



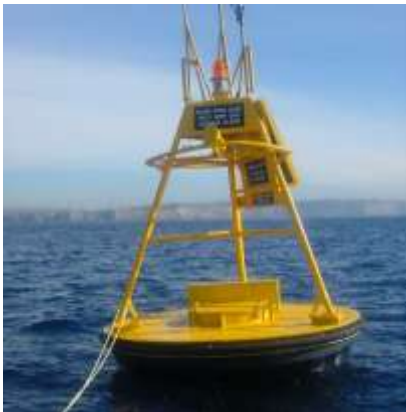
Land & Marine

Ocean Engineering Pty. Ltd.

*8 Cowdroy Ave Cammeray, NSW 2062 Australia
P: 02 9909 3437 F: 02 9953 8203 M: 0417 427 392
Email: a.fitz@bigpond.net.au ABN 39 099 768 564*



Seawall Construction



Ocean Engineering



Maritime Engineering



Sub-Sea Construction



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CAPABILITIES

Maritime and ocean engineering

Seawall Specialists – Design and Construction

Wharf – Design and Construction

Salvage – Consulting and Contracting

Demolition - Consultants

Maritime construction and management

Data analysis software design and preparation

Accredited Specialists in Nautical Charting

Registered Surveyors - Accredited Specialists in Industrial Offshore Surveys

Port Development - Port Operations - Nav aids

Remote Operated Vehicles - ROVs - Submersibles

Marine Shallow Seismic & Magnetics - Digital Sidescanning Sonar

Accredited Specialists in Coastal Zone Management

Air & Mixed Gas Ocean engineering & Diving Contractors

High Resolution Underwater TV Work - Vehicles - Dredging Tractors

Supply & Installation of Mooring Anchors & Mooring Systems

Marine Exploration & Salvage - Oil Spill Contingency Planning

Sampling - Water - Sediment - Biota - Sealife - Benthos

Data Processing - Electronic & Graphic Multiple Formats

Environmental Analysis - Organic & Inorganic - Priority Pollutants



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Jacksons Landing NSW

Client: Bovis Lend Lease

Land & Marine Ocean Engineering has repaired and reconstructed some 500 metres of seawall along the new development at Jacksons landing for Bovis Lend Lease. These works included 130 metres of precast seawall construction on submerged piers and headstocks, 60 metres of newly constructed sandstone wall and over 200 metres of underwater mass patch repairs.



Cofferdams used for headstock construction



Precast panels in place



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Diving operations and sandstone seawall



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Harbour wharf and Seawall engineering and construction



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**92 Wolseley Road Point Piper
Seawall construction and Jetty repair**



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Innovative seawall remediation using recycled HDPE

Land & Marine Engineering provides design services for:

Maritime civil and structural works.

Design of all maritime structures.

Remedial engineering design and supervision for existing facilities.

Major ferry wharf design.

Design of seawalls.

Floating marinas and private sector maritime development.

Private wharves, jettys and pontoons.

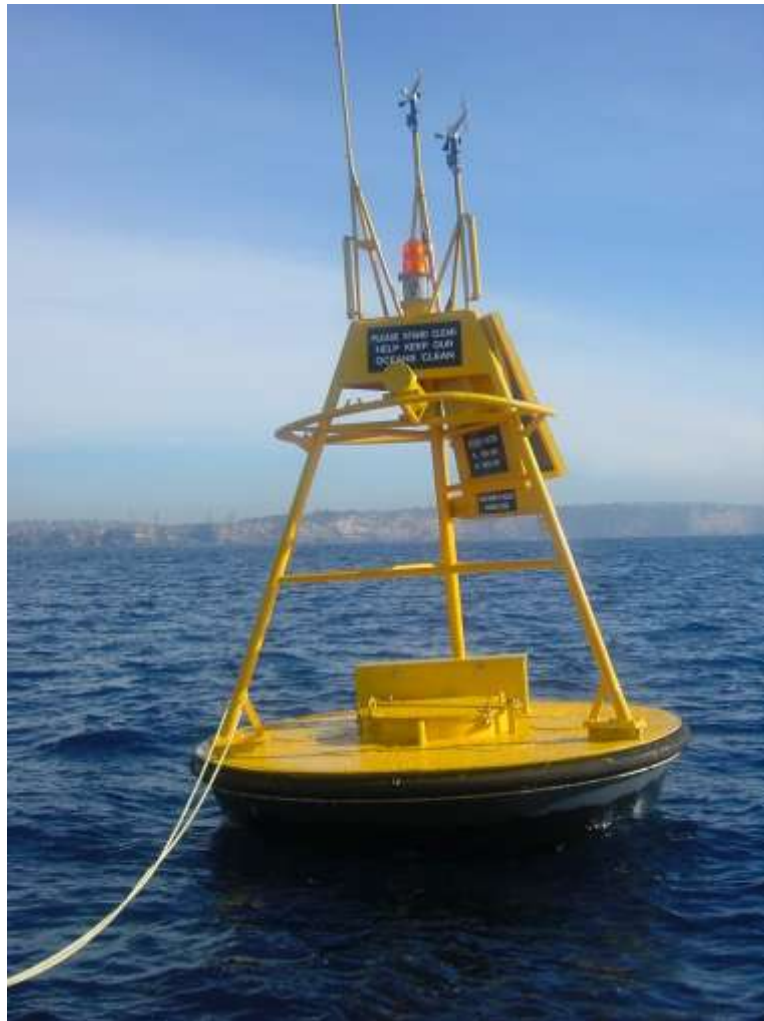
Underwater oceanengineering works.



