screwpiletechnologies

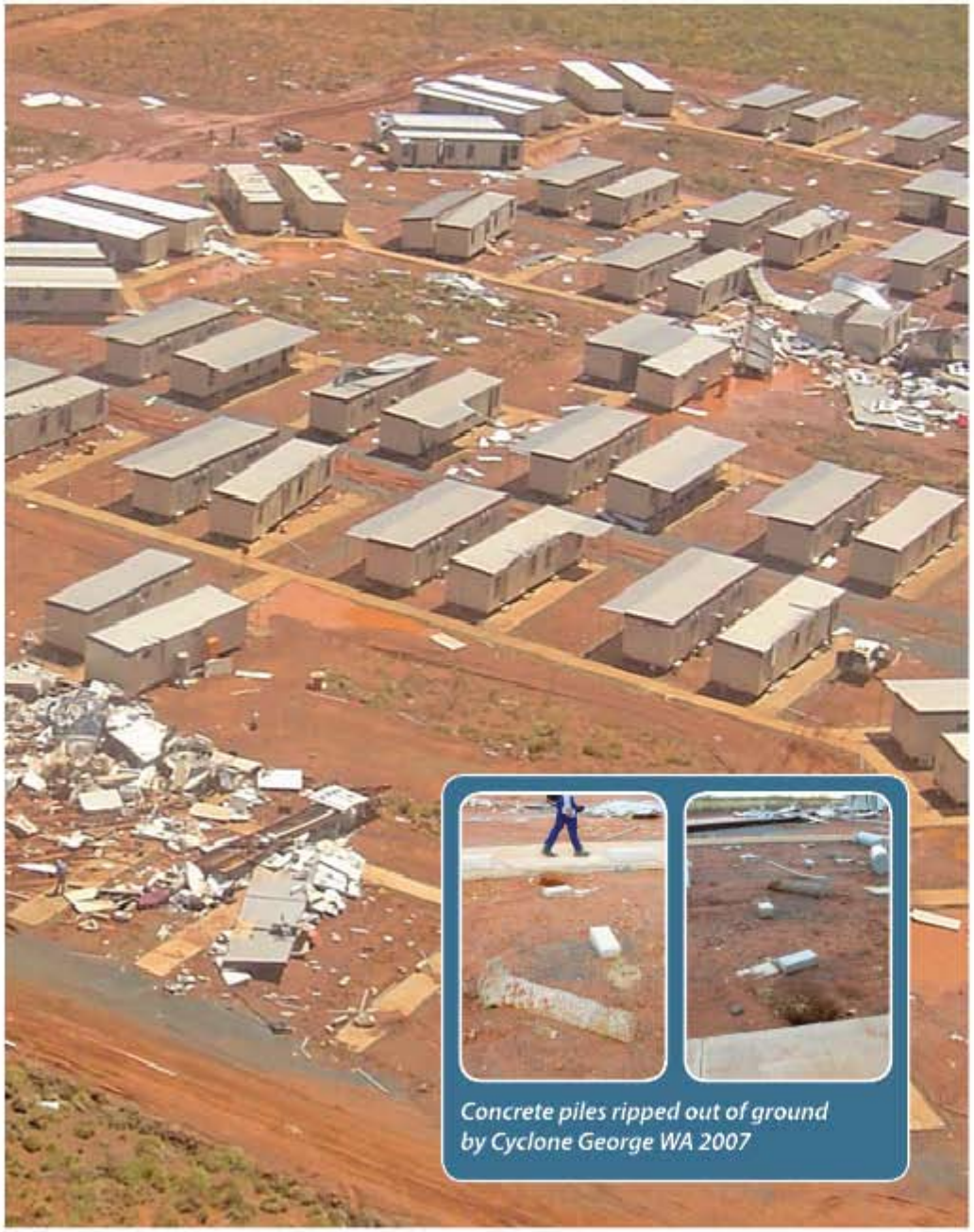
Foundation and Anchoring System

Introduction

In 1994 our associate company Instant Foundations introduced screwpiles to the Australian Market. It became so successful that Screwpile Australia was formed to strategically develop screwpile and screw-anchor technology into niche markets. Now Screwpile Australia under the auspices of its International Parent Company, Steel Technologies Ltd, has expanded its range of products and services with manufacturing and installation operations in strategic locations throughout South East Asia, including Singapore, Malaysia, Indonesia, Thailand, Korea, Vietnam, Japan and China.

Our products are manufactured under strict quality control with all steel conforming to the Australian Structural Steel Code AS1163. No B-Grade or second hand steel product is used and our manufacturing is in accordance with Australian Steel Structures Code AS4100 ensuring only the highest quality product leaves our manufacturing plants worldwide.

To date in excess of 3,500,000 screwpiles have been successfully installed in a multitude of applications. A common application is for sites that are subjected to high wind, such as cyclonic/typhoon regions and flood prone sites, such as low-lying coastal areas, and areas. with poor soil conditions, such as soft or reactive soils. In these environments no other piling or anchoring system can compete with Screwpile Technologies' project speed and cost advantages. Even in regions where labour costs are minimal mass concrete options cannot compete. Screwpile Australia and its associated companies are the pioneers in screwpile ground anchoring and foundation technology and are continually consulted for advice on suitable foundation and anchoring solutions for projects including mining camps, remote village accommodation and lifestyle sub-division villages. With the support of these industries and the culmination of 10 years of successful projects, over 200,000 screwpiles have been installed in the field specifically for this purpose.



