Phoenix Engineering
Control Systems Specialists
Hunters Lodge, Virginstow, Beaworthy, Devon. EX21 5EA
Tel: 01409 211167
www.phoenix-engineers.co.uk

## Personal Details

| | |
|---|---|
| **Name** | Howard Robinson |
| **Head Office address** | Phoenix Engineering<br>Hunters Lodge<br>Virginstow<br>BEAWORTHY<br>Devon<br>EX21 5EA |

## Qualifications

| | |
|---|---|
| **Qualifications obtained** | BSc (First Class Honours) Environmental Science, University of Bradford, 1977.<br>Chartered Environmentalist<br>Chartered Scientist<br>Chartered Waste Manager |
| **Memberships** | Chartered Institute of Wastes Management - Fellow<br>International Waste Working Group (IWWG) – Founding Board Member.<br>Chartered Institution of Water and Environmental Management – Fellow<br>Institute of Waste Management (South Africa) – Fellow |

## Career History

| | |
|---|---|
| **2025 - Present** | **Phoenix Engineering**<br>**Consultant** |
| **2014 – 2025** | **Phoenix Engineering**<br>**Process Director** |
| **1982 – 2014** | **Aspinwall; (became Enviros, acquired by Sinclair Knight Merz, and by Jacobs 2014).**<br>**Technical Director** |
| **1977 - 1982** | **UK Water Research Centre**<br>**Scientific Officer** |

## Pen Profile

Howard is the Process Director at Phoenix, whom he joined full-time in September 2014, although for 20 years before that he had prepared process designs for most of the 30 full-scale leachate treatment plants that Phoenix has constructed. Prior to joining Phoenix, Howard worked for SKM Enviros (formerly Aspinwall & Company) as Technical Director for more than 30 years, following six years' experience at the UK Water Research Centre. The whole of his working life (more than 40 years to date) has been spent on waste management projects, particularly in the fields of leachate characterisation and treatment, and landfill science and research.

Howard has been responsible for the detailed design and commissioning of more than one hundred full-scale leachate treatment plants in the UK and overseas, including some of the largest such plants in the World. In recent years, projects have involved work in South Africa, New Zealand, Mauritius, Italy, Malaysia, Germany, Austria, the USA, and Morocco. Howard was responsible for design and commissioning of one of the largest leachate treatment plants in the World, at the award-winning new 140Mm$^3$ Bukit Tagar Landfill, which was opened in 2006 to serve the city of Kuala Lumpur. He has also worked in Malaysia to design and commission another award-winning large leachate treatment plant at a closed 20Mm$^3$ urban dump at Taman Beringin, and on leachate treatment designs for eight other closed landfills.

Having already designed and commissioned three large leachate treatment plants in South Africa, Howard was responsible for design of a very large plant in Cape Town, which was commissioned by him during early 2012, to treat 500m$^3$/d of very strong leachate, with full nitrification and denitrification of high concentrations of ammoniacal-N, allowing surface water discharge of treated leachate. During May 2012 the plant received the Piet Vosloo award of the Water Institute of Southern Africa, as representing the greatest advance in wastewater treatment in Southern Africa during the previous two years.

Howard has written and presented more than 300 professional papers, book chapters and reports in the field of wastes management and leachate treatment, including definitive reports on leachate quality from landfills in the UK, Hong Kong, New Zealand, South Africa and Malaysia, and an international review of leachate quality at large landfills. He has written most of the UK guidance on composition and treatment of landfill leachates during the last 40 years and acted as a specialist expert witness in the UK and overseas. Howard is considered to be one of a very small number of World experts in the field of landfill science, and leachate management and treatment.

## Experience

Howard Robinson is an environmental scientist who has worked for more than 40 years on landfill processes, specialising in the generation, composition and treatment of landfill leachates, and their relationships with production of landfill gas. During 6 years spent working on behaviour of domestic and hazardous wastes in landfills, at the UK Water Research Centre, he carried out original and definitive studies into leachate management, on behalf of the UK Government. After joining Aspinwall and Company in 1982 (Enviros since 1997, and SKM Enviros since 2009), Howard began to design full-scale leachate treatment plants, and continued to undertake specialised Government research contracts to investigate behaviour of wastes in landfill sites, and management, treatment, and attenuation of landfill leachates, in natural strata. In 1983 he designed and commissioned the first engineered leachate treatment plant in Britain, at the Bryn Posteg Landfill in mid-Wales, and developed a team of scientists and engineers that had an international reputation in the field of leachate management, and well over 100 man-years of experience.

