

CAPABILITY STATEMENT

Oil, Gas and Petroleum



safeearth



Contents

Contents	2
Our Capabilities	3
Recognition	5
Relevant Clients	6
Related Projects	7
Design Standards	12
Importance of Quality Earthing Systems.....	13
Our People	14
Office Locations	16

Our Capabilities

Safeearth Consulting is a specialist engineering group providing world-class expertise in all areas of earthing and lightning.

Needs Analysis, Problem Definition

Establishing a sound basis for the services offered by clearly understanding stakeholder requirements, potential technical and commercial challenges.

Testing and Hazard Assessment

Safety compliance and integrity assessment from our first-hand testing including soil resistivity, bonding continuity, low frequency induction (LFI), earth potential rise (EPR), step & touch voltage testing. Visual site inspections and identification of key earthing and lightning related hazards.

Concept and Detailed Design

Development of facility-wide earthing and lightning protection design at a strategic & integration level. System modelling, using our specifically designed software tools, to guide decisions on implementation of earthing approach considering power and lightning protection systems.

Construction and Engineering Support

Providing support for the installation of the power, bonding and lightning system earthing elements. Ensuring design requirements are implemented to provide long term robustness and testability, whilst minimising hazards that may arise during installation.

Commissioning

Verification of design and performance using expertly trained and experienced testing staff. Visual inspection, integrity and continuity testing and fault simulation through current injection testing using specialised and industry leading test equipment. Benchmarking of results for future condition monitoring and maintenance assessments.

Education & Training

Site specific training for construction, supervisory and maintenance teams. Generic and specialist training through our public courses and conference presentations.

Maintenance and Assessments

Essential ongoing periodic verification of earthing system performance, through visual inspection, continuity testing, loop impedance measurement and fault simulation (injection testing).

Test Equipment

Quality test equipment designed by the most experienced testers in the field enabling reliable collection of critical data for input to design or verification of earthing and lightning protection systems.

Incident

Investigation of electrical shock incidents and development of expert witness reports and mitigation strategies.

Safeearth regularly works with asset owners during FEED, detailed design, commissioning, as well as maintenance and audit investigations. As subject matter experts in all areas relating to the design and testing of earthing, bonding and lightning protection systems, we are often called upon to solve problems that no one else can. Our experience extends across all areas of the oil and gas industry including:

- Upstream facilities including CSG and methane wells and piping
- Processing hubs and compressor facilities
- Pipelines
- Fuel storage at remote and processing sites
- Downstream and onshore processing and LNG facilities
- Offshore and Marine environments with proven past design and testing expertise.

Examples of services offered include:

- LFI (low-frequency induction) and EPR (earth potential rise) studies and testing
- Powerline, Substation and facilities earthing and lightning protection design and verification testing
- Soil resistivity testing
- Earthing system current injection testing and safety compliance assessment
- Earthing inspection and integrity testing
- Pipeline voltage hazard assessment
- Classroom and field training in design and testing
- Electrical incident investigation and expert witness
- System-wide concept, FEED, detailed design and planning.
- Electrical and technical standards advice and consulting for owners

Our Business Units

Consulting

Safeearth can provide engineering support for all your earthing needs, including design/test, policy and standards development, incident investigation and management.

Training

Safeearth have been at the forefront of earthing in Australia for more than 30 years. We delivered Australia's first public earthing training course in the early 1990's and have since trained hundreds of people both here and around the world.

Instruments

We design and build earthing test instruments with a focus on robust and reliable measurements of new and in-service earthing systems.

Software

Safeearth has a long history of developing software for analysing earthing related problems. We are now making some of this software commercially available.

Recognition

Committed to improving standards, professional education and supporting professional bodies, Safeearth Consulting is highly regarded throughout Australia and overseas. Safeearth is regularly involved in:

Standards & Guides

Representation on the following committees:

International:

- Cigre Study Committee B3 (Substations)
 - Publication of TB749 – Quantitative Risk Assessment
 - Committee B3.54 – Substation Earthing Test Methods
- IEEE PES Substations Committee
 - IEEE Standards 80, 81, 837, 998, 1246, 1268

Australian:

- AS2067 (Substations and HV Installations)
- AS1768 (Lightning Protection)
- ENA EG-0 (Power System Earthing)
- ENA EG-1 (Substation Earthing)
- AS3007.2 (Electrical Installations in Mining)

Conferences

Contribution at the following recent conferences:

International:

- IEEE PES Substation Meeting, 2018, Scottsdale, USA
- CIGRE Conference & Exhibition, 2018, Paris, France
- CEATI Grounding & Lightning Workshop, 2018, Anaheim, USA
- CIRED International Conference, 2013, Stockholm, Sweden

Australian:

- Down to Earth Conference 2010, 2012, 2014, 2016, 2018
- Mining Electrical Safety Seminars (NSW, QLD), 2014-18
- Engineers Australia MEMMES NSW Conference, 2013-18
- Engineers Australia RISK 2014 Conference

Publications

More than 30 papers published in the last 6 years

Six textbooks produced

Various training resources and white papers.



