PORT DEVELOPMENT GUIDELINES

Appendix F
Land Survey
Technical Standards

PILBARA PORTS

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TABLES

1. APPLICATION OF THIS DOCUMENT

This document outlines Pilbara Ports' technical standards to be applied to any survey works undertaken on port land, or on behalf of Pilbara Ports or its proponents. The technical standards will be used to review the quality and standard expected for any survey works.

This document can be applied to any terrestrial survey work but specifically considers the undertaking of cadastral/boundary surveys, topographic surveys, and underground utility surveys.

2. DEFINITIONS

Refer to the Port Development Guidelines (PDG) - Application Guide for definitions and acronyms.

3. NORMATIVE REFERENCES

- Australian Standard AS 5488-1:2022
- Classification of Subsurface Utility Information (SUI)
- Land Surveyors Licensing Board of Western Australia (LSLB WA)
  - Guidelines for Sound Practice (2010)
- Main Roads WA
  - Underground Utilities Survey Standard, 67-08-121
- Inter-Governmental Committee on Surveying and Mapping (ICSM)
  - Standard for the Australian Survey Control Network, Special Publication 1v2.2
  - Guideline for Control Surveys by GNSS, Special Publication 1 v2.1

4. QUALITY CONTROLS

4.1 Scope of survey works

Prior to any survey works being undertaken, a clear scope must be agreed with Pilbara Ports to ensure the accurate location and attributes of specified features to the agreed quality level are captured.

4.2 Qualifications

All survey work must be performed by qualified surveyors under the direct supervision of a licensed surveyor registered in Australia. These works to be undertaken in accordance with the Guidelines for Sound Practice (LSLB WA, 2010).

4.3 Methods of survey

Survey work must be performed in accordance with ICSM Standards and all work and materials must conform to local codes and regulations.

Suitable and sufficient geodetic control is required for all survey to enable specified accuracies to be met.

Existing control located within the extent of the survey must be checked to verify accuracy of position and conformation with GDA2020 datum.

A summary of survey control used and/or established is to be included in the provision of data. Any new reference marks required shall be established according to the Standard for the Australian Survey Control Network.

Field work must be performed in accordance with accepted technical methods as expressed in standard textbooks on surveying theory practice and procedures. Any textbook used for the purpose of surveying instruction by an accredited university or college will be considered an acceptable text for this purpose.

Survey procedures and equipment used must relate to the attainment of the spatial tolerance nominated for each data quality level, including those used to perform in-field or post processed transformation of data to meet datum requirements.

5. SPECIFIC SURVEY STANDARDS

Specific requirements for different types of surveys are outlined below.

5.1 Underground utility survey

Identification and locating of underground utilities must be undertaken in accordance with the Australian Standard AS5488-1:2022 - Classification of Subsurface Utility Information and to highest possible quality level as agreed to by Pilbara Ports.

Establish quality level to be achieved across work area. Mixed levels may be appropriate but need to be clearly defined prior to works commencing and identified in all deliverables.

Locating of underground utilities may be undertaken using a range of techniques, including but not limited to potholing, cable locating, ground penetrating radar, or interpolation between surface features. The utilised method must be clearly identified in all deliverables and agreed to by Pilbara Ports. Any excavation or other destructive detection methods used must be undertaken in accordance with the relevant Pilbara Ports' approvals, such as completing an excavation permit.

Information to be collected against all underground utilities must include, but is not limited to, the attributes detailed in Table 1 below.

Table 1 -Underground utility feature attributes

Attribute	Example	Description
Utility type	Power, water, communications, sewer, fuel, product, gas	High-level service type - used for map symbology
Feature	HV, LV, potable water, fire water, reticulation, fibre optic, copper, sewerage, diesel, ULP, oil, acid, ammonia, gas	Detail description of utility distribution
Capacity	240V, 12V, 11V, 415V, 15L/min, 2000L, 2 pair, 4 pair, 16 pair	For use in pipeline or tank assets for flow rate, capacity or volume calculations
Type	Pipe, conduit, culvert, DBC	How is the utility installed, what is it in, if anything
Size	100mm	External diameter of pipe/conduit in mm
Material	Steel, PVC, poly, concrete	The material of the buried service
Location	Above ground, below ground, on ground	To easily determine and symbolise sub-surface, on the ground or elevated features
Elevation	4.5m	TOP elevation against height datum (AHD)
Depth	1.0m	TOP depth below ground level. Likely to be point data (not continuous) at locations of confirmatory potholes
Status	Live, redundant, isolated, installed	Status of the infrastructure feature
Surface subsurface features	Pit, pole, valve, hydrant, transformer, RMU, tap, meter	What features are attached to this section of utility
Quality level	QL-A	Precision and accuracy rating of location and attribute information, as per Australian Standard AS5488-2013