Global Warming and Mother Nature

The advent of global warming is arguably causing an increase in severe tropical storms and extreme weather conditions in many countries. Recent history has demonstrated how unpredictable and violent Mother Nature can be with the devastating Asian Tsunami, storm surges and flooding of low-lying areas.

Western Australia was recently battered by Cyclone George, devastating a rail construction mining camp. This tragedy clearly demonstrates that ineffective foundation and anchoring methods render buildings useless in protecting human life during such storms.

Protecting the environment and your asset value for years to come

Forecasters are predicting an increase in violent weather patterns, so an effective foundation solution has never been more important.

Unlike other ground anchoring methods such as mass concrete foundations, drilled concrete bored piles or duckbill type ground anchors, screwpile performance is both reliable and predictable. Screwpiles retain their asset value long after the camp or village is decommissioned, as they can be unwound and reused many times.

Other foundation anchoring methods have to be destroyed on de-commissioning, as environmental concerns issues will not allow foundations to remain in-ground, resulting in significantly more expense. Above all, time and numerous cyclones later, have demonstrated that our screwpiles have delivered their intent; to safely anchor buildings to the ground in extreme weather conditions such as cyclones, hurricanes, typhoons and tornados and provide for easy and cost efficient removal after use.

Our patented building coupling system provides for ultra fast connection and disconnection between the structure and the foundation.

Our client base in Australia, Asia and the world is rapidly expanding

Demand for our product continues to increase with support from some of the most dynamic and successful companies in the region. Once we win client trust, we never lose it, we pride ourselves on going that extra mile for our clients. Many clients on our list have supported us since establishment some eleven years ago. Commitment to our clients and our continued product development has earned us the reputation of industry leader.

Our family of staff, from upper management to installers, pride themselves in knowing that they are the best in their field, continuously setting new challenges as our global expansion accelerates.

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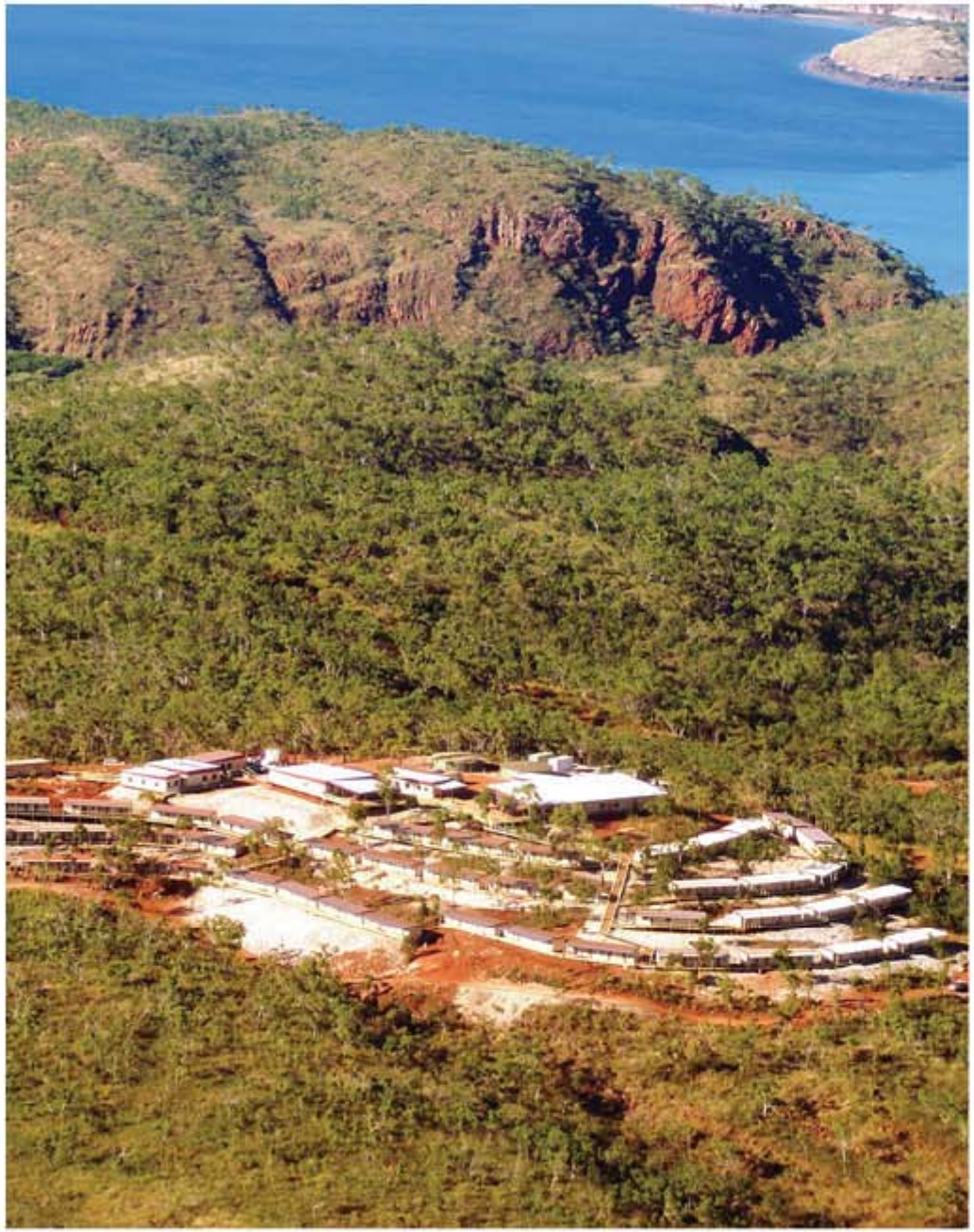
NEWCREST MINING LIMITED