Relevant Clients

Safearth Consulting has delivered more than 100 earthing solutions to our oil & gas clients in the last 5 years.

Our clients have included:



Related Projects

Safeearth Consulting has been engaged by owners and operators as subject matter experts in earthing, bonding and lightning protection for oil & gas projects and other major hazard facility, and critical infrastructure projects.

Our notable projects have included:

GLNG and QCLNG – QLD



Before energisation, Safeearth performed commissioning testing of the earthing and bonding associated with the power system and lightning systems at several upstream coal seam gas compressor stations on the GLNG & QCLNG projects.

This involved developing suitable tests for the sometimes partially connected power systems and performing subsequent analysis and modelling to confirm performance and prove compliance with relevant standards.

On the Roma East project, Safeearth has undertaken testing to directly measure electrical hazards impressed by the new 66kV powerline on nearby property fencing and gas pipeline. Safeearth's assessment of the voltage hazards through testing resulted in a significant reduction in EPR and LFI mitigation requirements for the project, saving both time and significant initial and lifetime costs.

Client Testimonial:

"It's very rare that I come across contractors that are both reliable and competent in their fields. Our dealings with Safeearth have been an absolute pleasure and you guys certainly do set the standard in your field. I will have no hesitation calling on you for any future earthing-related queries we have."

- Santos

Woodside, Pluto LNG and Karratha Gas Plant – WA



In 2015-16 Safeearth planned and performed investigative testing of fuel processing, storage and handling facilities at the Pluto and North West Shelf onshore sites. The testing was used to determine the performance of the earthing for the site lighting protection systems to confirm technical integrity. This project applied innovative test techniques to assess earthing performance and compliance with requirements of Australian Standards and provided a basis for performing future integrity monitoring activities and assessing ongoing operation of earthing for lightning across the site.

Inpex, Ichthys LNG Offshore FPSO and CPF – WA



In 2016 Safeearth was selected as subject matter experts to assess lightning-related risk on Inpex's flagship Floating Production, Storage and Offloading (FPSO) and Central Processing Facilities (CPF). The assessment included a detailed design review and on-site integrity testing of the installed earthing and bonding on each facility to confirm adequate installation and performance of the earthing safety system.

Jemena, Pipeline and Facilities Earthing – NSW



Safeearth performs engineering studies and field testing to assess the safety and integrity impacts of Low-Frequency Induction (LFI) & Earth Potential Rise (EPR) on gas pipeline and station facilities infrastructure. Such impacts arise from proximity to power system infrastructure and can result in safety hazards to operators, damage to protective pipeline equipment and instrumentation as well as corrosion risk. Where appropriate Safeearth designs remedial earthing solutions to reduce hazards and improve reliability.

ATCO Gas Australia – WA



Safeearth was appointed by ATCO Gas Australia to develop a Step and Touch policy and procedures for pipeline safety across its WA Network of gas pipelines and facilities. Following this Safeearth was selected to perform a Network-wide safety assessment of voltage hazards arising from power system interaction. This involved upfront engineering to triage assets according to safety risk followed by detailed safety assessment of individual pipelines against criteria from AS/NZS 4853.

Chevron, Wheatstone LNG- WA



Safearth was selected to design and commission the earthing and lightning protection design of the Wheatstone onshore LNG and condensate storage tanks. Design was completed in 2015 with final commissioning testing performed by Safearth in 2016.

The project involved a multi-disciplinary international team and meeting the requirements of local regulations, and owner design requirements.

APA & SEAGas Pipeline Voltage Assessment - SA



Safearth has been appointed by asset owners to review, assess and design to minimise electrical impacts on APA and SEAGas trunk gas pipelines as a result of the Gawler Rail Electrification project in South Australia. Assessment and testing is made in consideration of relevant Australian standards including AS/NZS 4853 as well as other requirements including for AC corrosion.

Inpex, Ichthys LNG Onshore Facilities – NT



In 2016 Safearth was selected by the project team to provide professional engineering services at the project, and in particular at the combined cycle power station.

Safearth has provided advice on electrical safety during the construction of the power plant at the Ichthys onshore LNG facilities. During the wet season, the area can experience extreme lightning activity which presents safety risks to workers on the plant. Safearth has assisted by assessing worker exposure and the performance of the partially complete system as the basis for developing requirements to achieve adequate safety.