Howard has been responsible for the design of more than 100 full-scale leachate treatment plants, in the UK and overseas. These plants often use innovative process designs to achieve strict effluent discharge consents, reliably and consistently, and all continue to operate well. Many use the modified Sequencing Batch Reactor (SBR) process that Howard has developed over many years, with user-friendly SCADA operating systems and modem interfaces allowing remote interrogation. All are well-engineered to meet the extended landfill aftercare periods that such plants must provide. More than half of the plants make discharges of effluent directly into surface watercourses, some meeting extremely strict discharge consents, including one where rainbow trout are required to survive unharmed for 96 hours in treated effluent, and have done so successfully for more than 20 years.

To meet these consents, Howard has developed and optimised various effluent polishing processes, and applied these to treated leachates. More than 25 reed bed polishing systems have been designed and commissioned, with a total area of well over 10 hectares. At other plants, treatment solutions have included Dissolved Air Flotation (DAF) systems, woodland or grassland irrigation, ozonation, ultrafiltration, or activated carbon filtration. The objective at each site has always been to provide an appropriate and cost-effective solution, capable of being operated in a simple manner by landfill site staff.

At some sites, landfill leachates are disposed of into the public sewer. Elevated concentrations of dissolved methane in untreated leachate can give rise to explosion hazards, and for safe disposal, greater than 99 percent methane removal is required. Based on innovative pilot-scale experiments, a technical design basis has been developed by Howard, and more than ten full-scale methane stripping plants have been designed and commissioned to treat leachates.

During the last 25 years, Howard has prepared definitive reviews of landfill leachate quality for government and private sector clients in the UK, Hong Kong, South Africa, New Zealand and Malaysia. From 1990 to 1995 he was responsible for researching and writing the 550 page UK Government "Review of the Composition of Leachates from Domestic Wastes in Landfill Sites" (CWM 072/95), and during the last 20 years has completed many other leachate research contracts for the UK Environment Agency. These leachate quality data presently comprise the basis for the leachate source term within the ***"LandSim"*** model. He also drafted the sections of DoE Waste Management Paper 26B, which relate to leachate management and composition, when this document was prepared by Aspinwall as a contract for the Department of Environment in 1994/5. He has worked at landfills that have received a variety of waste types, and undertaken many assessments of List 1 and Red List Components for private sector clients. Most recently, working for Enviros in association with Knox Associates, Howard directed a project for the UK Environment Agency to provide data, guidance, and a detailed reporting protocol, which now allows landfill operators to comply with the reporting requirements of the UK Pollution Inventory, for emissions of trace organic compounds in raw and treated leachates. Samples were collected and analysed from more than 60 landfills, and from 30 leachate treatment plants in the UK and Ireland. This work, and the protocol prepared, is available on the Agency's website. A second piece of work, to update the study and consider 30 additional compounds, was complete for the Agency in 2003. Another recently completed Agency project that Howard directed (completed in October 2000, on behalf of the Thames Region of the EA), was an assessment of trace organic compounds in leachates from landfills in the Thames Region, and how these were related to licensed inputs to these sites (TRW-MON). This will guide the monitoring required under Regulation 15 Reviews and Licence Surrender by the Agency.

Again working in association with Knox Associates, in 2004 Howard directed another very large project for the UK Environment Agency, entitled *"Improved Definition of the Leachate Source Term"* (project P2-236) to investigate the impacts that the EU Landfill Directive will have on leachate quality at UK landfills. Work involved extensive data collection, and visits to many EU landfills that had received Mechanically-Biologically Treated wastes, MSW Incinerator Ashes, and also hazardous waste mono-fills, to obtain leachate samples for detailed analysis. Two large final reports were prepared and published by the Agency during late 2004.

During October 2006, Howard was commissioned by the UK Environment Agency to provide technical guidance for the UK waste management industry that sets out the detailed requirements of Best Available Techniques (BAT) for landfill leachate management and treatment under IPPC. This guidance assists operators in applying for new integrated environmental permits, in a clear and unambiguous manner, and in 2007 a 200-page report was drafted for the Environment Agency as a definitive guide to the waste industry in the UK.

Howard has travelled widely during the last 40 years, directing projects and lecturing in many countries. He has received several awards for his work.

During the period 1988-1995, He worked extensively on leachate management in Hong Kong, being instrumental in developing Enviros' presence in South-East Asia, and managing two large contracts in the territory, working on projects for the Environmental Protection Department of the Hong Kong Government. The first of these projects was a major leachate disposal study for the proposed 70Mm$^3$ North Eastern New Territories (NENT) landfill, involving field studies, laboratory treatability trials, and the preparation of outline and detailed designs for an on-site leachate treatment plant, that was commissioned during 1995 and remains one of the largest such plants in the World. During December 1988 he undertook a further study for the Hong Kong Government EPD, to characterise leachates which would arise at the proposed WENT (Nim Wan) Landfill Site, and to assess the

interactions that might occur should these come into contact with a proposed bentonite landfill liner. He was subsequently been involved in design work for the new SENT landfill site, in the South Eastern New Territories. This work also involved original and innovative leachate treatment aspects, and during 1991 and 1992 he designed and managed sophisticated laboratory trials in Hong Kong to demonstrate treatment of typical landfill leachates, with nitrification and denitrification of high concentrations of ammonia (to 3 000 mg/l), to overcome concerns about toxic algal tides which might result from release of these nutrients into the local marine environment.

