sup>th</sup> South East Asian Geotechnical Conference, Hong Kong.
- Koor, N.P., Hadley, D. & Hart, J.R. (2001). The Foothills Bypass – From Design to Construction. Proceedings of the 14<sup>th</sup> South East Asian Geotechnical Conference, Hong Kong.
- Hart, J.R. (1997). Assessment of pile capacity in London clay utilising geological, geotechnical and experimental data. MSc Dissertation, Imperial College, London.