PORT DEVELOPMENT GUIDELINES

Appendix C
Hydrographic Survey
Technical Standards

PILBARA PORTS

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1. APPLICATION OF THIS DOCUMENT

This document outlines the technical standards for hydrographic surveys and applies to all port development works undertaken on port tenure by proponents and is to be read in conjunction with the Port Development Guidelines (PDG) Application Guide.

2. DEFINITIONS

Refer to the PDG Application Guide for definitions and acronyms.

3. HYDROGRAPHIC SURVEY REFERENCE STANDARDS

Pilbara Ports requires all hydrographic surveys to be conducted with the methodology using the Global Navigation Satellite System to conduct Ellipsoidally Referenced Surveying (ERS).

A Pilbara Ports unique 'hydroid' shall be used as a separation model for the determination of chart depths. Where available, Pilbara Ports shall provide proponents with the appropriate hydroid.

Where a Pilbara Ports' hydroid is not available, hydrographic surveys shall apply the AUSGeoid2020 to LAT offset at a predetermined location to propagate LAT to the survey location.

These Pilbara Ports' Hydrographic Survey Technical Standards are, in part, derived from the guidelines contained in:

- IHO S-44 6th Edition (Exclusive Order); and
- Principles for Gathering and Processing Hydrographic Information in Australian Ports – Version 1.5 (Nov 2012).

Note: Where a proponent cannot meet the Pilbara Ports' Hydrographic Survey Standards, the proponent is to obtain a formal exemption from Pilbara Ports to deviate from these standards prior to the commencement of any hydrographic survey. Avoidance of obtaining such an exemption may lead to the rejection of the survey deliverables.

4. HYDROGRAPHIC SURVEY CRITERIA

All surveys shall be conducted applying the hydrographic survey industry best practice and must meet the requirements of a Ports Australia Class 'A' hydrographic survey.

All surveys conducted over gazetted and non-gazetted navigable waters shall be approved by a Level 1 Certified Professional in Hydrographic Surveying (CPHS1), certified by the Australasian Hydrographic Surveyors Certification Panel (AHSCP). In addition, the CPHS1 must have demonstrated experience in conducting surveys within a port environment.

In addition to the requirements of a Ports Australia Class 'A' hydrographic survey, a proponent shall at a minimum conduct its hydrographic surveys to achieve the following criteria in its final processed survey data:

Hydrographic surveys over non gazetted navigable waters*:

- Total vertical uncertainty (TVU) of plus or minus 0.1m at a 95 per cent confidence level.
- Total horizontal uncertainty (THU) of plus or minus 0.5m at a 95 per cent confidence level.
- 0.5m Object detection (minimum of three (3) hits in the along track direction).
- 100 per cent coverage over the survey area as predetermined by Pilbara Ports or at a minimum of 150m surrounding any disturbed area.
- Final processed data shall be derived from the shallowest sounding in 1m BIN from a 0.5m statistically derived surface from the full density raw survey data.

Hydrographic surveys over gazetted navigable waters*:

- Total vertical uncertainty (TVU) of plus or minus 0.1m at a 95 per cent confidence level.
- Total horizontal uncertainty (THU) of plus or minus 0.5m at a 95 per cent confidence level.
- 0.5m Object detection (minimum of three (3) hits in the along track direction).
- 200 per cent coverage over the surveyed area of the gazetted navigable waters as predetermined by Pilbara Ports or at a minimum of 150m surrounding any disturbed area.
- Coverage shall be extended to a minimum of 100m outwards from the gazetted navigable waters' toe lines, where applicable and practicable.
- Final processed data shall be derived from the shallowest sounding in 1m BIN from a 0.25m statistically derived surface from the full density raw survey data.

*Note: Gazetted navigable waters are deemed to be channels, berth pockets, swing basins, etc. as depicted on the AUS Charts and its revisions or as determined by Pilbara Ports.

4.1 Progress surveys

Where a proponent carries out works that might affect the depths within a Pilbara Ports' predetermined survey area, the proponent shall at a minimum conduct monthly progress surveys over the whole predetermined survey area. The proponent shall at a minimum conduct its hydrographic surveys to achieve the following criteria in its final processed progress survey data:

- Total vertical uncertainty (TVU) of plus or minus 0.1m at a 95% confidence level.
- Total horizontal uncertainty (THU) of plus or minus 0.5m at a 95% confidence level.
- 0.5m Object detection (minimum of 3 hits in the along track direction).
- 100% coverage over the survey area as predetermined by Pilbara Ports or at a minimum of 150m surrounding any disturbed area.
- Final processed data shall be derived from the shallowest sounding in 1m BIN from a 0.25m statistically derived surface from the full density raw survey data.