Safearth has performed verification testing of the plant earthing as part of the power station commissioning process to ensure safety compliance and adequate earthing integrity and performance.

Design Standards

Safearth Consulting has proven capability and experience in designing, testing and analysing earthing and lightning protection systems to relevant safety standards, including:

AS/NZS 1768	'Lightning Protection'. Standards Australia, 2007
AS/NZS 1020	'The control of undesirable static electricity'. Standards Australia, 1995
AS/NZS 60079	'Hazardous Areas Standards – Explosive Atmospheres'. Standards Australia, 2009
AS/NZS 3000	'Electrical Installations (known as the Australian/New Zealand Wiring Rules)'. Standards Australia, 2007
AS/NZS 4853	'Electrical Hazards on Metallic Pipelines'. Standards Australia, 2012
AS/NZS 2067	'Substations and high voltage installations exceeding 1 kV'. Standards Australia, 2016
ANSI/IEEE Std 80	'IEEE Guide for Safety in AC Substation Grounding'. The Institute of Electrical and Electronic Engineers, 2000
AS/NZS 3007	'Electrical installations - Surface mines and associated processing plant - Part 2: General protection requirements'. Standards Australia, 2013
AS/NZS 3008	'Electrical Installations— Selection of Cables Part 1.1: Cables for alternating voltages up to and including 0.6/1kV—Typical Australian installation conditions'. Standards Australia, 1998
AS/NZS 4360	'Risk Management'. Standards Australia, 2004
AS/NZS 3835	'Earth Potential Rise - Protection of Telecommunications Network Users, Personnel and Plant – Part 1: Code of practice'. Standards Australia, 2006
AS/NZS 60479	'Effects of current on human beings and livestock'. Standards Australia, 2010
IEC 61936	'Power installations exceeding 1 kV a.c.'. International Electrotechnical Commission, 2010
AS7000	'Overhead line design – Detailed procedures'. Standards Australia, 2010
ENA C(b)1	'Guidelines for Design and Maintenance of Overhead Distribution and Transmission Lines'. Energy Networks Association, 2006.
ENA EG-0	'Power System Earthing Guide - Management Principles'. Energy Networks Association, 2010.
ENA EG-1	'Substation Earthing Guide'. Energy Networks Association, 2006.
HB 101 (CJC5)	'Coordination of power and telecommunications—low frequency induction'. Standards Australia, 1997

Importance of Quality Earthing Systems

A cheap earthing system could end up extremely costly...

Safety

The principal function of an earthing system is to minimise the risk of harm to employees and the general public during normal and abnormal operation of an electrical network and from other sources such as lightning or static discharge.

Poor designs can not only fail to adequately mitigate risks but can also introduce additional risks in other systems including communications, cathodic protection systems and controls.

Cost

A good earthing system design will provide a solution that minimises total costs whilst maximising performance and longevity. It is important to consider both installation cost and lifetime cost.

Performance

It is imperative that the earthing system design considers the operation of other systems, including the electrical protection system, and third-party systems such as communications, cathodic protection and control systems

Maintainability

Earthing systems are not "set and forget". They need to be regularly checked and inspected.

The design should be reliable over time and should also make ongoing maintenance as simple as possible.

Flexibility

Installations rarely remain unchanged. Networks are expanded, facilities are added, equipment is modified. The earth system needs to be flexible in order to accommodate future changes without costly modifications.

Compliance

Electrical systems and earthing are covered by many and varied standards and regulations. It is critical that designers have a sound understanding of all relevant standards and how to best apply engineering principles to achieve optimal outcomes and compliance.

Our People

Safeearth employs more than 20 full-time, degree-qualified engineers.

Safeearth has grown to more than 50 people and continues to expand. All staff have earthing systems training, even those in administrative and technical support roles.

All new consulting staff complete an internal 6-month intensive training program to provide them with world-class skills and experience. All staff participate in ongoing development programs. Our senior staff include:



Sean Lancaster BEng
Senior Engineer and Industry Lead – Oil and Gas

Sean is a highly experienced Electrical Engineer and leading consultant in the specialised field of earthing and lightning protection.

Since 2007 Sean has been providing consulting expertise to clients across all sectors including energy, rail, minerals, industrial and oil & gas. As a Senior Engineering and Industry Lead for Oil & Gas sectors, Sean provides leadership and technical guidance to a team of consultants providing specialist technical earthing solutions.

Sean graduated with the Bachelor of Engineering from the University of Newcastle in 2002. Sean began his engineering career completing a cadetship in the rail industry before moving to an electrical utility as an earthing consultant in 2007, from where his technical expertise in earthing and experience in providing consulting services has developed.