FLEETWOOD HOMES

FMG

bhpbilliton

wylie & sloane



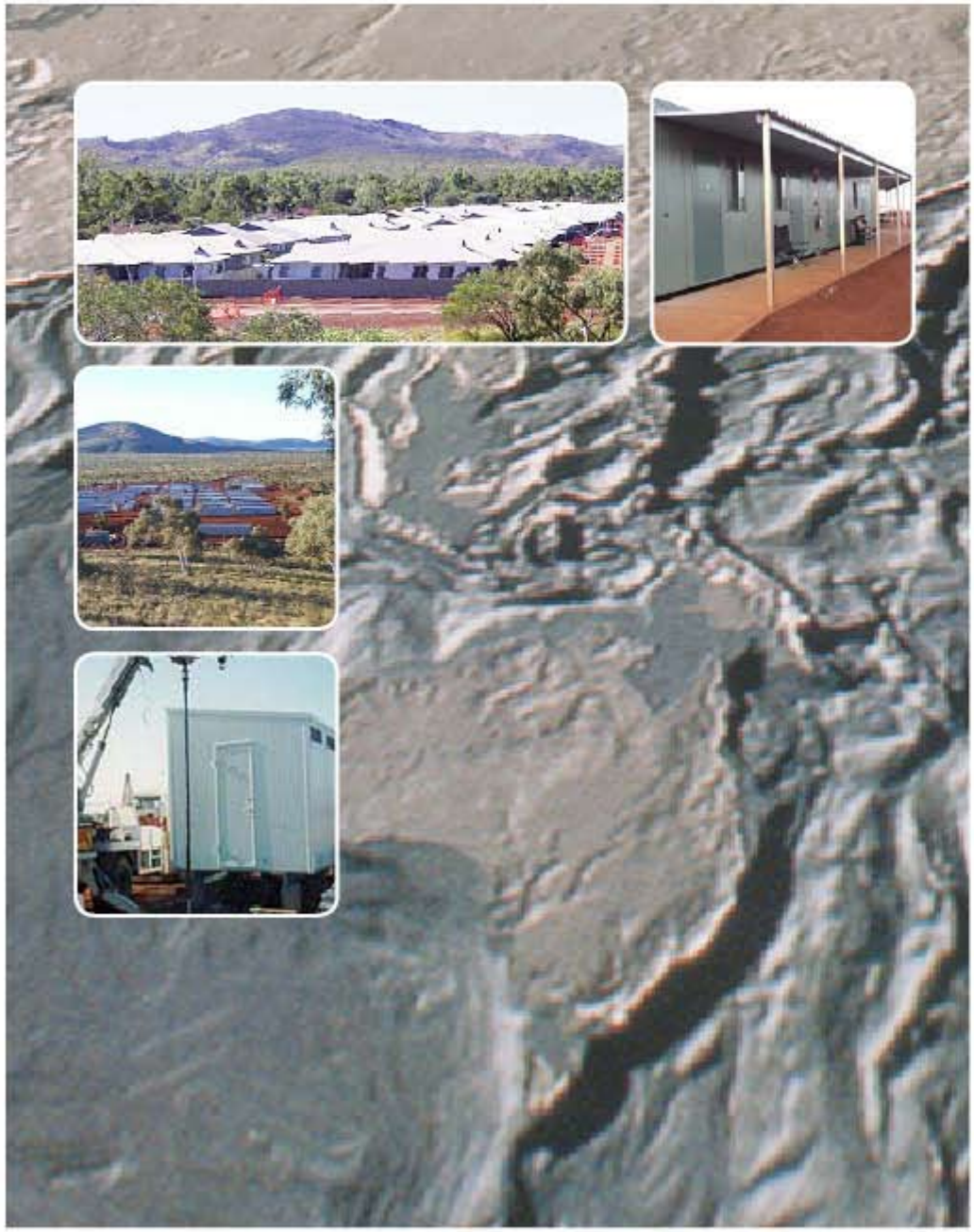
Transportable buildings and remote accomodation village projects completions and applications.

Some notable projects include:

- BHP DRI Accommodation Village, Port Hedland
- South Hedland Caravan Park
- South Hedland Accommodation Village
- Wedgefield Complex, Port Hedland
- BHP Office Complex, Port Hedland
- Learmonth Air Base Office Complexes, Exmouth
- Dept. of Immigration Camp, Curtain Air Base, Derby
- Denham Chalet and Caravan Park
- Telfer Mine Work Camp, Telfer
- Paraburdoo Mine Work Camp, Paraburdoo
- Koolan Island Mine Accommodation Village
- Yungaburra Aboriginal Community Accommodation, via Fitzroy Crossing
- Exmouth Chalet and Caravan Park
- Hamersley Iron Accommodation Village, Parker Point, Karratha
- Boddington Gold Mine Complexes
- FMG Iron Ore Rail and Line Camps

Screwpile Technology is an effective solution for both compression and tension (uplift) load foundations. This dual-acting performance is particularly beneficial to locations where:

1. Wind loads are substantial such as cyclonic/typhoon and coastal regions.
2. In areas where soil conditions have poor founding values at the surface.
3. Both 1 and 2 are combined.
4. Technical support is not available due to remoteness.
5. Greater on-site flexibility is required.
6. De-establishment may be required in the not to distant future.



Transportable buildings

Transportable buildings, commonly known in Australia as "Donga's" are typically light-weight stand alone or modulated building structures ranging in starting sizes from 3m x 3m to 14.4m x 3.6m. These structures are typically fitted with two underside 200-UB beams which act as subframe stiffening and foundation load transferring points. These modules are used to create larger complexes.