5. TECHNICAL STANDARDS

These technical standards provide proponents with information that will assist to address the performance criteria and acceptable solutions in relation to hydrographic surveys.

Some components of these technical standards may not be applicable to your development or operations. If you are unsure about the specific advice in the technical standards, contact Pilbara Ports' Port Development team.

5.1 Hydrographic survey deliverables

The proponent shall provide Pilbara Ports the following hydrographic survey deliverables for all hydrographic surveys and within the time period stated:

Charts, drawings and survey data:

- One (1) copy of the survey charts in AutoCAD (*.dwg) format.
- One (1) digital copy of the survey charts in PDF (*.pdf) format.
- One (1) digital copy of all raw survey data, calibration reports and logs.
- A digital copy of all processed hydrographic survey data:
  - One (1) digital copy of the final processed hydrographic survey data of the shallowest depths in 1.0m BINs with the horizontal position of the shallowest depth preserved from the statistically derived surface.
  - One (1) digital copy of the final processed hydrographic survey data of the shallowest depths in 1.0m GRID.
  - One (1) digital copy of all data deleted from the raw survey data.
- Three (3) copies of paper survey charts duly signed by the supervising CPHS1 Surveyor as being representative of the final processed hydrographic survey data.

Survey charts shall:

- Be plotted on A1 size sheet format.
- Be scaled at 1:2,500 or as specified by Pilbara Ports.
- Consist of depth clashed labels at the appropriate scale from the shallowest depth in a 1m x 1m BIN (note: not GRID).
- Contain depth labels rounded to the nearest decimetre.
- Contain contours at appropriate intervals.
- Contain all information as specified in the drawing standards section within this document.
- Address all of the requirements outlined in Ports Australia requirements to achieve a Class 'A' Survey.

All charts or drawings shall include any infrastructure within or near the survey area, including but not limited to wharf structures, fenders, aids to navigation, etc.

All charts or drawings shall be in metres, georeferenced to GDA2020 and projected in UTM to MGA Zone 50.

5.2 Metadata

Metadata must be provided for all digital data detailing at a minimum:

- Approval from a CPHS1 Author; date, accuracy; horizontal and vertical datum; contact details; source of information and any restrictions on use.
- File naming convention to include what datum the data has been provided in (e.g. filename_GDA2020).
- An attached metadata file must be provided with all data.

Metadata details may be held in title block for CAD files, if appropriate.

5.3 Survey report and deliverables

Pilbara Ports requires a comprehensive hydrographic survey report that comprehensively explains how the survey was conducted, and how the final survey deliverables were derived.

Pilbara Ports takes into consideration the correctness of the report when evaluating the quality of the hydrographic survey data and the accuracy of the report and reliability of claims made.