Since 1992, when UK Government sanctions were lifted, Howard has worked extensively in South Africa. In late 1992 he was originally invited by the South African IWM and Chemical Industry to spend 3 weeks on a lecture tour of major cities, including as keynote speaker at the WasteCon '92 conference in Johannesburg, *"Waste Management in a Changing Environment",* making national TV and radio appearances. He has been responsible for the design and commissioning of five large leachate treatment plants in South Africa, one at the Vissershok Landfill Site in Cape Town, and another at the Mariannhill Site in Durban, which have won national environmental awards. In October 2004 he was presented with the biennial "President's Award" by the Institute of Waste Management for Southern Africa, for "exceptional services rendered to the waste management profession in Southern Africa". He is currently working on other projects in South Africa, and has directed the World's largest CDM (Clean Development Mechanism) project, funded by the World Bank, to generate carbon credits by the production of up to 20 MW of electricity from landfill gas at 3 Durban sites, for the eThekwini Municipality.

In recent years Howard has also worked in Mauritius (preparing a report for the Government there on a failed leachate treatment plant), and in New Zealand (providing treatment designs and expert witness advice for leachate management at the new North Waikato Regional Landfill, which is now one of the largest new landfills in the Southern Hemisphere.

During his career, Howard has completed many hundreds of projects on leachate and landfill management for both public and private sector clients. These have included many large and complex commissions. He set up a specialised leachate treatability laboratory, which now allows Phoenix to collect large samples (1000 litres +) of leachate or waste waters from other industries (papermills, industrial sites, steelworks etc.) and carry out detailed treatability trials. These pilot-scale studies use acclimatised biological sludges from existing full-scale treatment plants, in purpose-built trial units, to provide very detailed predictions of actual effluent quality that will be achieved in a full-scale plant. Work routinely involves toxicity testing and characterisation of residual COD in treated effluent, as part of risk assessments during negotiation of surface water discharge consents. Some of the largest leachate treatment plants in the World have been based on these studies, including trials carried out in South Africa, Malaysia and Hong Kong.

From 2000 to 2001, Howard was responsible for design and commissioning of what remains the largest leachate treatment plant in the UK, at Arpley Landfill in Warrington, which relied extensively on such trials. The plant treats up to 450 $m^3$/d of leachate, containing up to 2,500 mg/l of ammoniacal-N and 8,000 mg/l of COD, to achieve extremely tight consent limits for discharge of effluent directly into the River Mersey.

For more than 40 years, Howard has lectured extensively and internationally, at conferences and training courses, recently in Peru and Ecuador. He has written and presented more than 300 professional papers in the field of wastes management and leachate treatment, and many definitive reports. He has been on the International Committee that organises the biennial Sardinia Landfill Symposium since 1987 and is a founder member of the Board of the IWWG (International Waste Working Group) since it was set up in 1999, to encourage international co-operation and communication between waste professionals. IWWG has an international journal "Wastes Management", published by Elsevier, and Howard is a member of the Editorial Strategy Group. He recently co-wrote a 40-page chapter on leachate treatment in a large textbook, *"Solid Waste Technology & Management",* published by Wiley in December 2010 and prepared by the IWWG.

Howard is widely considered to be one of a very small number of World experts, in the fields of landfill science and management, and of leachate control and treatment.

## Some Recent Projects

**Taman Beringin LTP, Kuala Lumpur, Malaysia.**
Detailed appraisal of leachate quality and existing designs for a LTP at a large landfill in SE Malaysia, leading to new detailed designs of an alternative facility that will work.

**Westmill Landfill LTP, Hertfordshire, UK. Client: Biffa WM, Summer 2014.**
Directed full design and commissioning of LTP at the Westmill Landfill Site, to achieve full nitrification of 1100mg/l of ammoniacal-N. Treatment rate 150m$^3$/d, discharge into sewer. Client training and support.

**Brookhurst Wood LTP, Horsham, UK. Client: Biffa WM, Autumn 2013.**
Complete redesign, extension and commissioning of existing LTP not working adequately at very large landfill. Ammoniacal-N to 3000mg/l. Full treatment before discharge to sewer, 150m$^3$/d. Modified SBR process. Full staff training etc.

**Riga Landfill LTP, Latvia. Client: Getlini AB, Autumn 2013.**
Detailed review of failing LTP at Latvia's biggest landfill, leading to detailed operational recommendations and full remediation of the plant. 200m$^3$/d.