The number of screwpiles required for any structure will depend on a number of factors such as location, ground conditions, building configuration, and underside beam strength. The connection methods between the beam and the screwpiles are numerous and are designed to suit the client's individual needs. They can be temporary, semi-permanent or permanent.

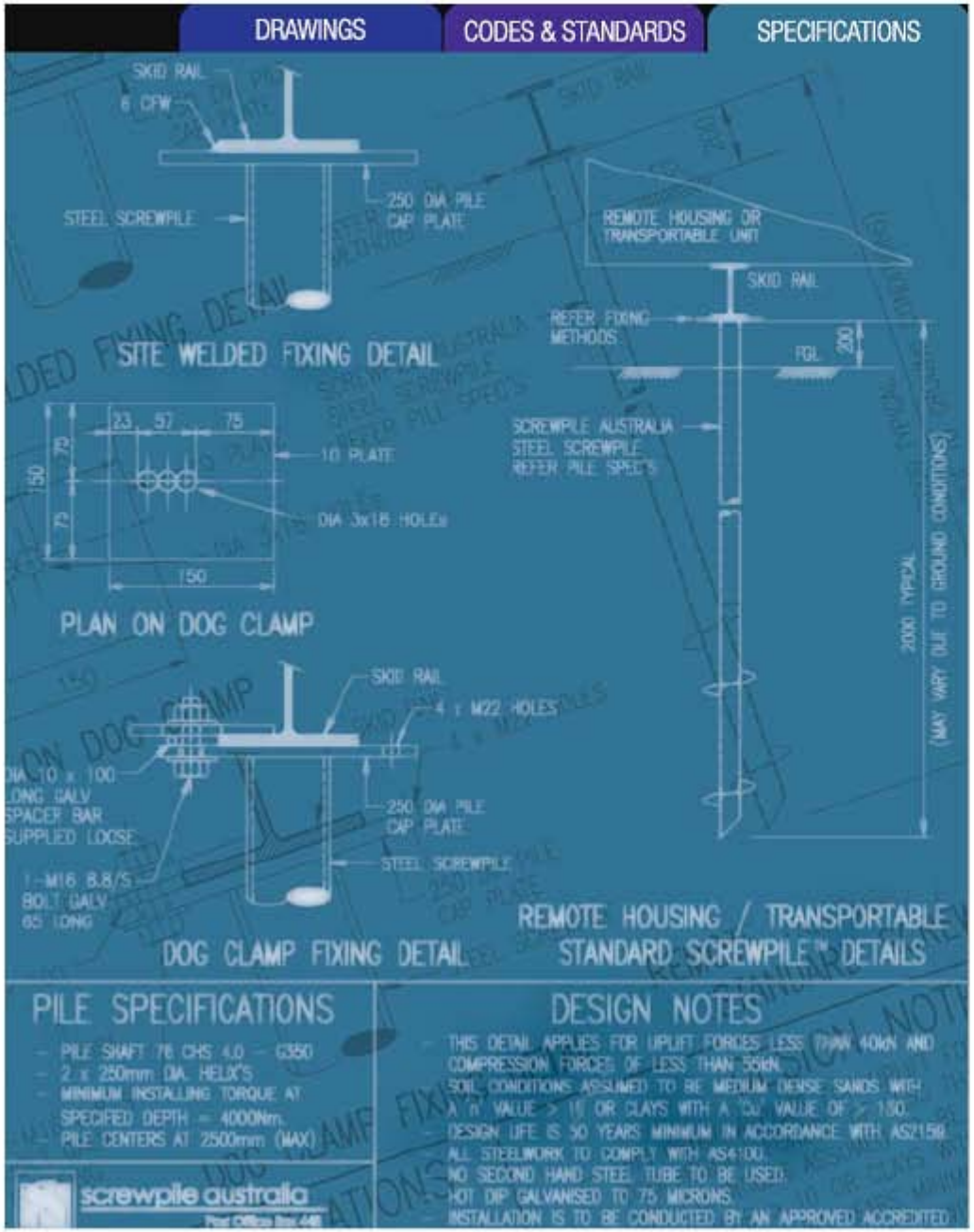
A recently developed quick connect/release assembly allows for extremely rapid commissioning or de-commissioning of a building.

Screwpile's innovative quick connect/release assembly system allows for quick, safe and cost effective anchoring.

Installation

Screwpile design for remote housing is determined by the site's location, soil conditions and design loads. Installation is typically via mini-excavators or skid-steer loaders (Bobcats). Ideally, this machine should be purpose configured to suit the application. With correct machine configuration and an experienced operator, up to 80 screwpiles can be installed in a single day, enough foundations for 8 standard transportable buildings. Extraction is even faster upon building de-commissioning.

Our group has numerous Accredited Screwpile Installers. We offer clients a project turn-key approach as well as extending the opportunity for individuals and companies to become a Accredited Screwpile Installers by virtue of our Accreditation Scheme. Full training and technical support is provided to those who wish to join our installation group. Independent Accredited Screwpile Technologies Installers gain the added benefit of receiving referral projects.