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**The Sydney “Ocean Reference Station” (ORS)
The ORS provides the following real-time data:**

- **Wave height and period**
- **Wind velocity**
- **Full water temperature profile**
- **Current velocity at –20m and –55m**
- **Conductivity**

Land & Marine Pty Ltd operate and maintain the ORS on behalf of Sydney Water. We produce quality assured data, which is disseminated to the EPA, and to the scientific and marine community.



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**New Hydraulic Ferry Berthing Facility at Kirribilli Wharf
State Transit Sydney Ferries**

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Major ferry wharf design.

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Underwater oceanengineering works.



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Ocean Engineering

Wollongong Ocean Outfall – Remedial Works

End Plate Fabrication and Replacement

Removal of existing steel diffusers

Fabrication and installation of new stainless diffusers

‘No results no pay engineering’



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Land & Marine conducts engineering surveys of Sydney's Deep Ocean Outfalls.

We have been doing this work for nine years. We inspect every 6 months.

The contract is awarded every three years via an international tendering process.

Our dynamic ROV's and flying ROV's are used to execute the tasks.

We position our vehicles and equipment arrays on the seafloor with great accuracy.

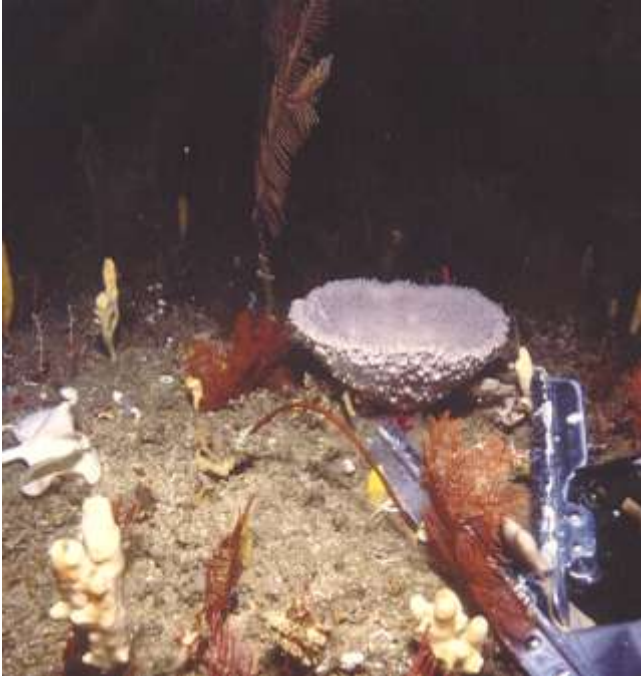
Land & Marine also contribute with Ocean Engineering remedial works.



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Collection of Deep Ocean Epi Benthos by ROV

Significant advances in pharmaceuticals have been made by delving into the complex chemistry of Deep Ocean Sponges.

Land & Marine can locate and harvest Deep Ocean Sponges.

We have carried out many thousands of ROV deployments for ocean monitoring, engineering and marine science purposes.



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Vibrocoring Operations – Shallow Estuarine Conditions.

Land & Marine Pty Ltd have deep and shallow water Vibrocoring capability.

We own and operate our own Vibrocorers.

R.V. Oceanographer was purpose built for Vibrocoring and ROV operations.



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TRANSPLANTING SEAGRASSES

Ability - Land & Marine developed the "Dugong" - a reliable mechanical seagrass harvester. We have also developed successful & efficient methods to transport & transplant seagrasses. About 100 square metres of seagrass meadow can be relocated in a 10-hour day. "Dugong" collects the leaves, shoots and rhizomes of the meadow along with the sea floor material immediately surrounding the plants. It is an important Coastal Zone Management tool.

Why - Seagrass meadows provide an important habitat for juvenile fish, estuary animals and invertebrates. They create an essential link in the food chain for larger fish, birds & animals.

How - The "Dugong" seagrass recovery vehicle slices the meadow & the first 10 centimetres of the seafloor. The product is cut into transportable sections as it enters the vehicle. About 2 square metres of seagrass are collected with each vehicle deployment. The vehicle is then recovered & the product transferred to special transit containers where it is covered in local seawater for the inter site journey. These containers are set up to self swim to the seafloor at the transplant site. They are randomly swum to the floor at the new site & then carefully placed by divers into the required geometry for the new colony.