5.2 Topographic survey

Establish a survey grid to cover the entire work area, as defined in the scope of works.

Elevation measurements shall be taken at maximum 10m x 10m grid intervals and must cover the following (and is not limited to): full outlines of surface feature and grade breaks such as top and toe of embankments, dunes and crests, crown of roads, edge of shoulders, high point and low point of pavements, and ridge and valley lines.

All existing and new infrastructure and landforms to be identified in accordance with agreed requirements where present, including but not limited to:

- All road or access tracks including centrelines, crown lines, edges, changes in surfacing type, top and bottom of earthworks batter slopes, signage, and roadside barriers.
- All drainage structures including invert and obvert levels (captured at the inside of pipe/box), connection and direction of pipes/boxes (if evident), dimension and description.
- Structures such as fencing, rock pitching, retaining walls (including type, thickness and level).
- Any confirmed cadastral boundaries.
- All visible utilities including pipe locations, hydrants, valves, fittings, pipe diameter and type of mains.
- All communications, electrical and lighting infrastructure, including pole locations, pillars, manholes, height clearance from road surface level to the lowest catenary of overhead electrical road crossings.
- All significant vegetation (large trees, or bushes).

5.3. Cadastral or lease/licence boundary survey

Survey work must only be completed by or under the direct supervision of a Licensed Surveyor with a current practicing certificate under the *Licensed Surveyors Act 1909* (WA).

Undertake survey works in accordance with the Guidelines for Sound Practice (LSLB WA, 2010) to a standard suitable for submission of survey plans, field books and notes to Landgate:

- Survey boundaries and provide all boundary corner monuments and identify with coordinates.
- Locate all rights-of-way and easements within and near the boundaries.
- Conduct all necessary document research and field surveys to accomplish the work as described above. Where explicitly agreed to by Pilbara Ports, lease and licence surveys may be undertaken using alternative methods.

6. TECHNICAL STANDARDS

The following technical standards provide proponents with information to address the performance criteria in relation to survey standards.

6.1 Data deliverables

All spatial data generated must be provided in accordance with the PDG Appendix G - Spatial Data Technical Standards.

6.2 Final maps/drawings

All surveyed information is to be presented in .pdf maps or drawings of work area including clear presentation of all features and measurements captured in the field, indicating data quality level (if variable across survey).

Include the authorising signature of licensed surveyor, and include all relevant metadata as outlined below.

6.3 Metadata

A specific metadata file must be provided with all data. Metadata must be provided for all digital data detailing at a minimum:

- Author.
- Date.
- Accuracy.
- Horizontal and vertical datum.
- Datum transformation methodology (if applied).
- Contact details.
- Source of information.
- Data classification.

Additional metadata details may be held in title block on final maps, or as feature level attributes if appropriate.

6.4 Survey report

A survey report must detail at a minimum:

- The survey methodology used in the field to locate and identify any features and any data manipulation and processing undertaken.
- Personnel involved in any part of the works including field and office-based activities.
- File names and references of all deliverables provided.
- A stated accuracy of all parts of the survey work, including detail of all instrumentation accuracy checks and standards achieved.
- Specifically including but not limited to the accurate determination of GDA2020 coordinates as referenced from known monument points.
- Any transformations applied to survey data, including details of how the transformations results were verified against ICSM standards, using the Geoscience Australia GDA2020 online transformation service Geodetic Calculators (ga.gov.au).

Document amendment table

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V3	Pilbara Ports	5/7/2024	Replaces Appendix 4 Land Survey Standards and Deliverables V2 2/7/2020.

Document owner

The Developments Manager is responsible for the Port Development Guidelines.

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