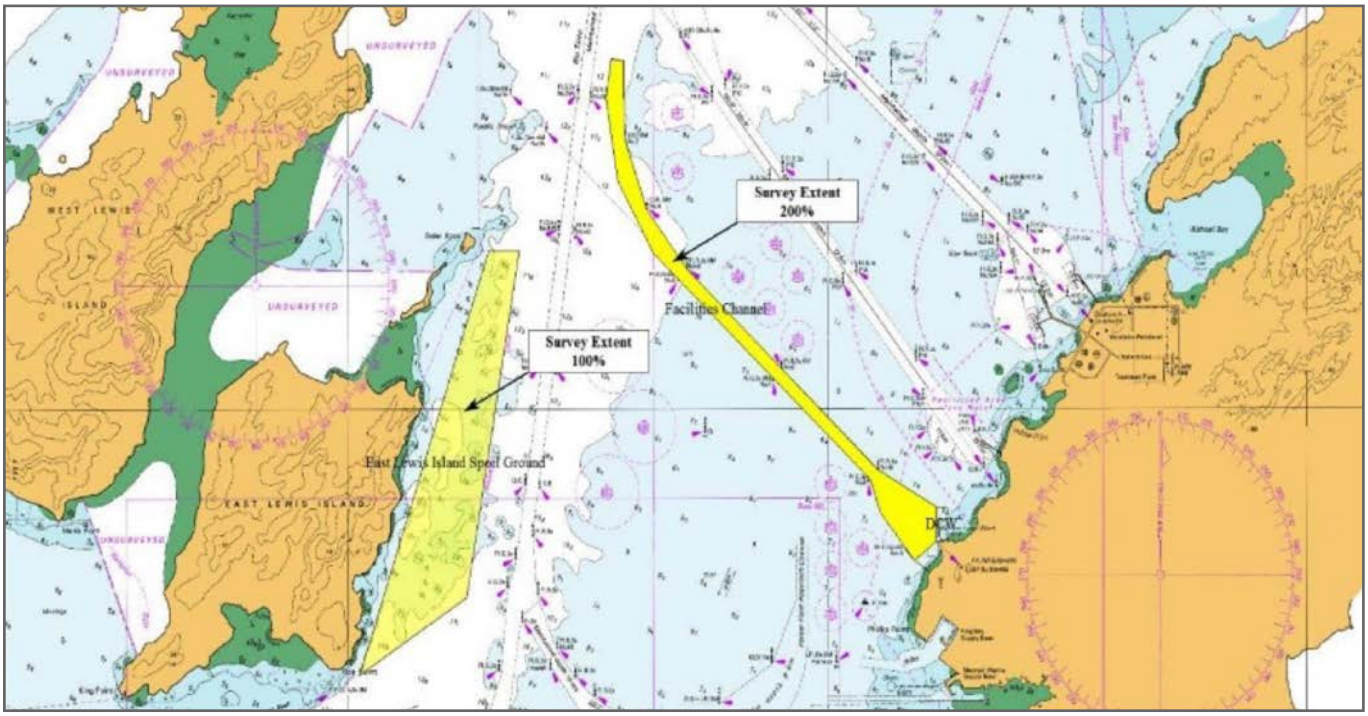
Failure to provide an acceptable report may lead to rejection of the survey deliverables or the application of a negative tolerance to the horizontal and vertical accuracy of the processed survey data.

Survey reports shall address and contain at a minimum:

- The survey methodology conducted by the proponent including all personnel, procedures, equipment, software and data filters employed during the survey.
- A concise description over all survey work conducted. Noting the report shall describe how all survey work was actually conducted. A reference of the survey work being compliant to a pre-survey prepared work method statement is not acceptable.
- All field reports.
- Photographic evidence of permanent and temporary installations of equipment employed during the survey.
- Check measurements against official benchmarks including results and subsequent adjustments and calibrations.
- All applied offsets on the survey vessel from GPS receiving antenna to transducers in figures and diagram.
- Survey data processing methodology.
- Survey data quality control, including a traceable connection between real time checks and calibrations with any data post processed using Post Processed Kinematic or Precise Point Positioning techniques.
- Apriori assessment of accuracy.
- Proof that requirements and accuracy have been achieved through checks, calibrations and ongoing quality control.
- A statement of the file name(s) of the final processed survey data and drawings.
- A statement on the quantity of materials dredged to date, if applicable a signed statement by the CPHS1 Surveyor that the hydrographic survey and its processes was conducted under their direct supervision.
- A signed approval statement by a CPHS1 Surveyor that the hydrographic survey deliverables are in compliance with the Pilbara Ports' Hydrographic Survey Standards.
- The report shall include a diagram to an appropriate scale indicating the bounds of the survey in relation to its surrounds, including the relative extents of 100 per cent and 200 per cent coverage areas (see example below).

The hydrographic survey deliverables for all hydrographic surveys, other than progress surveys, shall be provided to Pilbara Ports no later than four (4) weeks after the completion of the field work for all hydrographic surveys.