**Mugga Lane Landfill, Canberra, Australia. Client: ACT NOWaste, Canberra, Summer 2013.**
Detailed review of under-performing leachate treatment plant at Canberra's main landfill, and preparation of report containing detailed recommendations for significant modification and upgrading of the plant.

**Shirley LTP, Birmingham, UK. Client: Worcestershire County Council, Summer 2013.**

Design and commissioning of reedbed for treatment of weak leachate (100mg/l ammoniacal-N) from old closed landfill, before discharge to sewer, at rates of up to 150m$^3$/d.

**Masons LTP, Ipswich, Suffolk, UK. Client: Viridor WM, Spring 2013.**

Treatability trials leading to full design and commissioning of large leachate treatment plant, providing full treatment of strong leachate containing 2000mg/l of ammoniacal-N. Modified SBR, UF separation, discharge to sewer.

**Ämmässuo LTP, Helsinki, Finland. Client: FCG Finland, Summer 2012.**

Detailed biological treatability trials on leachate from Finland's biggest landfill, and preparation of detailed report and process designs for LTP to treat up to 200m$^3$/d of strong methanogenic leachate.

**Horton LTP, Brighton, UK. Client: Viridor WM, Summer 2012.**

Responsible for treatability trials, and then detailed design and commissioning of small LTP on a recently closed large landfill, with modified SBR, UF separation, and reed bed polishing of 80m$^3$/d leachate with 2000mg/l of ammoniacal-N, discharge to river.

**Vissershok LTP, Cape Town, South Africa. Client: Cape Metro Council, Summer 2012.**

Responsible for treatability trials, and then process design and commissioning of large LTP at Cape Town's biggest landfill. Plant treats 415m$^3$ of leachate with 2000mg/l of ammoniacal-N, with full nitrification and denitrification, UF separation, and discharge to stream/use of effluent for dust suppression on-site. Winner of the 2012 biennial Piet Vosloo award for the biggest advance in wastewater treatment in Southern Africa during the previous two years.

**Bletchley LTP, Buckinghamshire, UK. Client: FCC (UK), Summer 2011.**

Responsible for full design and commissioning of an innovative large LTP at very large (>1000T/d) landfill, with nitrification and denitrification of 1500mg/l of ammoniacal-N. Treatment rate 200m$^3$/d, discharge into sewer. Client training and support.

**Fes Landfill, Morocco. Client: ECOMED Casa, Summer 2011.**

Detailed biological treatability trials on leachate from the City of Fes's biggest landfill, and preparation of detailed report and process designs for LTP to treat up to 200m$^3$/d of strong methanogenic leachate, with high chromium levels.

**Connon Bridge LTP, Cornwall, UK. Client: SITA (UK), Summer 2010**

Directed full design and commissioning of LTP at large rural landfill, to achieve full nitrification and denitrification of 1500mg/l of ammoniacal-N. Treatment rate 200m$^3$/d, discharge into sensitive small stream. Client training and support.

**Winterton LTP, Humberside, UK. Client: Viridor WM, Summer 2010.**

Directed full design and commissioning of a LTP at large rural landfill, to achieve full nitrification and denitrification of 2500mg/l of ammoniacal-N. Treatment rate 150m$^3$/d, discharge into small, rural WwTW. Client training and support.

## Awards

**October 2019:** Presented with an award for the best presentation to the 2019 Sardinia International Waste Management and Landfill Symposia, for his paper *"Lifestyle, Landfills and Lunacy".*

**October 2007:** Presented with an award to recognise 20 years of contributions to the biennial series of Sardinia Waste Management and Landfill Symposia.

**June 2005:** Presented with the James Jackson Medal of the UK Institute of Wastes Management, for the best paper presented during calendar year 2004-2005. The paper was presented to the CIWM Annual Conference, Torbay 2004, and was entitled, *"Design and operation of cost-effective leachate treatment schemes at UK landfills: Recent case studies".*

**October 2004:** Presented with the biennial President's Award by the Institute of Waste Management of South Africa, for exceptional service rendered to the waste management profession in Southern Africa.

**June 1996:** Presented with the James Jackson Medal of the UK Institute of Wastes Management, for the best paper presented to any meeting of the IWM during calendar year 1995-1996. The paper was presented to the IWM Annual Conference, Torbay 1995, and was entitled, *"The UK: leading the way in leachate treatment".*

**June 1988:** Received the Annual Waste Disposal Engineers' Association Award for 1987 for the best paper on a waste disposal subject presented to the Institution of Wastes Management during calendar year 1987.

**March 1988:** Presented with the European Year of the Environment Award for Innovation, for progress in the treatment of leachates on landfill sites, by Mr Stanley Clinton-Davies, European Environment Commissioner, at a ceremony in Brussels.

## Publications

See separate publications list.