

# SPATIAL DATA AND SURVEYING TECHNICAL GUIDELINES

## Table of Contents

1	Purpose .....	4
2	Scope .....	4
2.1	General – Survey .....	4
2.2	Precedence .....	5
3	Relevant Documentation .....	5
3.1	Guideline Series .....	5
3.2	MWPA Policies and Procedures .....	5
3.3	Local, State and Federal Statutory Requirements .....	6
3.4	Standards and Codes .....	6
3.5	Additional References.....	6
4	General and MWPA Specific Requirements.....	6
4.1	Surveying.....	7
4.1.1	Horizontal Datum .....	7
4.1.2	Vertical Datum.....	7
4.1.3	General.....	9
4.2	Health and Safety .....	9
4.2.1	Safety Risk Review.....	9
4.2.2	Safety During Surveying .....	9
4.2.3	Personal Protective Equipment.....	9
4.3	Navigation Requirements .....	10
4.4	Equipment .....	10
4.5	Services and Utilities.....	10
4.6	Tides.....	10
4.7	Environment.....	10
4.8	Wind .....	10
4.9	Waves.....	11
4.10	Mines Act Requirements .....	11
5	Hydrographic Surveys.....	11
5.1	Introduction .....	11
5.2	Required Qualifications.....	12
5.3	Horizontal and Vertical Datums .....	12

5.4	Method Statement .....	13
5.5	Class Of Hydrographic Surveys .....	13
5.5.1	Special Order .....	14
5.5.2	Other Classes .....	14
5.5.3	MWPA Additional Requirements .....	14
5.6	Survey Report .....	14
5.7	Survey Plan .....	15
5.8	Deliverables .....	15
5.8.1	Digital Data ( <i>Refer to Section 10 – Spatial Data Guidelines</i> ) .....	15
5.8.2	Hard Copy Data .....	16
6	Cadastral Surveying .....	16
6.1.1	Required Qualifications .....	16
7	Engineering Surveying .....	16
7.1	Required Qualifications .....	17
7.2	Mines Act Requirements .....	17
8	Aerial Surveys .....	17
8.1	Digital Aerial Photography Specifications .....	17
8.1.1	Oblique .....	17
8.1.2	Vertical .....	18
8.1.3	Orthophotos .....	18
8.1.4	Large Scale Aerial Coverage .....	18
8.1.5	Small Scale Coverage – Unmanned Aerial Vehicle (UAV) .....	19
9	Field Works Guidelines .....	20
9.1	Port Operations .....	20
9.2	As Constructed Surveys .....	20
9.3	Documents to be Submitted .....	20
10	GIS and Spatial Data Technical Guidelines .....	20
	Glossary of Terms .....	20
10.1	Development of the Spatial Data Guideline .....	21
10.2	Application of the Guideline .....	22
10.2.1	Copyright Clause .....	22
10.3	Coordinates Systems .....	22
10.3.1	Universal Transverse Mercator Coordinates .....	22
10.3.1	Geraldton Coastal Grid – Local Project Grid .....	24
10.3.2	Geographic coordinates – (Latitude and Longitude) .....	24
10.4	Map Submission .....	25
10.4.1	Map Scale .....	25
10.4.2	Geographical Features .....	26

10.4.3	Map Elements .....	26
10.4.4	Map Projections .....	26
10.5	GIS Data.....	26
10.5.1	Spatial Data Formats.....	27
10.5.2	Projections .....	28
10.5.3	GIS Multimedia Location Data.....	29
10.5.4	The Generation of Geotagged Photos.....	29
10.5.5	Metadata .....	29
10.5.6	Attribute Data .....	29
10.6	GIS Data submission receipt and archiving.....	31
10.6.1	How do I submit spatial information? .....	31
10.6.2	Registering Spatial Data for Archiving and Publishing – MWPA Enterprise GIS? .....	31
10.7	MWPA GIS Data Request by consultants / contractors / third parties.....	31
10.8	MWPA GIS Data Submission Flow Process.....	32
11	Associated Documents .....	32
12	References.....	33
13	Glossary.....	34
13.1	Common Drawing and Survey Terminology.....	34
13.2	Abbreviations .....	36
14	Monitoring, Evaluation and Review .....	37
15	Administration.....	37
	Appendix A1 .....	38
	Appendix A2.....	39
A2.1	Hydrographic Survey and Bathymetry Data .....	39
A2.2	General – Survey Control Points.....	39
A2.3	Asset Infrastructure and Services Survey Pick Up Data .....	39
A2.4	Aerial Imagery Survey Data.....	39
A2.5	Conceptual Design and As Constructed Models.....	39
A2.6	Environmental Monitoring Survey Data.....	39
A2.7	Project Specific Spatial and Survey Data .....	40
A2.8	Nautical and Navigational Charts.....	40
A2.9	Other Departments or Third Parties Acquired Data.....	40
	Appendix B – Spatial Data Process Map .....	41
	Appendix C – Spatial Data Request and Dispatch Process Map .....	42
	Appendix D1 – Location Map Overview Map .....	43
	Appendix D2 – Detailed Feature Map.....	44
	Appendix E.....	45
	Appendix F.....	46
	Appendix G .....	47
	Appendix H.....	48

## 1 Purpose

This Guideline document sets a consistent framework that ensures that Mid West Ports Authority (**MWPA**) contractors and third-party stakeholders, deliver precise, accurate and repeatable surveys and spatial data for MWPA use and records. The Guidelines outline the standard MWPA expectation with respect to survey requirements and geospatial data submission requirements.

All survey and geospatial data provided to MWPA must include full raw data and processed outputs, in formats suitable for integration with MWPA GIS, CAD, and document management systems.

This document does not replace project basis of design, design criteria or specifications, but is intended to provide a benchmark guide for the minimum survey requirements and spatial data delivery specifications for existing infrastructure, new construction, refurbishment and repair of structures and other forms of infrastructure found within Geraldton Port.

The sections of this Guideline document include guidance and statutory requirements for structures in general, and Geraldton Port specific design and construction guidelines for existing and future infrastructure and operational requirements. This is to ensure that all surveys carried out within the Geraldton Port are carried out to a common standard to facilitate that all collected and collated spatial data can be integrated with confidence into a MWPA database system. The Guideline document also ensures that geospatial data submissions are complete, accurate, and consistent across all MWPA to support an efficient and effective operational and regulatory process.

## 2 Scope

The Guideline document is composed of two parts, the first part namely sections 2.1 to 10 dealing with Survey Guidelines and the second part from section 10.0 covering the GIS and Spatial Data Technical Guidelines.

### 2.1 GENERAL – SURVEY

This Survey Guideline defines the minimum survey requirements for cadastral, engineering, hydrographic and aerial surveys for the design, construction, and As Constructed surveys of the following types of structures.

- Detailed site surveys of breakwaters and other infrastructure footprints, sometimes extending into the water.
- Topographic pick-up surveys of roads, pavements, rock and sea walls and revetments.
- Set out surveys for both land and sea-based infrastructure.
- Land boundary surveys to legally define the dimensions of new and existing land parcels, reserves, easements, leases and strata titles, legal definition of land, its ownership and any rights and restrictions pertaining to said land.
- Dimensional surveys of infrastructure – single or multidimensional.
- As Constructed Surveys of installed infrastructure, both visible and buried / submerged.

Where documents are referred to in this Guideline, the reference should be taken to mean the most recent revision, unless noted otherwise.

## 2.2 PRECEDENCE

As a general guide, where certain aspects are not covered in the MWPA Technical Guidelines, or where conflict between documents exists, the following precedence for standards applies.

- Statutory Regulations
- Design Codes and Standards
- Project Specific Specification
- MWPA Technical Guidelines
- Other References (such as Recognised Industry Best Practice)

Regardless of the general order of precedence, if there is a conflict between documents the clause highest on the list will govern. If in doubt, or in all cases where noncompliance is anticipated, clarification should be sought from MWPA.

## 3 Relevant Documentation

### 3.1 GUIDELINE SERIES

This Guideline should be read in conjunction with any other parts of the MWPA Technical Guideline series which might exist in either draft or are officially published, where relevant, as listed below.

- Additional Guidelines, some are internal docs (for example, Hydrographic Guidelines)
- Buildings and Structures Guidelines
- Civil Engineering Guidelines
- Drafting and AutoCAD Standards Guidelines
- Electrical and Instrumentation Guidelines
- General Guidelines
- Guidelines for Maritime Structures
- Guidelines for Rail
- Mechanical Guidelines
- Port Development Guidelines

#### **Attention is drawn specifically to:**

- General Guidelines – Appendix A, where information on additional relevant guidelines may be found; and
- Drafting Guidelines and AutoCAD Standards.

Where the referenced MWPA Guidelines do not yet exist, the relevant Australian Standards and Industry Best Practice shall apply.

### 3.2 MWPA POLICIES AND PROCEDURES

All parties involved in works should be aware of and comply with MWPA policies and procedures. A full list of MWPA policies and procedures can be obtained from either the MWPA website, [www.midwestports.com.au](http://www.midwestports.com.au), or requested from MWPA Project Owner or Owner's Engineer.

### 3.3 LOCAL, STATE AND FEDERAL STATUTORY REQUIREMENTS

In addition to the requirements of this part of the MWPA Technical Guidelines, all works should meet the requirements of Local, State and Federal statutory, health, safety and environmental requirements and regulations and include, but not be limited to, the list in the Reference Legislation Section on page 36.

### 3.4 STANDARDS AND CODES

The latest version of the following standards and documents should be adopted for all works covered by this Guideline.

**Table 1 – Standards and Codes**

Document	Title
Australian Standard	AS 1726 Geotechnical site investigations

Location - SAI Global - <https://www.saiglobal.com/online/>

Authority	Document
International Hydrographic Organisation Standards for Hydrographic Surveys	IHO Publication S-44
Intergovernmental Committee on Surveying and Mapping (ICSM)	<a href="https://www.icsm.gov.au/publications">https://www.icsm.gov.au/publications</a>

### 3.5 ADDITIONAL REFERENCES

The following reference resources have been used in the production of the Survey guideline and provide additional reference information, in addition to those cited in the References section of this document.