Engineering

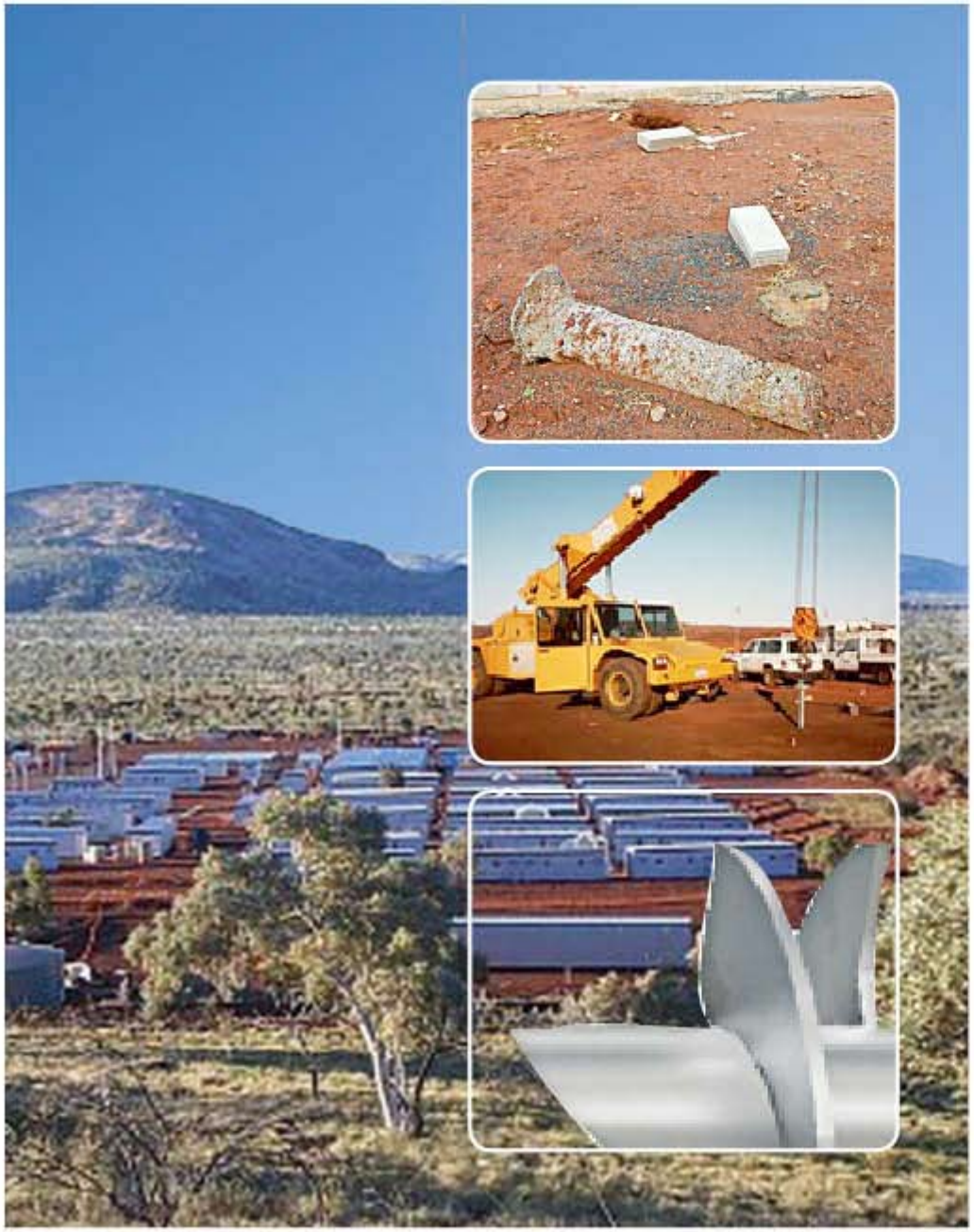
Worldwide engineering and CAD drafting services form part of our service. Screwpiles are designed, manufactured and installed in accordance with the region's relevant building codes. In Australia the Standards are the Australian Piling Code AS2159 and the Australian Steel Structures Code AS4100. Subject to site conditions and longevity requirements, screwpiles may be hot-dip galvanised if a section of the pile/anchor forms the pier element which is exposed to ambient conditions.

Screwpile design is based on 6 separate criteria:

a) Structural design load
b) Foundation design life requirement
c) Building configuration
d) Geotechnical parameters
e) Wind region and terrain classifications
f) Earthquake load factors

Design loads will vary with the wind and terrain category applicable for the site and the building configuration. Geotechnical parameters will influence the screwpile design. All are governing factors in screwpile integrity, depth and sizing. A standard range of "off the shelf" transportable building and remote housing screwpiles are available.

Screwpiles can be designed for structural loads up to 1200kN. Remote housing design loads are typically in the range of 5kn to 100kN in both tension and compression. In conjunction with one of Australia's most experienced independent consulting engineers specialising in this field, RSA Engineering, Screwpile Australia has recently undertaken a full audit of the processes of piling and anchoring remote structures. The audit focused on the entire process, from initial client enquiry, site analysis, buildings and screwpile engineering, screwpile manufacturing components and processes, building to screwpile interface connection and options, installation process and accreditation, documentation and certification. The intention of the audit is to produce, once and for all, an industry standard that is the benchmark recognised by the relevant authorities.



Proven and guaranteed screwpile performance

In past years there have been some building contractors that have elected to use foundation and anchoring methods that, at best, can only be described as outside any intended engineering design. Recent events have shown that this practise can cause expensive asset destruction and in extreme circumstances, even loss of life.