Matthew Bale BEng, MBT, MIEAust, CPEng, NER, RPEQ #19315
Principal Engineer and Consulting Manager

Matthew is Principal Electrical Engineer at Safeearth and manager of a team of engineering consultants across offices in 5 states. Having worked at Ausgrid for nearly a decade Matthew has since been a full-time earthing specialist for over 10 years and worked in all industries including power, mining, oil and gas, heavy industry and rail. Matthew is an expert practitioner in all areas related to earthing and lightning, a trainer, conference presenter, author of numerous subject papers and has recently co-written the revised ENA Substation Earthing Guide. He has investigated a number of electrical incidents including as expert witness for the NSW Department of Planning and Industry in the Cudal matter.

Matthew is a degree qualified engineer, holds a Masters of Business and Technology from the Australian Graduate School of Management, and is a Certified Practicing Engineer and Registered Professional Engineer of Queensland.



Stephen Palmer BEng, GradCertBA, MIEAust, MIEEE
Director

Stephen is one of Australia's leading experts in the specialist electrical engineering field of earthing/grounding. For over 18 years Stephen has investigated and managed the risks associated with earthing/grounding, lightning protection and interference. His expertise covers design, audit and test in sectors including power generation and delivery, heavy industry, mining and rail. As the leader of a team of 25 consultants & researchers his experience extends well beyond the technical aspects of the field.

Stephen has delivered formal earthing (grounding) training for more than a decade and has presented at numerous conferences in Australia and overseas. He has been a contributing member on a number of standards committees and has been a key to the development and adoption of quantified risk in earthing system risk management.



Bill Tocher BEng, SMIEEE, MIEAust, CPEng, RPEQ
Principal Engineer and Manager New Business

Bill has been involved in the discipline of electrical earthing/grounding and lightning protection full-time for 15 years, providing consulting expertise to a range of key clients and projects primarily in the electrical utilities sector. Bill is now one of the Principal Engineers at Safeearth and is responsible for leading a team of consultants servicing all areas relating to electrical utilities, mining, tunnelling and heavy industry. Bill is also dedicated to the further development of the field at international standards level and also in support and mentorship of his team and the industry locally. More recently Bill is responsible for managing new business globally.

Bill graduated with the Bachelor of Engineering with first class honours from the University of Newcastle in 2001. Bill began his engineering career in the rail/rolling stock industry and later joined EnergyAustralia/Ausgrid as a consulting engineer in the substation earthing team. Over the last 15 years Bill has gained power utility experience in project management, primary and secondary design, network earthing and in providing specialist consulting expertise.



Dr Darren Woodhouse BEng, BMaths, PhD, MIEAust, CPEng, RPEQ #15174, SMIEEE
Principal Engineer and Training Manager

Darren is a Principal Engineer with Safeearth Consulting. He received his BE(Elec.)(Hons I) (1993), BMaths (1994) and PhD (2004) from the University of Newcastle, Australia. In 1992 what was Shortland Electricity instigated a business unit known as Safeearth Engineered Solutions, or Safeearth, of which Darren was one of the original members. In the ensuing years that group grew to over 30 staff and in 2008 changed its name to Network Earthing. During that time Darren was involved in consulting, training and R&D. Before joining Safeearth Consulting in 2011 as Principal Engineer, Darren's roles included Development Manager and two years as Acting Principal Consultant.

For over 20 years Darren has investigated and managed the risks associated with earthing, lightning protection and interference. The more notable projects include investigations of the Snowy Mountains Hydro Scheme, Pacrim West OFC interference, CLP interference in Hong Kong and a number of forensic investigations. Darren has delivered formal earthing training, including over 20 earthing short courses for the ESAA/ENA across Australia, New Zealand and Asia, and has presented at numerous conferences including CIGRE and the IEEE. Darren co-delivered an appendix for AS2067 on earthing system testing and is the editor of the ENA Working Group tasked to publish on risk to telecommunications assets from power system earthing hazards and the recent revision of EG-1.

Office Locations

Safearth Consulting have specialists based across Australia, America and the UK.

For all enquiries, please contact our head office in Newcastle NSW using the details below.

Head Office

212 Macquarie Rd (PO Box 706)
Warners Bay NSW 2282

P: 1800 327 844

E: enquiries@safearth.com
safearth.com



[Newcastle \(Head Office\)](#) | [Perth](#) | [Sydney](#) | [Brisbane](#) | [Melbourne](#) | [Canberra](#) | [Adelaide](#) | [USA](#)

© Safearth Consulting. All rights to this material are reserved and issued as commercial in confidence. Except where allowed by the Copyright Act, no part of this document may be reproduced, stored in a retrieval system or transmitted in any form, either electronic or mechanical, without prior written permission from Safearth Consulting.