**Table 2 – Additional References**

No.	Reference
1	<a href="http://www.transport.wa.gov.au">www.transport.wa.gov.au</a>
2	<a href="http://www.midwestports.com.au">www.midwestports.com.au</a>
3	Australian Hydrographic Service Australian National Tide Tables 2013 (AHS, 2012)
4	Surveying and Spatial Sciences Institute – <a href="https://sssi.org.au">https://sssi.org.au</a>
5	The Land Surveyors Licensing Board of WA – <a href="https://www.lslb.wa.gov.au">https://www.lslb.wa.gov.au</a>
6	Ports Australia – Port Survey Principles Version 1.5
7	International Hydrographic Organisation (IHO) – <a href="https://iho.int/en/hssc">https://iho.int/en/hssc</a>
8	AS/NZS Standards on SAI global link

## 4 General and MWPA Specific Requirements

Contractors shall familiarise themselves with relevant MWPA marine operations, permits, access and HSEQ requirements. General guidance on these can be found in Work Health and Safety, Environmental and Quality (HSEQ) Policies and Procedures and any MWPA contractor guidelines on the MWPA website, [www.midwestports.com.au](http://www.midwestports.com.au).

## 4.1 SURVEYING

### 4.1.1 Horizontal Datum

All surveying should be undertaken using, GDA 2020 Zone 50 datum or the local horizontal survey datum Geraldton Coastal Grid 2020 (**GCG2020**) unless otherwise noted on construction drawings (pre-2021 surveys **GCG94**). The plane grid (**GCG94**) is used to ensure that the dimensions derived from the database are true to ground scale. It may be necessary to convert the GCG2020 coordinates to MGA or GDA2020 coordinates from time to time for external users and the appropriate survey software to fully convert a dataset must be used. Simple 'shift' transformations are not to be used.

All surveys require compliance to the Australian Survey Control Network Special Publication 1' (SP1 v2.1) in alignment with the [Landgate Survey guidelines](#).

### 4.1.2 Vertical Datum

Generally, all land-based infrastructure is based on an Australian Height Datum (**AHD**) vertical datum, is used mainly for land / assets/LiDar.

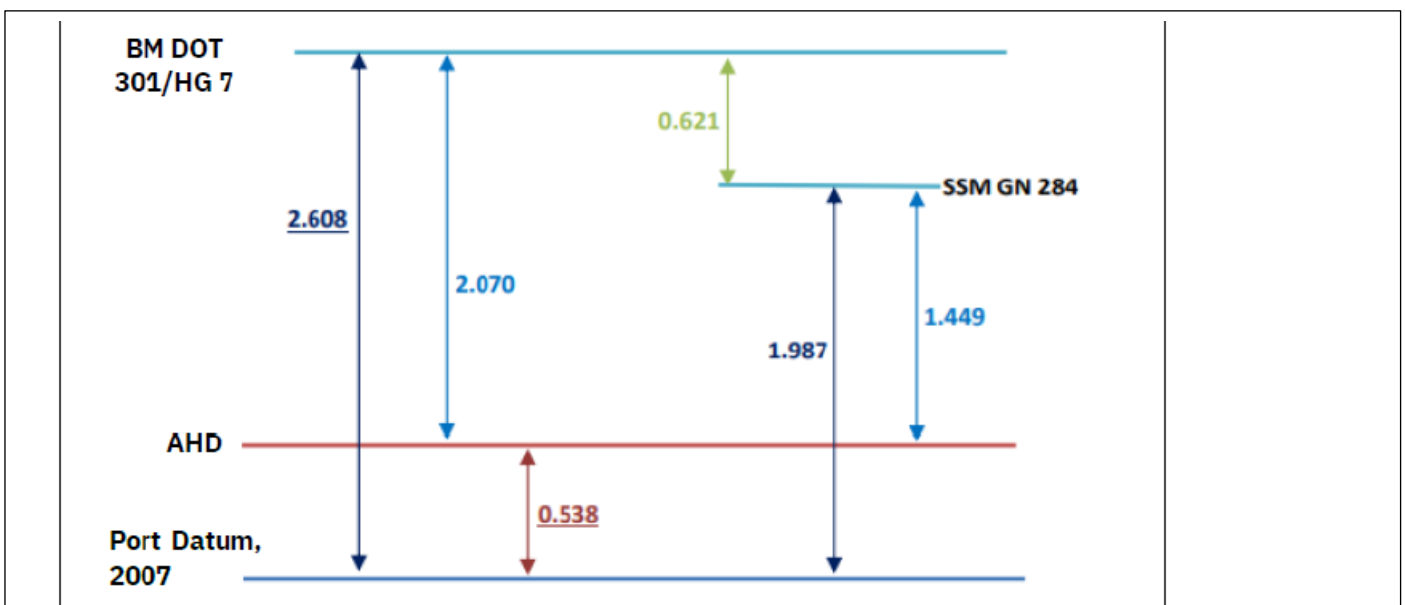
For Geraldton (WA), marine-based datums are primarily **tidal vertical datums** used for navigation, hydrography, and coastal engineering and is referenced Lowest Astronomical Tide (LAT).

Marine data in Geraldton is referenced to Lowest Astronomical Tide (LAT) used for marine / bathymetry, which serves as the chart datum for nautical charts and depth measurements. Other tidal datums include Highest Astronomical Tide (HAT) for vertical clearances and Mean Sea Level (MSL) for long-term oceanographic reference. Land-based datasets use the Australian Height Datum (AHD), requiring appropriate transformation when integrating coastal and marine datasets.

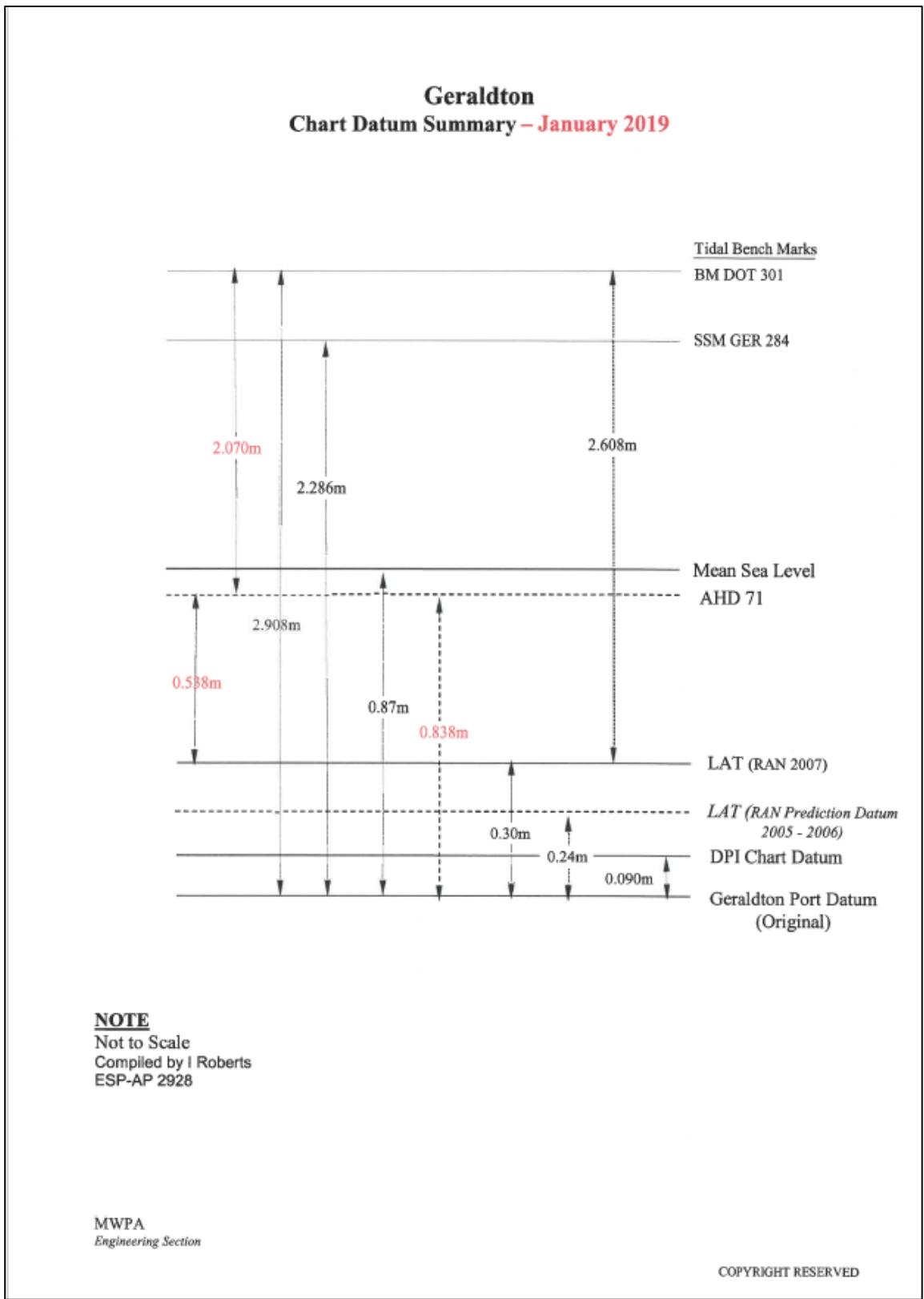
Vertical levels shall be relative to Geraldton Port Chart Datum (**CD**) where R.L 0.00 equates to LAT R.L 0.00, which in turn is defined as the below for both LAT and AHD.