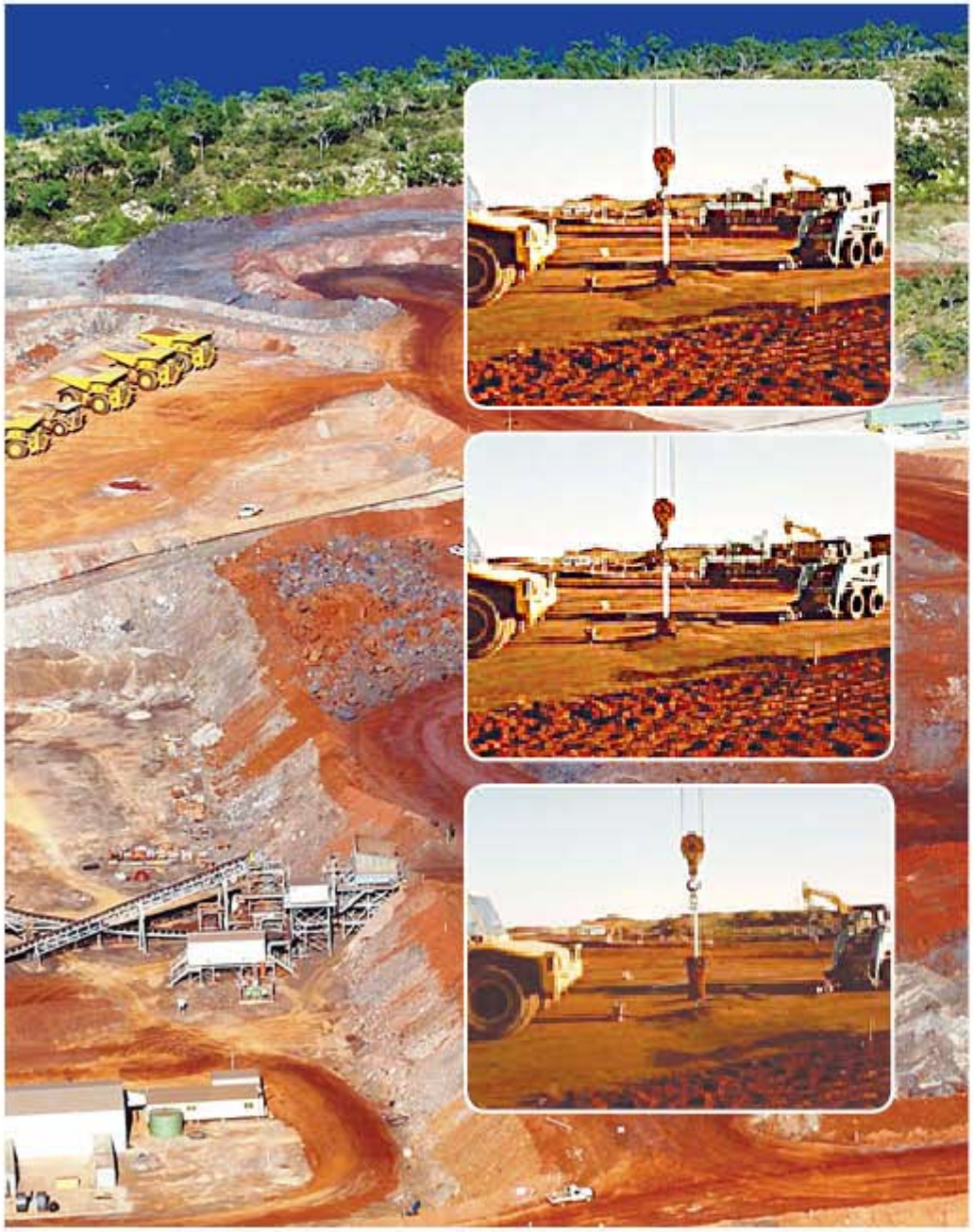
Over the past 10 years our screwpiles have been installed on numerous projects in one of our planet's most destructive environments, the coastal township of Port Hedland and the surrounding region - the North of Western Australia. The region has a history of being battered by some of the world's most severe tropical cyclonic storms. Extreme winds and storm surges have ripped through the area with no evidence of screwpile failures - demonstrating the strength of our anchoring system.

Screwpile ultimate uplift load capacities can easily confirmed by conducting simple pull-out tests. Tests can be done using standard cranes or calibrated jacks and stiff transfer beams. Since developing screwpiles in 1994, we have undertaken hundreds of load testing programs to confirm theoretical design loads in most soil conditions.

This has produced a comprehensive screwpile design database that allows us to accurately predict screwpile performance in all soil conditions. Screwpile performance may differ with changing ground conditions. Knowledge of the expected ground conditions is important prior to final screwpile design.