Positioning - The "Dugong" is positioned by Differential GPS or sightlines, depending on water clarity & the density of the grasses.

Minimum Impact - The "Dugong" system is able to carry out the harvesting procedure with minimal impact. The abutting seagrasses in the pick up area are not damaged nor is the surrounding seafloor at the new site.

Scientific Enquiries - Please refer Dr Phillip Gibbs and Gary Henry at N.S.W. Fisheries or Paul Anink at Marine Pollution Research Pty Ltd.

Effective & Economic - "Dugong" transfers root structures and surrounding floor materials assisting the seagrasses to rapidly colonize new areas. "Dugong" is essential kit for development works in meadow areas.



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Engineering Excellence 1998 –

The Lady Robinson’s Beach Remediation Project won the Case Earth Award for Excellence in Environmental Engineering. Land & Marine provided the Seagrass Transplantation Sector, essential to this project.



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Engineering Excellence Award Beach Restoration Project

The \$2.5 million Lady Robinson's Beach restoration project at Sans Souci has won a major environmental and civil engineering award.

The Lady Robinson's Beach restoration project won its category in the "1998 Case Earth Awards", an award granted by the Civil Contractors Federation for innovation in remediating or protecting the environment.

Sydney Ports Authority, who co-ordinated the project used 40,000 tonnes of rock to build eight groynes designed to capture sand and stabilise the three kilometres of beach which had almost entirely eroded.

Land & Marine Pty Ltd harvested, transported and transplanted 1.8 hectares of *Zostera* seagrass - the first successful large scale, mechanical transplanting of *Zostera* on the east coast of Australia according to Sydney Ports Authority.

Sydney Ports Authority consider the badly eroded beach has been fully restored. "We started with a very degraded site-and an enormous effort was made to make it better using cutting edge technology," a spokesperson said.

St George & Sutherland Shire Leader, Thursday, June 18, 1998

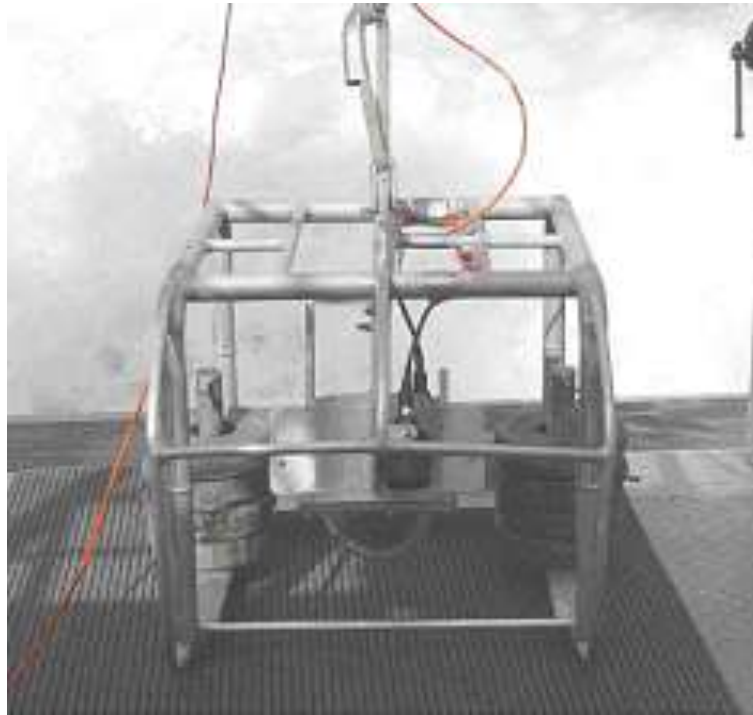




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Lik Lik Rover - Line Flying Tilt-Pan ROV

We can fly this vehicle along predetermined tracks at 2 to 3 knots.

Depending on turbidity, the ROV is maintained at a flying height of 0.5 metres to 3 metres above the seafloor in order to collate and immense amount of detail on the seafloor and items thereon.

Accordingly, on a good day, up to 20 nautical miles of seafloor can be video-scanned in great detail. If an item of significant interest is located, the vehicle can be flown onto the seafloor and more detailed tilt-pan and focus information about the target can be taped.

This vehicle is a superb tool for in situ inspections of pipelines and underwater cables. We have used this vehicle to locate many shipwrecks and aircraft crash sites. In crash location operations it is used in close coordination with our state-of-the-art Side Scan Sonar.

If highly significant areas require further inspection, then we can deploy the Hyball Dynamic ROV for maximum details and seafloor information.



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Excellence in Maritime Engineering

In 1997 Land & Marine Pty Ltd carried out the first mechanical transplanting of Zostera Seagrasses as part of the Lady Robinson's Beach remediation project. This project won the 1998 Case Earth Award for Excellence in Environmental Engineering