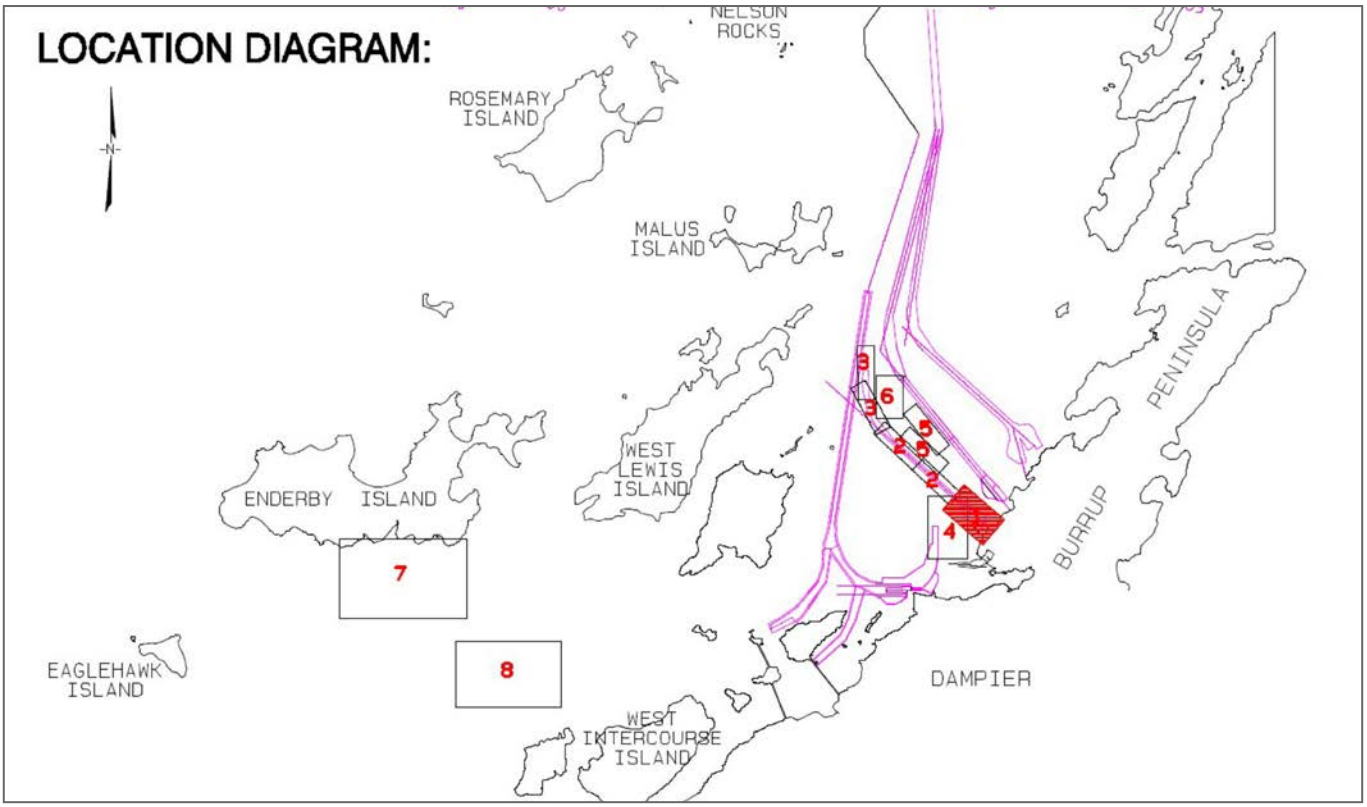
For progress surveys, the proponent shall provide to Pilbara Ports the hydrographic survey deliverables within the first week following the month that the progress survey has been conducted.



6. DRAWING STANDARDS

Information to be included on each drawing:

6.1 Location diagram



6.2 General notes

Survey period from / / to / /

Survey vessel details:

- Transducer installation:
  (hull mounted/over side mount).
- Survey equipment and software details.
- Survey report reference.
- Survey data reference

GENERAL NOTES :

Survey undertaken between 23/02/2017 and 03/03/2017

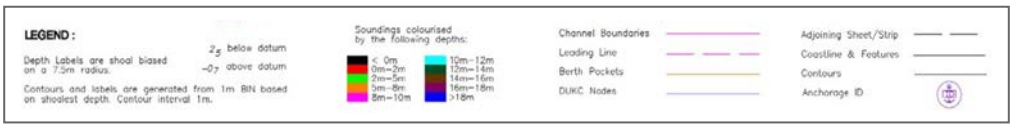
Survey Vessel:
- Length: 18.5 m
- Beam: 4.8 m
- Draft: 1.6 m
- Survey installation: Moon Pool

Survey Equipment:
- R2Sonic 2024 wideband multibeam sonar (400 KHz)
- POS MV Wavemaster Inertial Navigation System with RTK corrections
- Valeport MiniSVS
- Valeport MiniSVP/Swift SVP
- Pacific Crest ADL radio modem
- QPS QINSy navigation and acquisition software
- QPS Qimera data processing software
- BeamworX AutoClean data processing software
- Trimble Terramodel charting / CAD software