Geraldton, Lowest Astronomical Tide 2007 (also named HG 7)  
 2.608 m below benchmark DoT 301  
 0.55 m below AHD 1971 and

0.538 m below AHD. DOT 301 lies 2.070m above AHD. This change has been in place for all Biannual Hydrographic Surveys since December 2017



Port Datum vs AHD – as reflected on the latest REVELARE HYROSPATIAL surveys – relationships of the different benchmarks.



From time to time, the berth and infrastructure erected on or behind the berth may need to be referenced both Mid West Port CD and AHD vertical datums.

#### **4.1.3 General**

The Contractor should ensure that all survey controls that are installed remain visible and undisturbed and is responsible for establishing and maintaining coordinate reference points and level control on site. MWPA or its representative should be notified in the event of any disturbance of survey controls.

Any scope of works will need to include the purpose of the survey, and the Surveyor will determine the appropriate equipment and methods required to attain the desired outcome.

All equipment used by the Surveyor should have a current certificate of calibration available for presentation upon request.

Where specific data sets are required, the Surveyor shall be able to issue metadata statements for that data set to the MWPA so that integration into the MWPA database can be undertaken with confidence as to the level of underlying accuracy.

For 'As Constructed' data sets the metadata statement is imperative, as it is required to describe how the locations were derived, particularly buried services.

Data sets shall be provided in a format that is compatible with MWPA drafting and Spatial Data Technical Guidelines.

## **4.2 HEALTH AND SAFETY**

For general safety requirements and documentation to be submitted prior to commencement of any work, refer to the **Worker and Port User Handbook on MWPA website**.

### **4.2.1 Safety Risk Review**

A Safety Risk review, considering all stages of the works, should be undertaken for all projects. The types of situations or hazards which may occur on projects should be managed according to MWPA safety guidelines in the **Worker and Port User Handbook**.

### **4.2.2 Safety During Surveying**

Survey works require management of numerous safety risks. Consideration should be given to the following to eliminate or mitigate hazards.

- Assess site safety to accommodate survey activities, such as traffic management.
- Assess requirements to ensure events do not pose a risk to survey personnel carrying out survey activities.
- Assess weather conditions to ensure these conditions do not pose a risk to survey personnel carrying out survey activities.

For more details please refer to the *Worker and Port User Handbook and MWPA Work Health and Safety, Environmental and Quality Policies and Procedures and Induction for Working in the Port* requirements available on MWPA webpage.

### **4.2.3 Personal Protective Equipment**

MWPA minimum mandatory Personal Protective Equipment (**PPE**) for work performed within the Port is detailed in **MWPA100, Section 6.5.1**, and includes high visibility long sleeved shirts with reflective strips, long pants with reflective strips, safety footwear, safety glasses, gloves and helmets.

As detailed in **MWPA100, Section 6.6.2**, Personal Flotation Devices (**PFDs**) are to be worn when working near or above water.

For more details, please refer to the *Worker and Port User Handbook* and *MWPA Work Health and Safety, Environmental and Quality Policies and Procedures* and *Induction for Working in the Port* requirements available on MWPA webpage.

### **4.3 NAVIGATION REQUIREMENTS**

All parties should observe the regulations and requirements of MWPA and other government agencies which apply to navigation on water and obtain all necessary permits and licences, for more details refer to the *MWPA Permit to Work Procedure*.

Contractors must seek the approval of the Duty Pilot before entering the harbour, before moving any floating plant and equipment within the harbour and before exiting the harbour. Contractors must adhere to any instructions issued by the Duty Pilot, which may include exiting the harbour during ship movements. Contractors should allow for attending daily site operations meetings with MWPA personnel.

### **4.4 EQUIPMENT**

Contractors are responsible for ensuring that all equipment is suitable for the intended purpose. Contractors must familiarise themselves with the works required, access restrictions and environmental site conditions. Contractors are expected to visit the work site to assess the suitability of their proposed equipment.

Contractor's plant and equipment should be maintained in a good and serviceable condition and must comply with all WorkSafe and MWPA requirements throughout the works.

MWPA has the right to carry out inspections of all equipment prior during the works. The inspections may include, but need not be limited to, checking the calibration status of equipment. If an inspection reveals that equipment provided is not in a condition acceptable to MWPA the contractor shall, at no additional cost to MWPA, carry out the necessary repairs or replacements.

### **4.5 SERVICES AND UTILITIES**

Contractors shall locate and survey existing buried utilities to limit disturbance and reduce risk during the works. For further details refer to **MWPA100 Section 5.3**, and **MWPA502 - Guidelines for Buried Services**. Current Port Services Drawings may be accessed by the link below:

<https://www.midwestports.com.au/port-services-drawings.aspx>. Efforts to provide a more usable way of providing buried services is underway and will be shared through MWPA website once in place.

### **4.6 TIDES**

The hourly tidal forecasts can be accessed via the following link:

<https://www.midwestports.com.au/operations/seaview.aspx>

### **4.7 ENVIRONMENT**

The means of reducing environmental impacts and consequences should be considered for each survey.

### **4.8 WIND**

The Geraldton Port area is exposed to significant wind energy, which has the potential to disrupt survey works. For survey planning purposes, contractors should familiarise themselves with the local wind conditions, considering potential downtime and safety issues.

<https://www.windy.com/?-28.767,114.629,13>

## 4.9 WAVES

The wave climate at Geraldton Port is influenced by waves generated predominantly from the north to north-west sector.

<https://www.windy.com/-Waves-waves?waves,-28.767,114.629,13>

## 4.10 MINES ACT REQUIREMENTS

Information and guidance can be found at the following link:

[http://www.dmp.wa.gov.au/Documents/Safety/MSH\\_COP\\_MineSurvey.pdf](http://www.dmp.wa.gov.au/Documents/Safety/MSH_COP_MineSurvey.pdf)

# 5 Hydrographic Surveys

## 5.1 INTRODUCTION

This section provides high-level guidelines for conducting hydrographic surveys, outlining the key requirements to achieve and maintain the required standards of information. It does not include detailed processes or technical methods, which are the responsibility of the Hydrographic Surveyor and must be demonstrated within the Method Statement. The section defines the criteria for 'Special Order' surveys and highlights the importance of documenting procedures, covering requirements from survey planning through to data management and presentation.

MWPA ensures navigable waters in Geraldton Port are safe and fit for purpose through biannual hydrographic surveys conducted in line with national and internal standards. The resulting data supports operational decisions such as under keel clearance, depth declarations, asset condition monitoring, dredging needs, and project planning, and is shared with the Australian Hydrographic Office to maintain nautical charts. A scope of these surveys normally details specifications of the work of each of these guided by the Ports Australia document 'Principles for Gathering and Processing Hydrographic Information in Australian Ports' and MWPA's internal document 'Hydrographic Surveys Procedure'.

MWPA will adopt as a minimum, Class A surveys for all surveys of channels, swing basins, draft limited anchorage, and berths, where there will be a declaration of a navigable depth following dredging.

- All surveys conducted over 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 and application for navigational safety.
- Hydrographic surveys are to be conducted at a six-monthly interval at the Port of Geraldton. The frequency of surveys is to be reviewed periodically.
- Standards for Class A and Class B surveys are contained in the 'International Hydrographic Organisation.
- (IHO) Special Publication S – 44 (Standards for Hydrographic Surveys) and are available from the IHO website [https://iho.int/uploads/user/pubs/standards/s-44/S-44\\_Edition\\_6.0.0\\_EN.pdf](https://iho.int/uploads/user/pubs/standards/s-44/S-44_Edition_6.0.0_EN.pdf).
- In accordance with the Ports Australia document, 'Principles for Gathering and Processing Hydrographic Information In Australian Ports', MWPA requires all class A surveys to meet IHO S44 5E Special order as a minimum.

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.

- Total Vertical Uncertainty (TVU) of plus or minus 0.1m at 95% confidence.
- Total Horizontal Uncertainty (THU) of plus or minus 0.5m at 95% confidence.
- 0.5m Object detection (minimum of three hits in the along track direction).
- Main channel, Northern channel, Inner Harbour, Berth pockets, QN anchorage and Fishing Boat Harbour (entrance and adjacent areas) – 200% coverage over the survey area or at a minimum of 150 metres surrounding any disturbed area; and Final processed data shall be derived from the shallowest sounding in 1 metre BIN from a 0.25m statistically derived surface from the full density raw survey data.
- All Anchorages (except QN anchorage) – 100% coverage over the survey area or at a minimum of 150 metres surrounding any disturbed area; and Final processed data shall be derived from the shallowest sounding in 1 metre BIN from a 0.5m statistically derived surface from the full density raw survey data.
- Coverage shall be extended to a minimum of 100 metres outwards from the navigable waters' toe lines, where applicable and practicable.

Hydrographic surveying relies on information from several sensors and is a form of remote sensing. As such, the Surveyor must ensure that equipment is kept in calibration and demonstrate that it meets the accuracy requirements of the survey.

IHO Publication S-44 provides the minimum standards for hydrographic surveys. However, S-44 does not address data currency, nor contain guidelines on evaluating whether the survey results are actually 'fit for their intended purpose'. This depends upon numerous factors, including survey equipment and environmental conditions.

In addition, most ports that operate with a minimum DUKC have dredged channels that can suffer from siltation that may result in a reduced depth available for shipping. These guidelines are intended for use where shipping operates with DUKC. They are targeted at the provision of hydrographic data that is used as input in a port's DUKC formula.

The guidelines in this Section do not set out how or what technologies should be used to achieve the required standard; they set out the requirements for a survey, and particularly those which must be addressed in the 'Method Statement'. The Method Statement plays a critical part in ensuring that the selected class of survey can be achieved. It addresses the factors that must be considered when planning, carrying out, appraising and presenting the survey, as well as the detailed technical aspects of the tasks undertaken during the survey that are to be included in the Method Statement.