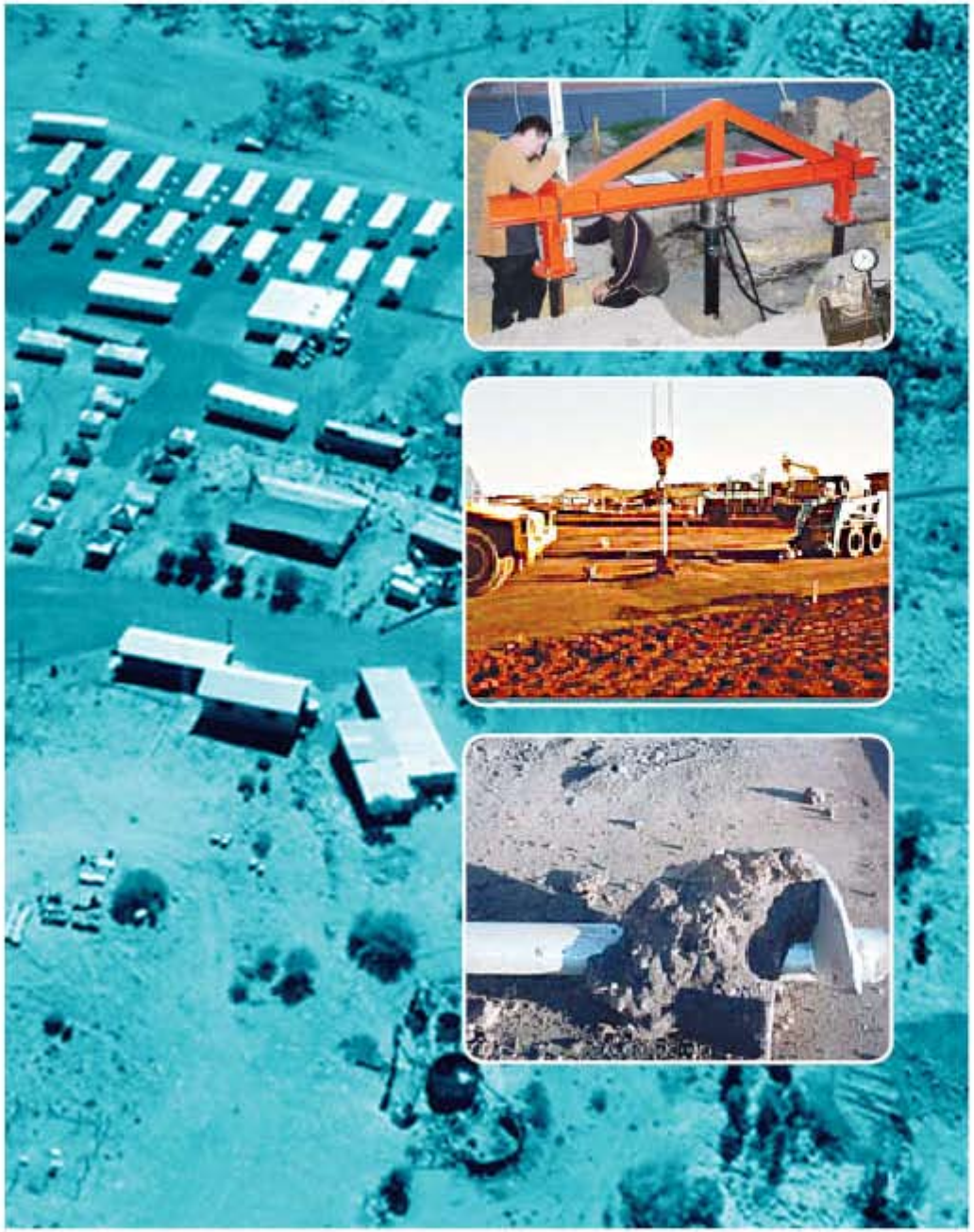
The images on this page show load testing to confirm the screwpiles' ultimate capacity.

Our screwpiles demonstrated superior holding capacity over conventional methods. The screwpile was installed to a depth of 1.0m. The specified uplift design load for the screwpiles on this site was 35kN or 3.5 tonne. Actual tests at this load indicated minimal anchor deflection and no sign of soil shear or heave was evident. The screwpiles' performance exceeded all load requirements by a factor of three.



These images show the installed screwpile under extreme load conditions, well in excess of the required design. This demonstrates the amount of residual capacity that could be extracted from the screwpile and the ground, should the need arise. Testing was continued to failure to determine the ultimate uplift soil failure. The loads were employed in cyclic sequence to mimic severe wind loading conditions. Soil failure is likely to occur well before any screwpile component failure. Note the ground heave that appears before ultimate failure demonstraties the angle of soil friction for this particular site. In this instance, soil failure and anchor pullout finally occurred at a load 90kN (9T). Extraction shows the relatively small size of the screwpiles helix over the size of the soil cone.

Screwpiles are designed to exceed ultimate soil failure of the site's geotechnical conditions. Note the retained soil plug and no evidence of anchor failure. Screwpile shaft size, wall thickness, helix size and quantity are subject to the design load required.



The following is an extract from testing conducted at the Hamersley Iron Ore Mining Accommodation Village Projects in Western Australia. In excess of 1,500 screwpiles were installed in four separate construction stages. A daily average of 97 screwpiles were installed during the construction phase.