Refer to report: for further information
ASCII 1m XYZ file used: PPA-Dampier-1m-Shallowest-BIN.pts

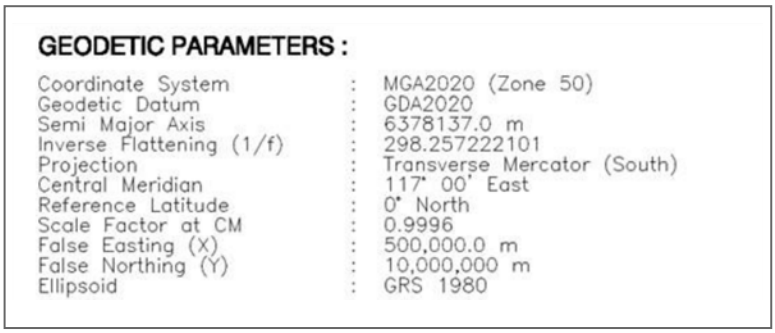
6.3 Legend

- Depth labels details
- Contour details
- Soundings and features colour legend:

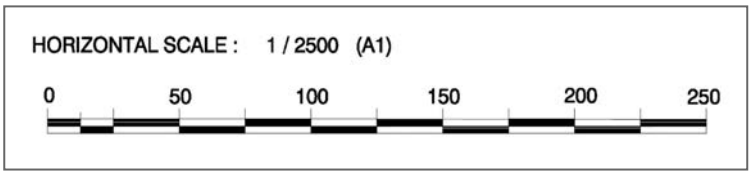


6.4 Geodetic parameters

- Coordinate system
- Geodetic datum
- Semi major axis
- Inverse flattening
- Projection
- Central meridian
- Reference latitude
- Scale factor
- False easting
- False northing
- Ellipsoid

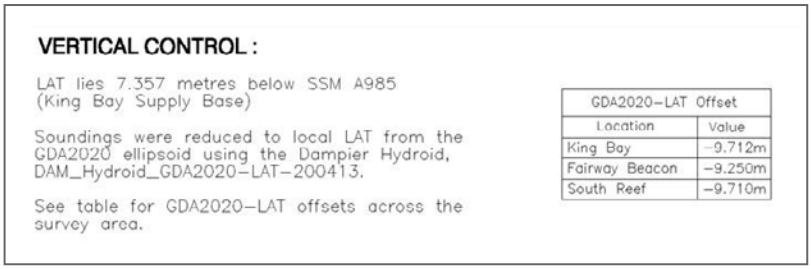


6.5 Scale referenced to chart size



6.6 Vertical control

- LAT reference to benchmark.
- AHD to LAT offset applied.
- AUSGEOID applied, if applicable.
- AHD to chart datum reference diagram.



6.7 Survey uncertainty

- Total horizontal uncertainty.
- Total vertical uncertainty.
- Survey class.

UNCERTAINTY:
Survey uncertainty is assessed to be no greater than:
Total Horizontal Uncertainty +/- 0.5m
Total Vertical Uncertainty +/- 0.1m

SURVEY STANDARDS:
Ports Australia Class A, IHO Exclusive Order
Pilbara Ports' Port Development Guidelines Appendix C - Hydrographic Technical Standards - Version 12 (5/07/2024)

6.8 Survey approval

- CPHS1 details.
- Client details.

APPROVAL :

Surveyor:

Signature: Date:

Client Representative :

Signature: Date:

6.9 Chart title and revisions

CHART TITLE :

FACILITIES CHANNEL
INNER HARBOUR

REV	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
0		Released for client approval			
A		Issued for internal review			

6.10 Project information

- Project name
- Client
- Survey contractor
- Drawing and sheet number
- Chart format

PROJECT :

DAMPIER HYDROGRAPHIC
SURVEY 2017

CLIENT :	CONTRACTOR :
Contract No.	Doc. Format A1
Doc. No:	Sheet: 01/08

Document amendment table

VERSION	PREPARED BY	DATE	AMENDMENT DETAILS
V12	Pilbara Ports	5/7/2024	Document replaces Pilbara Ports 'Appendix C Hydrographic Survey Standards and Deliverables Version 11'.

Document owner

The Developments Manager is responsible for the Port Development Guidelines.

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