These guidelines do not attempt to provide a step-by-step manual on how to carry out a particular survey. However, the following can be referenced for further information.

## **5.2 REQUIRED QUALIFICATIONS**

The Hydrographic Surveyor responsible for the hydrographic information shall be a Hydrographic Surveyor Level 1, as determined by the AHSCP and the SSSI, and should be able to demonstrate a proven ability to undertake the works.

It is the responsibility of this person to ensure the quality of any information or data supplied by third parties that is used in compiling the resulting information.

## **5.3 HORIZONTAL AND VERTICAL DATUMS**

The survey shall be undertaken to GDA2020 and GCG2020 datum in the horizontal plane and Port Chart Datum in the vertical plane and be connected to the Port's 'standard port' benchmark. The relationship to the ellipsoid height should also be ascertained for the standard port benchmark and any other tidal stations used for the reduction of soundings. Refer to section 4.1.1 and 4.1.2 on survey datums.

## 5.4 METHOD STATEMENT

The Hydrographic Surveyor will produce a Method Statement for each survey carried out within the Port. The Method Statement is to clearly set out the personnel, equipment, calibration methods and frequency, processes used in reduction and the method of classification of results. It is mandatory that the Method Statement is developed, documented and clearly demonstrates that the requirements to 'Achieve Special Order' have been adhered to for each survey.

Where calibration or testing of equipment is carried out other than during the survey, the Method Statement shall refer to these calibrations. Calibrations of this nature shall be fully documented and archived.

The Method Statement shall, as a minimum, address the following points.

- Horizontal positioning
- Vertical datum
- Depth measurement
- Echo sounder frequency(s)
- Seabed coverage
- System checks, calibrations and frequency of these checks
- Data processing methodology
- Sounding reduction and data presentation
- Data quality and retention

Examples can be found at the following links:

[http://www.msq.qld.gov.au/-/media/MSQInternet/MSQFiles/Home/boatingmaps/Hydrographic-survey-standards/Wrd\\_method\\_statement.doc?la=en](http://www.msq.qld.gov.au/-/media/MSQInternet/MSQFiles/Home/boatingmaps/Hydrographic-survey-standards/Wrd_method_statement.doc?la=en)

<http://www.rms.nsw.gov.au/maritime/property-planning/development/documents-forms.html>

(download Guidelines for hydrographic and geotechnical data document and see **Attachment 2**).

## 5.5 CLASS OF HYDROGRAPHIC SURVEYS

There are four classes of hydrographic survey.

1. Special Order
2. Order 1a
3. Order 1b
4. Order 2

The MWPA utilises Special Order as a minimum, to meet or exceed the requirements for use in critical Under Keel Clearance requirements.

## **5.5.1 Special Order**

### **5.5.1.1 Application**

Special Order surveys are required for, but not limited to:

- investigations of an existing / proposed new channel, anchorage, berth, swing basin, and the like, the outcome of which will be the declaration of a navigable depth;
- increasing the declared depth in a channel following maintenance or development dredging; and
- investigating a grounding or reported shoaling in an area.

### **5.5.1.2 Requirements**

For survey information to satisfy this class the following shall be met.

- The method or methods used to undertake the hydrographic survey within the waterway shall ensure that the minimum depth in the navigable waterway has been determined.
- The resultant reduced depths shall have a total vertical uncertainty equal to or better than the survey uncertainty component included in the Port's DUKC formula.

In all other respects, the data emanating from a survey is to meet or exceed the requirements for Special Order surveys in accordance with IHO Publication S-44, with the vertical uncertainty to be  $\pm 0.1\text{m}$ .

## **5.5.2 Other Classes**

MWPA may request other classes of survey outside of critical DUKC waterways.

### **5.5.3 MWPA Additional Requirements**

Additional to the requirements set out for Class A surveys, MWPA requires the following specifications to be met.

- Total Vertical Uncertainty (**TVU**) is not to exceed 0.1m at 95% confidence.
- Total Horizontal Uncertainty (**THU**) is not to exceed one metre at 95% confidence.
- Proof the system in use can detect a 0.5m x 0.5m object at the depth of survey with at least three pings in the along-track direction.
- 200% seabed coverage in navigation channels after dredging.
- 100% coverage for annual monitoring surveys and outside navigation channels.
- Final digital data is to be a one metre shallowest BIN from a statistically derived 0.25m surface.

## **5.6 SURVEY REPORT**

All surveys are to be accompanied by a detailed survey report on how the survey was conducted, along with proof that the specifications have been met. The report shall cover, but not be limited to, the following.

- Sequence of events
- Mobilisation and installation of survey equipment
- Pre-survey checks and calibration results
- Acquisition methodology
- Online quality control processes

- Ongoing quality control check results
- Data processing methodology
- Processed data quality control
- Detailed uncertainty assessment and supporting results
- Data deliverables (Spatial data in ESRI GIS compatible format)
- Level 1 Surveyor approval statement

## **5.7 SURVEY PLAN**

The minimum metadata to be included on the Survey Plan is:

- Class of Survey;
- Horizontal Datum and its definition;
- Total Horizontal Uncertainty;
- Vertical datum(s) and their definition;
- Total Vertical Uncertainty;
- Dates of Survey;
- Name of Surveyor responsible for survey and their signature;
- Scale of Plan;
- Survey system utilised (Echo-sounder, Heave Compensator / Motion Reference Unit, Horizontal Positioning System, Data Collection/Processing System, Tidal Information);
- Gazetted depths;
- Reference to the report of survey; and
- Data files used to create the plan.

## **5.8 DELIVERABLES**

Survey results are to be delivered in the following formats:

### **5.8.1 Digital Data** *(Refer to Section 10 – Spatial Data Guidelines)*

- Report in PDF
- Charts in PDF
- One metre shallowest BIN in ASCII format or ESRI grid format
- Raw data in ASCII format and ESRI grid format
- BAG files (Bathymetric Attributed Grid)
- Digital spatial data files in requested format, being GDA2020, GCG2020
- Processed GIS 3D and surface data models and grids in ESRI GIS compatible format

### 5.8.2 Hard Copy Data

- Survey Report
- Plans
- Cross sections, if required

## 6 Cadastral Surveying

Cadastral surveying is the branch of surveying that specialises in the establishment and re-establishment of land parcel boundaries. It is an important component of the legal creation of properties. A Cadastral Surveyor must apply both the spatial-measurement principles of general surveying and legal principles in respect of neighbouring titles, and in relation to:

- land parcel boundary definitions;
- lease boundaries;
- easement alignments;
- metadata requirements for Crown Law, Legal financial instrument documentation; and
- land boundary surveys to legally define the dimensions of new and existing land parcels, reserves, easements, leases and strata titles, legal definition of land, its ownership and any rights and restrictions pertaining to said land.

All Survey works to be guided by the [Landgate Survey and Plan policy and procedure guides](#).

A Licensed Surveyor registered with the Land Surveyors Licensing Board in WA is suitably qualified to deal with these matters.

Where fieldwork is involved relating to a boundary of the interested lands, the Licensed Surveyor must also hold a current Practising Certificate in WA to enable lodgement of appropriate documentation.

### 6.1.1 Required Qualifications

The Licensed Surveyor practices individually under the *Licensed Surveyors Act 1909 (WA)* and the *Licensed Surveyors (General Surveying Practice) Regulations 1961 (WA)* attached to that Act.

A Licensed Surveyor may be a member of the Surveying and Spatial Sciences Institute (**SSSI**).

## 7 Engineering Surveying

Engineering surveying typically involves topographic; layout and as-built surveys associated with engineering design. They often need geodetic computations beyond normal civil engineering practice, working with elements of geometry, trigonometry, regression analysis, physics, engineering, metrology and programming languages. They use equipment like total stations, robotic total stations, GPS receivers, retroreflectors, 3D scanners, radios, handheld tablets, digital levels, drones, GIS and surveying software in the following areas.

- **As Constructed Survey** – A survey that documents the location of recently constructed elements (both visible and buried / submerged) of an installed infrastructure. As Constructed surveys are done for record, completion evaluation and payment purposes. An 'As Constructed survey' is also known as a 'Works as Executed survey'.

- **Control Surveying** – Control surveys establish reference points to use as starting positions for future surveys.
- **Construction Surveying** – The planning and execution of most forms of construction require this.
- **Deformation Survey** – A survey to determine if a structure or object is changing shape or moving.
- **Levelling** – Either finds the elevation of a given point or establishes a point at a given elevation.
- **Measured Survey** – A building survey to produce plans of the building. Such a survey may be conducted prior to, and/or at end of the construction process. A 3D Scanner might be used for this purpose.
- **Photographic Control Survey** – A survey that creates reference marks visible from the air prior to aerial surveys being undertaken to allow aerial photographs to be rectified.
- **Setout** – An element of many other surveys where the calculated or proposed position of an object is marked out for both land and sea-based infrastructure. This can be temporary or permanent. This is an important component of engineering and cadastral surveying.
- **Topographic Pick-up Survey of Roads, Pavements and Other Features** – A survey that measures the elevation and location of points on a particular piece of land, such as breakwaters and other infrastructure footprints, sometimes extending into the water, and presents them as contours or outlines on a map to display both natural and artificial features.
- **Dimensional Surveys of Infrastructure** – Single or multi-dimensional.
- The **Total Station** and **RTK GPS** are the most common instruments used, with advances in three-dimensional (3D) scanning, LiDAR, UAV and satellite and remote imagery allowing for more common use of same in the topographical and photogrammetric fields.

## 7.1 REQUIRED QUALIFICATIONS

A Surveyor engaged for engineering surveys must be eligible for full membership with the Surveying and Spatial Sciences Institute (**SSSI**), preferably with current ESP-AP (Engineering Survey Professional – Asia Pacific Region) certification. An experienced Licensed Surveyor can also undertake these works.