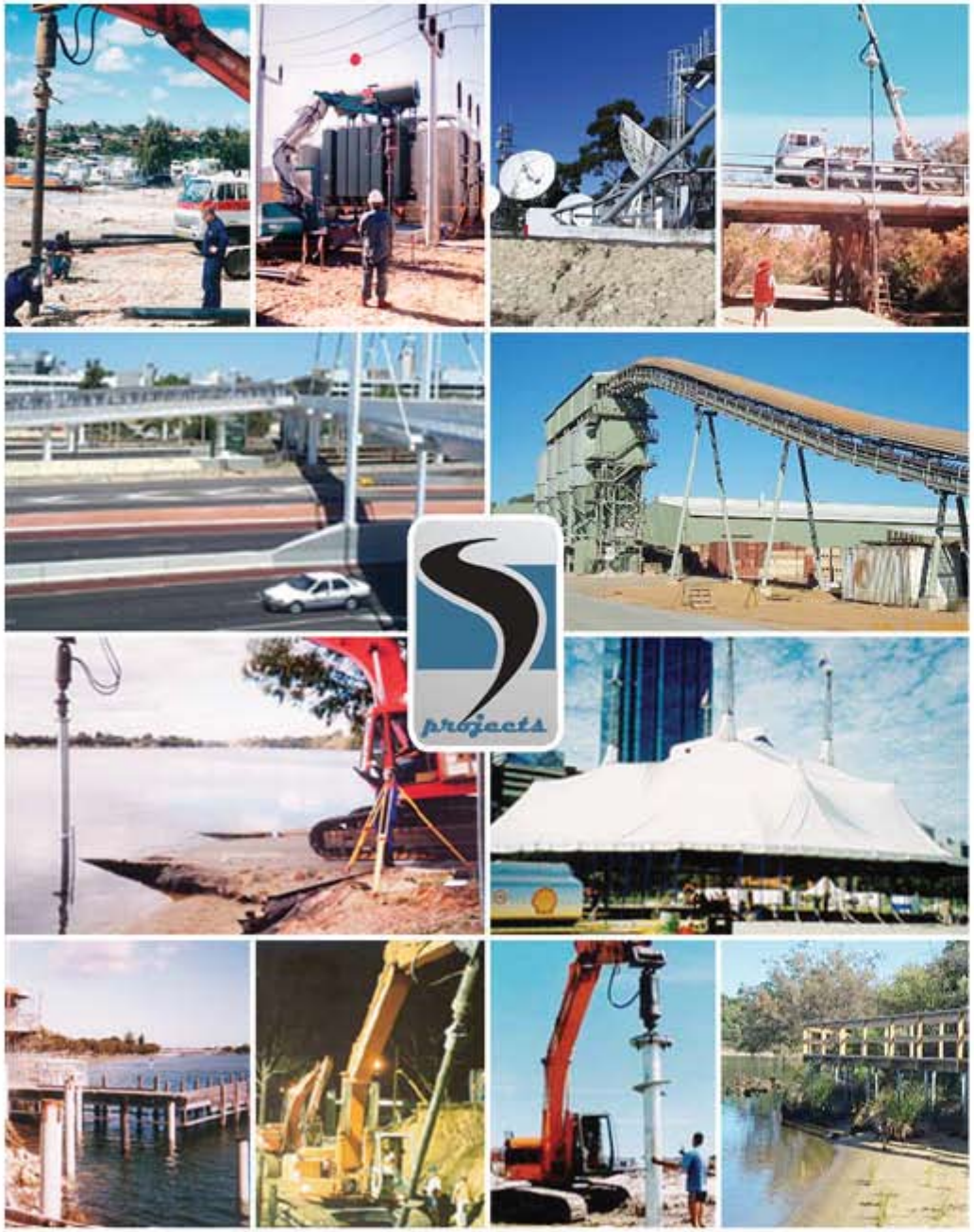
Load testing values were confirmed using the crane's calibrated lifting cell. Considering the minimal screwpile embedment depths of 0.8m and 1.0m respectively, the results are considered 50% higher than typical ground conditions found in the Pilbara Region (Pindan - Sandy Clays) as the soils were engineered and compacted fill.

TEST No1 Installed Screwpile Embedment Depth from Ground Level 0.8m

Applied Load	Hold Duration	Pile Head RL	Comment
0 kN	0	670mm	Base measurement
50 kN	2.5 min	682mm	Holding
60 kN	2.5 min	686mm	Holding
70 kN	0	Not taken, for safety reasons.	As increased load was applied, cracks in the pavement were observed and a major drop in the load cell. Test was terminated at this point.
0 kN	0	680mm	Pavement cracking observed, pile removed

TEST No2 Installed Screwpile Embedment Depth from Ground Level 1.0m

Applied Load	Hold Duration	Pile Head RL	Comment
0 kN	0	745mm	Base measurement
50 kN	2.5 min	755mm	Holding
60 kN	2.5 min	758mm	Holding
70 kN	2.5 min	758mm	Holding
80 kN	2.5 min	760mm	Holding
90 kN	0	Not taken, for safety reasons.	As increased load was applied, surface cracks observed and a major drop in the load cell. Test was continued to observe the shear failure.
0 kN	0	Screwpile extraction	



Environmental concerns and buildings de-commissioning

There is no other foundation anchoring system that can match screwpiles in areas where there are environmental concerns. Screwpiles can be installed with no or very minimal impact on the surrounding area. Machine tracking can be kept to a minimum, leaving little or no evidence that the work has been undertaken.

A major benefit of using screwpiles is they can be removed at any point and re-installed to another site should the site require de-commissioning, thereby dramatically:

1. Reducing building de-commissioning costs.
2. Limiting the extent of environmental impact on top-soils and vegetation.
3. Retaining the asset value of the screwpiles.
4. Reducing the time it takes to de-commission a site.

Related works

There are times when a problem site requires a combination of related foundation solutions. We offer engineering, design, supply, installation and certification of the following specialised foundations.

- Underpinning
- Soil Screw Nailing
- Compression Screwpiles
- Shoring & Soil Retention
- Marina Piling
- Marine Moorings
- Micro-Fine Grout Injection & Soil Stabilisation

Executive summary

To date, in excess of 3,500,000 screwpiles have been successfully installed in a multitude of applications. One common application is for building sites which are located in cyclonic/typhoon or high wind coastal regions and for flood-prone sites, such as low lying coastal areas and areas with poor soils such as soft or reactive clays and silts.

In these environments there is no other piling or anchoring method which can compete with screwpiles' project speed and cost advantages. Even in countries where labour costs are minimal, mass concrete options rarely compete.

Our client base continually expands and boasts some of the most dynamic and successful companies in the region. Many clients on our list have supported us for over 10 years. Our commitment to our clients and our continued product development has earned us the reputation as industry leader.

Please visit our website www.screwpile.com.au for additional information or contact a regional office nearest you.

Thank You
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