## 7.2 MINES ACT REQUIREMENTS

Information and guidance can be found at the following link:

[http://www.dmp.wa.gov.au/Documents/Safety/MSH\\_COP\\_MineSurvey.pdf](http://www.dmp.wa.gov.au/Documents/Safety/MSH_COP_MineSurvey.pdf)

# 8 Aerial Surveys

Depending on size, timing and access of terrain coverage requirements, a large-scale aerial or UAV survey may be chosen as the more appropriate.

## 8.1 DIGITAL AERIAL PHOTOGRAPHY SPECIFICATIONS

### 8.1.1 Oblique

Photographs taken from the air at an angle are called oblique photographs. If they are taken from a low angle, they are called low oblique and if taken from a high angle they are called high oblique.

### 8.1.2 Vertical

Vertical aerial photographs are taken perpendicular to the geoid. They are mainly used in photogrammetry and image interpretation. Pictures that will be used in photogrammetry are traditionally taken with special, large format cameras. Multiple geometric transformations are applied to the image, depending on the perspective and terrain corrections required.

### 8.1.3 Orthophotos

Vertical aerial photographs are often used to create orthophotos. Once these images have been geometrically 'corrected' with known real-world coordinates, they can be widely deployed to be usable as a map orthomosaic.

### 8.1.4 Large Scale Aerial Coverage

**Table 3 – Large Scale Data Acquisition Specifications**

Term	Definition
Aerial Triangulation	Imagery to be triangulated using suitable ground control points and photogrammetric techniques to achieve required accuracy.
Bit Depth	Minimum 12 bit
Capture Conditions	Photography should be captured where the sun angle is between 35 to 60 degrees. Atmospheric condition should be clear, with no haze, smoke, cloud, cloud shadow or other obscuring air column interference.
Deliverables	<ol style="list-style-type: none"> <li>1. Overall Ortho mosaic in ECW, GEOTIFF and JPEG</li> <li>2. Ortho mosaic tiles in ECW, GEOTIFF and JPEG</li> <li>3. Tile layout in ESRI Shape and DXF</li> <li>4. Metadata report</li> </ol>
Digital Camera Description	Large format digital metric aerial survey camera or sensor. Camera shall be tested and stable with a geometrically calibrated system with appropriate documentation, suitable for the use of precision photogrammetric ortho-imagery and elevation generation applications.
Horizontal Accuracy (1 sigma)	±0.2m
Image GSD	12.5cm
Image Orientation	Imagery shall have an average 60% (±5%) forward overlap and 25% (±5%) sidelap.
Map Projection	GDA2020 -MGAz50 and GCG2020 or GCG GDA94-MGAz50 (old surveys)
Ortho Mosaic	A high degree of seamlessness to be achieved. Minimum amount of seamline is required to achieve high level of integrity in the port infrastructures.
Ortho Rectification	Imagery to be ortho rectified using appropriate ground elevation model.
Spectral Range	RGBI (Red, Green, Blue, Intensity)

**8.1.5 Small Scale Coverage – Unmanned Aerial Vehicle (UAV)**
**Table 4 – UAV Data Acquisition Specifications**

Term	Definition
Capture Conditions	Photography should be captured where sun angle is between 35 to 60 degrees. Atmospheric condition below 500 feet should be clear, no haze, smoke, cloud, cloud shadow or other obscuring air column interference. Operator to have appropriate CASA certification and documentation.
Deliverables	Overall Ortho mosaic in a suitable format, such as ECW, GEOTIFF and JPEG. Ortho mosaic tiles in suitable format, such as ECW, GEOTIFF and JPEG. Tile layout in ESRI Shape and DXF. Metadata report. To deliver DTM/DSM/DEM as required with appropriate grid density.
Digital Aerial Photography Specifications	Unmanned Aerial Vehicle ( <b>UAV</b> )
Digital Camera Description	Large format digital metric aerial survey camera or sensor. UAV platform camera shall be tested, stable, proven survey grade system with appropriate documentation and certification, suitable for the use of precision photogrammetric ortho-imagery and elevation generation applications.
Geo Referencing	Imagery to be triangulated using suitable ground control points of sufficient density to provide sufficient control to achieve requirements and photogrammetric techniques to achieve required accuracy and resolution.
Horizontal Accuracy	±5cm or better.
Image GSD	Typically, four centimetres (4cm).
Image Orientation	Imagery should typically have a 75% (±5%) forward overlap and 75% (±5%) sidelap.
Map Projection	Horizontal GDA2020-(MGA Zone50) and/or GCG GDA2020-(MGA Zone50) preferred or GDA94-(MGA Zone50) and/or GCG GDA94-(MGA Zone50) and/or GCG as requested, with electronic files to be supplied in both formats. Vertical AHD or Port Chart Datum as requested.
Ortho Mosaic	A high degree of seamlessness to be achieved. Minimum amount of seamline is required to achieve high level of integrity in the Port infrastructure using appropriate processing software.
Ortho Rectification	Imagery to be ortho rectified using appropriate processing software to produce the ground elevation model.
Vertical Accuracy	±10cm or better.

## 9 Field Works Guidelines

### 9.1 PORT OPERATIONS

MWPA conducts operations, including shipping and shiploading, on a 24-hour basis. In most cases Port Operations, shipping movements and activities, will take priority over a contractor’s work activities. Port operations should therefore be considered in all stages of works.

Depending on location, work may be scheduled during MWPA nominated maintenance shutdown periods to avoid hampering operations.

For more details on Port Operations refer to **MWPA100, Section 9**.

### 9.2 AS CONSTRUCTED SURVEYS

Contractors are responsible for the completion of post-construction surveys to demonstrate that the required construction tolerances have been achieved in accordance with MWPA and contractual requirements. Surveying processes to verify conformance shall be conducted by personnel with a minimum qualification for acceptance to the Surveying and Spatial Sciences Institute (**SSSI**).

### 9.3 DOCUMENTS TO BE SUBMITTED

Contractors shall undertake ‘As Constructed’ surveys and deliver same in appropriate hard and soft copy format (for detail refer **MWPA200**) for all works undertaken on behalf of MWPA or on MWPA owned or operated land or infrastructure to illustrate that the design has been achieved within the tolerances specified in the Contract. This may include the results of diving inspections to verify the standard of the as-built structures below water.

## 10 GIS and Spatial Data Technical Guidelines

### GLOSSARY OF TERMS

Term	Definition
AGOL	ArcGIS Online is an ESRI complete cloud-based GIS mapping software that connects people, locations and data using interactive maps.
Apps	Spatial capability web application program that is stored on a remote server and delivered over the Internet through a web browser interface.
ArcGIS Portal	Portal for ArcGIS is a map-centric content management system that an organisation can host within its own infrastructure. Portal can be deployed on Windows or Linux operating systems and installed on an organisation’s physical machines or in the cloud.
A-SPEC	A-SPEC is the acronym for the program involved in developing specifications for the delivery of newly constructed assets as Digital Data in a GIS ready format to Asset Owners and Managers in Local Governments, Utilities and Water Authorities.
Attribute Data	Geographic description of the features in form of tabular which might be textual, numeric or any other GIS supported formats.
Coordinate Reference System	Coordinate reference system ( <b>CRS</b> ) that defines the map projection for the spatial data to be displayed in real world coordinates ( <b>RWC</b> ).
Data Custodian	A custodian is an agency, section, department or role that performs any number of agreed upon responsibilities for a data set as per an agreement with the Steward.

Term	Definition
Data Owner	A data owner has the authority to make decisions about business term definitions, data quality, accessibility and retention requirements as they tie to the business needs.
Data Steward	A steward is an agency, section or department accountable for a data set published and used on behalf of MWPA; accountability may be through legislation, regulations or policy.
Datum	A spheroidal mathematical model that measures locations relative to centre of the earth.
ESRI	Environmental Systems Research Institute ( <b>ESRI</b> ) is an international market leader of geographic information system (GIS) software, web GIS and geodatabase management application.
ESRI GIS	A leading (GIS) software, web GIS and geodatabase management applications and tools that MWPA core GIS capability is built on.
GDA2020	The latest Geocentric Datum of Australia 2020, Australia's static datum or Geospatial Reference System aimed at improving positional alignment to GPS systems like GNSS.
GIS	Geographic Information Systems – Computerised Spatial Capability System
i3s	ESRI Indexed 3d Scene Layer (I3S)
LiDAR	Light Detection and Ranging, remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth.
LOD	The level of detail (LOD) is a concept in 3D modelling - indicating how thoroughly 3D data should be surveyed and how much detail should be modelled.
Master Data Management ( <b>MDM</b> )	A discipline that ensures the uniformity, accuracy, stewardship, consistency and accountability of the enterprise's official shared data assets that provides a common point of reference. For geospatial data, the scope includes all relevant data and information assets which include data sets, web services (including map services and geoprocessing services) through web applications.
MoU	Memorandum of Understanding
OGC	Open Geospatial Consortium ( <b>OGC</b> ) a worldwide community committed to advancing geospatial location information and services and standards, driven to make it FAIR – Findable, Accessible, Interoperable and Reusable.
Point Cloud	A point cloud is a huge collection (thousands-billions) of points in space each with XYZ values – they are generally produced by 3D scanners or by photogrammetry software.
RoV	Remotely Operated Vehicle Remotely operated underwater vehicle.
RPA	Remotely Piloted Aircraft – Drone
SLPK	ESRI Scene Layer Package (SLPK)

## 10.1 DEVELOPMENT OF THE SPATIAL DATA GUIDELINE

This Guideline was developed to clarify the Standards for Geographic Information Systems (**GIS**) Spatial data submissions, initially released by MWPA in August 2020. The GIS Guideline is developed to emphasise the technical aspects of geospatial data specifications acceptable to MWPA. The draft GIS Guideline will be reviewed periodically for any material changes and will be published after ratification by the MWPA GIS Transformation Advisory Group.

The intended audience for this document is MWPA consultants / contractors and MWPA Project Managers and workers that are responsible for preparing spatial data sets and maps incorporated by reference (or referred to in) Port Development Projects and any Port Operations work or instruments and other plans.

## 10.2 APPLICATION OF THE GUIDELINE

This Guideline applies to any geospatial data and associated GIS outputs:

- **submitted** to MWPA by contractors / consultants or third parties exchanging data with MWPA. Any submissions associated with features listed in Appendix A2 are required to follow this Guideline. If assistance is required for submitting coordinates, maps, and GIS data, contact MWPA Workers before submission or the MWPA GIS Administrator, by email at [gis.admin@midwestports.com.au](mailto:gis.admin@midwestports.com.au). MWPA may request geospatial data at any stages during the project. For example, any change of geospatial data in an application should be resubmitted after MWPA approval to accurately reflect the most current activities.
- **supplied by** MWPA to a contractor to support any work or project(s) on behalf of MWPA or its representatives. For spatial data supplied by MWPA to contractors a data license agreement stipulating terms of use and copyright should accompany the data.

### 10.2.1 Copyright Clause

When contractors or consultants are engaged to create spatial data and maps, the requirement for the spatial data sets to be submitted to MWPA should be reflected in the contractual arrangements. The contractual arrangements with consultants should contain an acknowledgement from the consultant that the work to be undertaken, is undertaken for the purposes of creating valuable intellectual property in the form of information and data and MWPA is the owner of any new copyright subsisting in the work created by the consultant or contractor.

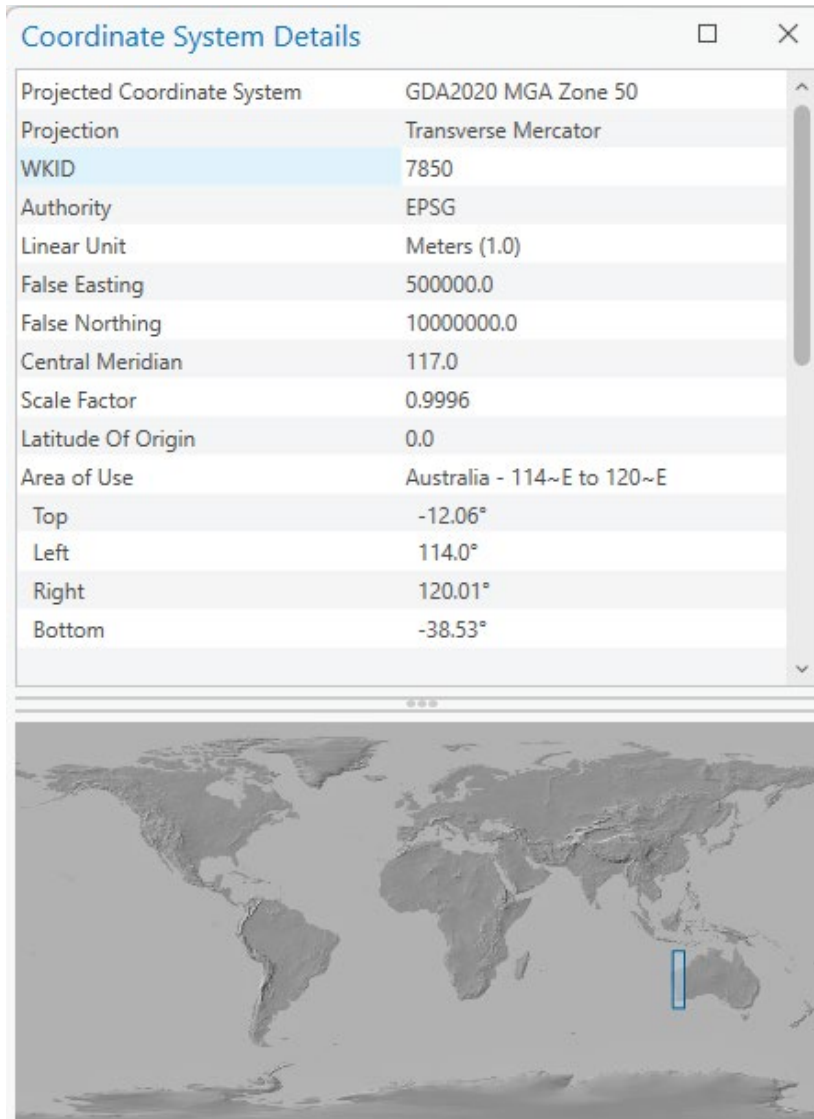
## 10.3 COORDINATES SYSTEMS

MWPA standard coordinate system for any geospatial data submitted is expected to be **GDA2020 MGA Zone 50**, which has the parameters defined below:

### 10.3.1 Universal Transverse Mercator Coordinates

#### GDA2020 MGA Zone50 and GCG 2020

Name	Description	CRS - EPSGID	Units
GDA2020 / MGA Zone 50	Geocentric Datum of Australia 2020 Zone 50	7850	Metres
GDA94 / MGA Zone 50	Geocentric Datum of Australia 1994 Zone 50	28350	Metres
GCG2020	Geraldton Coastal Grid of Australia 2020	Local Project Grid	Metres



Since several organisations are in the process of transitioning to the new coordinates reference system standard of Australia (**GDA2020 MGA Zone 50**), data submitted in GDA 94 MGA Zone 50, will be accepted in some exceptional cases.

If data is submitted in any other Real-World Coordinates, apart from the stipulated MWPA coordinate system standard, please submit information to indicate the CRS used and the projection files.

### 10.3.1 Geraldton Coastal Grid – Local Project Grid

All survey work at MWPA Geraldton Port needs to be conducted using the **GCG 2020** (previous survey work was conducted at GCG94). This makes the project grids ideal for engineering applications, facilitating the use of plane coordinate calculations for design and construction set out.

Geraldton	GDA2020 (GCG2020)	GDA94 (GCG94)	AGD84 (GCG)
Central Meridian	114°35'00"	114°35'00"	114°40'00"
Central Scale Factor	1.00000628	1.00000628	1.000016
False Easting	50 000.0	50 000.0	50 000.0
False Northing	3 450 000.0	3 350 000.0	3 350 000.0
Extent NW Corner	S28°29'00"	S28°29'00"	S28°30'00"
	E114°31'00"	E114°31'00"	E114°31'00"
Extent SE Corner	S29°06'00"	S29°06'00"	S29°06'00"
	E115°00'00"	E115°00'00"	E114°54'30"
Height Limit	195m	195m	200m

### 10.3.2 Geographic coordinates – (Latitude and Longitude)

Any geographic coordinates submitted should be in the format of degree, minutes, seconds or decimal degrees as shown in the Table below; and the CRS or Datum used specified, such as GDA2020 or GDA 94.


Name	Description	CRS - EPSGID	Units
GDA2020	Geocentric Datum of Australia 2020	7844	Degrees
GDA94	Geocentric Datum of Australia 1994	4283	Degrees

Format	degree, minutes, seconds a (DMS)	Decimal Degrees
Longitude, Latitude	Degree, minutes, seconds a (DMS)	Decimal Degrees
Example	114°35'45.173" E, 28°46'52.022" S	114.5958625° E 28.778880° S
Unit Symbols D	DDD°MM'SS.SS" E, DDD°MM'SS.SS" S	
Direction (East, South)	E, S	

1. The seconds in DMS must be to a precision of at least two decimal places.
2. The decimal degrees must be to a precision of at least four decimal places.
3. Coordinates should be consistently in either DMS or decimal degrees, other coordinate systems are not accepted.
4. If using DMS, indicate the degree (°), minutes ('), seconds (") by specifying their unit symbol.

## GDA2020 CRS Datum Parameters

Geographic Coordinate System	GDA2020
WKID	7844
Authority	EPSG
Angular Unit	Degree (0.0174532925199433)
Prime Meridian	Greenwich (0.0)
Datum	GDA2020
Spheroid	GRS 1980
Semimajor Axis	6378137.0
Semiminor Axis	6356752.314140356
Inverse Flattening	298.257222101
Area of Use	Australia - GDA
Top	-8.47°
Left	93.41°
Right	173.34°
Bottom	-60.55°



## 10.4 MAP SUBMISSION

Submissions should include overview and detailed maps. See **Appendix D1** for example.

### 10.4.1 Map Scale

The overview map **Appendix D1** should be scaled at 1:250,000 or less (for example 1:500,000) to show the location of the project area.

Detailed maps (**Appendix D2**) should be scaled at 1:50,000 or more (for example 1:5,000) to show local geographic features, structures, and operations of the project. Multiple detailed maps may be required if the project extends across a large geographic area.

### 10.4.2 Geographical Features

In addition to base map features (including topography, place names and administrative boundaries), maps submitted should also include all project features of interest (such as proposed facilities, including temporary structures).

### 10.4.3 Map Elements

All acquired survey information is required to be presented in map outputs in .pdf format (**OCR**) of area under review, including clear presentation of all geometries and labels of features and measurements captured in the field, a clear indication of data quality level (if variable across survey), authorising signature of licensed surveyor and all relevant metadata as outlined below.

The maps should include elements such as a map title, north arrow, map scale (scale text and/or scale bar), latitude / longitude graticules labels, data source, and disclaimers. See **Appendix D1** for example.

The following elements should be included on the key in the basic map template:

- Descriptive title;
- Legend;
- Scale;
- Projection;
- North arrow;
- Locality map; and
- Title and Signature Block – with author, company, publication dates.

### 10.4.4 Map Projections

All maps and GIS data must be in one of the following projections:

- All spatial data must be geo-referenced, preferably projected to the new GDA2020 MGA50 or GDA94 MGA50 or other established coordinate system.
- If a local or plant grid is used, all projection parameters must be provided; or
  - The new Geraldton Coastal Grid 2020 (**GCG2020**) is the current adopted local grid standard or previously used Geraldton Coastal Grid 94 (**GCG94**) are the accepted coordinate systems standards for all MWPA Port Survey pick up work.

## 10.5 GIS DATA

GIS data must be submitted with associated applications (if not MWPA ESRI standard format) and final plans. As outlined in Section 10.4.2, all project features (such as structures and services, transportation, hydrographic, monitoring observations, other coastal and land surveys) must be included in the dataset as individual files (see **Appendix A2** links for examples). Base map features such as topography or administrative boundaries are not required to be submitted as GIS data, Copyright, unless specified.

Any submitted GIS datasets are regarded as open for MWPA discretion for onward publishing onto MWPA public portals. For GIS data under database release agreement (such as sensitive datasets), proponent should follow the conditions of the agreement when sharing data (for example, acquire written consent to share data). For non-transferable GIS data, please provide the source of the database such as citation and contact information.

### 10.5.1 Spatial Data Formats

GIS data must be submitted in a format compatible with a specified version of ESRI ArcGIS Desktop where possible. MWPA will accept the following formats:

#### Vector Data

- **ArcGIS File Geodatabase (.gdb) or GeoPackage (.gpkg)** feature classes – A file Geodatabase is stored within the compressed zip file (and must be extracted from the zip file to be made accessible), the feature class is stored within the Geodatabase.
- **Shapefiles**, although an older format, must be extracted from the zip file after download to ensure all required files are included.
  - Shapefiles with main file (.shp), index file (.shx), and dBase table (.dbf) (see Section 5.5) are required. Submission of other files such as Coordinate system file (.prj) are encouraged.
- **GeoJSON or KML / KMZ** for web map or APIs.
- **ESRI GIS Symbology** files to be included where necessary – indicating GIS application version and symbology file types.

Submit different features as individual shapefiles.

- Please note that all spatial datasets constructed, all adjoining polygons must be coincident, and all vertices used in the construction of the planning polygons must be aligned to the adjoining polygons. This will ensure that there are no gaps or overlaps in the polygon spatial data submitted.
- All vertices used in the construction of vector spatial data must align with the vertices of the underlying reference spatial data. In most cases this will be the cadastre or port infrastructure features (including coastline and roads). The planning spatial data will assume or adopt the spatial accuracy of the underlying reference spatial data.
- Spatial data that has complex geometry, intersects with itself or has an excessive number of vertices can cause errors during display, selection and intersection and must be avoided where possible.
- **AutoCAD drawings (.dwg)** is not the preferred GIS spatial data format, but if there is no option the dwg must be submitted in real world coordinates and coordinate reference system (CRS) specified and key attributes captured for layers of the dwg file.

#### Raster Data

- Images: satellite imagery, aerial photography, digital elevation models (**DEM**).
- Tagged Image File Format (**TIFF**) GeoTIFF (.tif, .tiff and .tff); and ECW
- Ortho-corrected and georeferenced
- ESRI Grid compatible data, for example Bathymetric Attributed Grid file (**BAG**) for bathymetry data.
- Contact MWPA Workers for other file formats; and use .zip file to consolidate multiple files for a single submission.

### 3D Models Data

The submission of 3D GIS data models (**LODs**) need to be in 3D format that are compatible with MWPA ESRI GIS software and the 3D models, for example, ESRI Indexed 3d Scene Layer (**I3S**) and Scene Layer Package (**SLPK**) also need to be georeferenced ingest in 3D GIS software in real world coordinates preferably in Web Mercator (**WGS84**). The following 3D formats and any other ESRI GIS-supported formats are the MWPA-acceptable formats unless a 3D viewer or application is provided with the data. The accuracy and level of detail need to be specified.

- Indexed 3D Scene Layer (**I3S**)
- Collada File (**DAE**)
- 3D Studio file (**3DS**)
- Open Flight File (**FLT**)
- Wavefront Object File (**OBJ**)
- Virtual Reality Modelling Language (**WRL**)
- AutoCAD (**.dwg, .dxf**) and Revit (**.rvt**) files for engineering and construction BIM models

### Point Cloud Data

MWPA uses ESRI software such as Drone2Map, Site Scan software to consume, process and publish 3D meshes and 3D Models as web scene layer packages (SLPK) onto ArcGIS Portal or AGOL from point cloud data such as drones / aerial photogrammetry or LiDAR data(.LAZ).

A point cloud is just a huge collection (thousands-billions) of points with a XYZ values (.LAZ) – they're unrelated despite looking like they're related. The enormous scale causes issues – bigger project areas lead to more complexity of data points and classification.

*The ways that Points Clouds are acquired are:*

- generated by laser scanning (Terrestrial, Mobile, Aerial);
- via photogrammetric techniques (such as UAVs); and
- by using SONAR (such as Hydrographic Surveys).

*Why do we use Point Clouds?*

- They appear to be very detailed and intuitive – they look almost like photographs (and it is possible to measure between the points), which makes people think they are loaded with useful information.
- They can also be captured rapidly and at a relatively low cost (particularly using LiDAR) and will need to be submitted in LAS / LAZ, XYZ or XYZRGB format.

### Raw Data

Where raw sensor data is required to be submitted to MWPA, all the relevant sensor and data acquisition data and metadata should be provided.

The data can be presented as – LAS / LAZ, XYZ or XYZRGB for things like point cloud data or as ASC format, for example with flood modelling data.

#### 10.5.2 Projections

Any Spatial data format submitted should have real world coordinates specified accompanied by the respective projection files. (See Section 10.4.4)

### 10.5.3 GIS Multimedia Location Data

*Georeferenced or geotagged photos and videos* from UAVs or SONAR and mobile devices need to be submitted in a format that is named logically so that the spatial representation can easily be built from the submitted data for visualisation in MWPA Enterprise GIS.

### 10.5.4 The Generation of Geotagged Photos

If geotagged photos are generated as part of the delivery of spatial data for a project, ensure that all photos are geo-tagged (by ensuring that location services are enabled on the mobile devices before capture). Deliver the photos in logically named zipped folders and provide a photo library guide or read me instructions to accompany the data.

### 10.5.5 Metadata

Metadata must be provided for all digital data detailing at a minimum: author; date, accuracy; horizontal and vertical datum; contact details; source of information and any restrictions on use.

An attached metadata file must be provided with all data, details may be held in title block for CAD files, if appropriate.

The submitted datasets must include basic metadata in the format and standard of Extensible Markup Language (**XML**). Proponent can use one of the Federal Geographic Data Committee (**FGDC**) approved metadata standards to fill out the ESRI metadata stylesheet. The documentation must include, at a minimum, the following (See *Stormwater Pipes* example in section 10.5.6).

- Originator name
- Project / data set description
- Scale of data set compilation (such as 1:20,000)
- Datum and projection of data set compilation
- Citation information, for example, originator
- Date of creation and any updates
- Data source (such as GPS or air photo) with resolution
- Data quality and accuracy
- Agency and person responsible for the data set and contact information
- Restrictions and limitations
- List of attributes, description of the attributes and acronyms

### 10.5.6 Attribute Data

The dBase table (.dbf) is commonly created along with a shapefile unless a feature class is created in the case of data supplied in a file geodatabase format. The dBase table should consist of attribute fields used to describe each entity in each dataset. Acronyms in the attribute table should be identified in the metadata (.xml). The attributes can vary depending on the type of project.

The level of detail in the attribute table should reflect the description in the GIS application. In addition to the default fields such as Object ID and Shape (point, polyline, polygon), the attribute table should include fields, if applicable, such as:

<b>Name / Site ID</b>	example: well site ID
<b>Type of operation</b>	examples: camp, access road
<b>Status</b>	examples: active, suspended, inactive
<b>Date / season</b>	example: sampling date
<b>Area / length / width / depth</b>	example: airstrip dimension
<b>Capacity / volume</b>	example: campsite capacity
<b>Note (for other description)</b>	

Mandatory fields for different features need to be completed in accordance with any referenced discipline industry standard such as ACDC – As Constructed Design Certification.

**A-SPEC** is the acronym for the program involved in developing specifications for the delivery of newly constructed assets as Digital Data in a GIS-ready format to Asset Owners and Managers in Local Governments, Utilities and Water Authorities. Where no other standard is specified A-Spec standard is applied for Port assets.

#### Example: Feature Type – Stormwater Pipes

Field Name	Data Type
Asset ID	vaChar
Asset Type	vaChar
Asset_Sub_Type	vaChar
Diameter	Numeric
Width	Numeric
Depth_to_invert	Numeric
Depth	Numeric
Invert_Level	Numeric
Lid_Level	Numeric
Install_Date	Date
Survey_Date	Date
SurveyJobNo.	vaChar
Survey_Date	Date
Surveyor	vaChar
Condition	Integer
Notes	vaChar
CRS	vaChar

Field Name	Data Type
Coordinate _Source	vaChar
Positional Accuracy	vaChar

See **Appendix D** for example.

## 10.6 GIS DATA SUBMISSION RECEIPT AND ARCHIVING

The submission and handover of any data generated for MWPA is governed by the *State Records Act 2000 (WA)* and as such it is the responsibility of MWPA Workers to ensure that the delivery of any data is compliant with the Act in regard to:

- a) creating, maintaining, indexing, organising, storing, preserving, securing, retaining and managing records; and
- b) maintaining, preserving, securing and retaining how any information on a record can be recovered.

### 10.6.1 How do I submit spatial information?

Spatial information can be submitted in the following ways:

- a) Digital spatial data (shapefiles, GeoDatabase or GeoPackage, and the like) and digital maps as zipped email attachments to be sent to the respective project appointed MWPA Workers email. (if size is not >10Mb)
- b) Using a secure ftp site such as Objective Connect, or *Microsoft OneDrive* shared folder link provisioned by MWPA or a secure ftp site provided by the contractor / consultant when data is ready to be shipped.

### 10.6.2 Registering Spatial Data for Archiving and Publishing – MWPA Enterprise GIS?

#### (MWPA Workers ONLY)

Internal MWPA spatial data flow procedure for registering and loading any created spatial data will guide MWPA Workers.

## 10.7 MWPA GIS DATA REQUEST BY CONSULTANTS / CONTRACTORS / THIRD PARTIES

Contractors and third parties might require a copy of MWPA GIS data to be extracted and submitted consultants or contractors or nominated third parties as per contractual obligations or conditions set out in some terms of agreement for a project. The transfer and submission of such data (**Appendix C**) should be accompanied by the following.

- a) Completion of a Digital Data Request form – **Appendix E**
  - To provide Agency / Company contact information and digital data requirements in the Digital Data Request form.
  - The digital data requirements include a description of the area of interest using one or more of the following three options.
    1. Provide a bounding polygon dataset (MGA Zone 50) in one of these data formats: ESRI Shapefile; or File geodatabase feature class.
    2. Zip the files and attach to an email along with the completed form.
    3. Use a named location, for example: Named Locality or Place (such as West End Suburb locality or Tugboat Harbour).

- Describe the coordinates of a bounding polygon containing the area of interest. Note the top left and bottom right coordinate location in the following format: Easting / Northing, (metres) MGA2020 Zone 50;
- b) The requesting Agency / Company / Consultant must provide information pertaining to their intended use of the data, for example design plan, as constructed plan.
- c) Signed MWPA GIS Data use license agreement with clear terms of use. Appendix F
- d) MWPA GIS Data dispatch release form – Appendix G, which should summarise the data being dispatched and authorisation to release data by a MWPA representative.

**Note:** MWPA will in future use its public facing web mapping portal to deliver certain spatial data layers externally, and this platform will evolve to provide a gateway for classified information to be granted to certain contractors and consultants as authorised by MWPA.

## 10.8 MWPA GIS DATA SUBMISSION FLOW PROCESS

The flow of spatial data created by consultants / contractors is shown on the simplified process map in Appendix B.

## 11 Associated Documents

Document Title
<a href="#">12 - Hydrographic Surveys Procedure</a>
<a href="#">Drafting and AutoCAD Standards Guideline</a>
<a href="#">Information Statement - Freedom of Information Act 1992</a>
<a href="#">Permit to Work and Authority to Work Procedure</a>
<a href="#">Port Development Guidelines</a>
<a href="#">Project Management Framework</a>
<a href="#">Records Management Procedure</a>
<a href="#">Spatial Data Checklist Form</a>
<a href="#">Spatial Data Dispatch Form</a>
<a href="#">Spatial Data Licensing Agreement Form</a>
<a href="#">Spatial Data Request Form</a>
Work Health and Safety, Environmental and Quality Policies and Procedures
<a href="#">Worker and Port User Handbook</a>

**Location** - Mid West Ports Intranet – [Document Centre](#)

## 12 References

Standards
IHO Publication S-44 (Standards for Hydrographic Surveys) – 5th Edition, Feb. 2008
IHO Publication C-13 (Manual on Hydrography): <a href="https://www.iho.int/iho_pubs/CB/C-13/english/C-13_Chapter_1_and_contents.pdf">https://www.iho.int/iho_pubs/CB/C-13/english/C-13_Chapter_1_and_contents.pdf</a>
‘Standards for Hydrographic Surveys within Queensland Waters’:
‘Standards for Hydrographic Surveys (HYSPEC) v3’: <a href="http://www.linz.govt.nz/docs/hydro/stds-and-specs/hyspec-v3-24-apr2001.pdf">http://www.linz.govt.nz/docs/hydro/stds-and-specs/hyspec-v3-24-apr2001.pdf</a>
External ICSM – Guideline Control Surveys – Differential Levelling ICSM
ICSM – Standard Australian Survey Control
Landgate – Surveying Standards and Guidelines
AS 5488: SAI Global – Standards
NULCA guides

Authority	Online Reference
SAI Global	<a href="https://www.saiglobal.com/online/">https://www.saiglobal.com/online/</a>
OGC Standards	<a href="https://www.ogc.org/docs/is">https://www.ogc.org/docs/is</a>
Landgate Standards	<i>Standard for the Australian Survey Control Network V2.1</i>
A-SPEC	<a href="https://www.a-specstandards.com.au/why-a-spec">https://www.a-specstandards.com.au/why-a-spec</a>
Before you Dig – Best Practice	<a href="https://www.byda.com.au/before-you-dig/best-practice-guides/">https://www.byda.com.au/before-you-dig/best-practice-guides/</a>
Portal for ArcGIS	<a href="https://enterprise.arcgis.com/en/portal/latest/use/what-is-portal-for-arcgis-.htm">https://enterprise.arcgis.com/en/portal/latest/use/what-is-portal-for-arcgis-.htm</a>
Australian Hydrographic Office Nautica Charts	Chart Details for AUS81
MWPA	Induction for Working in the Port
MWPA	Declaring Depths Work Instruction

Legislation
Freedom of Information Act 1982
Licensed Surveyors Act 1909 (WA)
Environmental Protection Act 1986 (WA)
Environmental Protection Regulations 1987 (WA)
Occupational Safety and Health Act 1984 (WA) / Work Health and Safety Act 2020 (WA)
Occupational Safety and Health Regulations 1996 (WA) / Work Health and Safety Regulations 2022 (WA)
W.A. Marine (Certificates of Competency and Safety Manning) Regulations 1983
Mines Safety and Inspection Act 1994 (WA)

**Legislation**

Mines Safety and Inspection Regulations 1995 (WA)  
 Dangerous Goods Safety Act 2004 (WA)  
 Port Authorities Act 1999 (WA)  
 Maritime Transport and Offshore Facilities Security Act 2003 (Cth) (**MTOFSA**)

Western Australian - <https://www.legislation.wa.gov.au/> | Commonwealth - <https://www.legislation.gov.au/>

## 13 Glossary

### 13.1 COMMON DRAWING AND SURVEY TERMINOLOGY

**Table 5 – Glossary of Terms**

Term	Definition
Accuracy	The level of closeness of an estimated value of a quantity – measured or computed – to its true or accepted value.
Bathymetry	Underwater topography of seabed.
BIN	Grid box containing recorded data
AHD71	The Australian Height Datum 1971 is the NGRS normal-orthometric height datum for mainland Australia.
AUSGeoid	The national quasi-geoid model for converting between GDA94 or GDA2020 ellipsoidal heights and AHD heights. The current version of AUSGeoid is AUSGeoid2020.
Benchmark ( <b>BM</b> )	A survey control point of known vertical height, it may also have horizontal coordinates. Refer to: <a href="http://www.landgate.wa.gov.au/business-and-government/specialist-services/geodetic">http://www.landgate.wa.gov.au/business-and-government/specialist-services/geodetic</a>
Control Survey, Datum	A survey which defines, extends or improves the NGRS. These surveys are included in NGRS adjustments to allow for the most rigorous estimation and testing of position and uncertainty.
Control Survey, General Purpose	A survey which connects to the NGRS for the purpose of estimating the position and uncertainty of new survey control marks relative to the NGRS. Such surveys are not included in NGRS adjustments.
Data Quality and Retention	The method(s) used to determine the quality and length of data retention duration.
Datum	Any permanent line, plane or surface used as a reference datum to which elevations are referred.
Depth Measurement	The method or methods used to determine depths – particularly the least depths in the navigable waterway – shall be clearly stated.
Echo Sounder	Equipment used to measure depth of water.
GDA94	Geocentric Datum of Australia 1994. Realised by the derived coordinates of the Australian Fiducial Network (AFN) geodetic stations, reference to the GRS80 ellipsoid and determined with respect to ITRF92 at epoch 1994.0.

Term	Definition
GDA2020	GDA2020 is based on a realisation of the ITRF2014 at epoch 2020.0, or 1 January 2020. This means the coordinates in Australia are projected forward to the date of 1 January 2020. This provides a more robust and accurate datum which is more closely aligned to global positioning systems like GNSS and will ensure that Australian industry, the research community and the public can accurately align themselves and their data.
Geoid	The equipotential surface of the Earth's gravity field which best fits global mean sea level.
GRS80	Geodetic Reference System 1980 reference ellipsoid, where $a = 6378137\text{m}$ , $f = 1/298.257222101$
Highest Astronomical Tide (HAT)	The highest level of water which can be predicted to occur under any combination of astronomical conditions. This level may not be reached every year.
Lowest Astronomical Tide (LAT)	The lowest level of water which can be predicted to occur under any combination of astronomical conditions. This level may not be reached every year.
Mean Sea Level (MSL)	The average height of the sea for all stages of the tide over a 19-year period, usually determined from hourly height readings.
Measurement	A measurement is an observed value, the outcome of a repeated set of observations, or the result of processing such observations.
MGA94	Map Grid of Australia 1994. Universal Transverse Mercator projection of the Geocentric Datum of Australia 1994.
MGA2020	Map Grid of Australia 2020. Universal Transverse Mercator projection of the Geocentric Datum of Australia 2020.
National Geospatial Reference System (NGRS)	Authoritative, reliable, high accuracy spatial referencing system for Australia. It includes the GDA94, AHD71.
Precision	A term used to quantify the variability of a measurement or computed value. If several measurements are taken repeatedly to represent the same quantity, precision is used to refer to the degree of closeness or conformity of those measurements to each other.
Port of Geraldton Chart Datum	The vertical datum for Hydrographic survey work is to be the Port of Geraldton Chart Datum. It is defined as: Geraldton Lowest Astronomical Tide 2007 2.608m below benchmark DoT 301 0.55m below AHD 1971
Quasi-geoid	A reference surface based on the Earth's gravitational potential. The geoid and quasi-geoid are approximately the same surface over the oceans but diverge over land due to the influence of topography.
Seabed Coverage	The expected coverage of the seabed floor.
Sounding Reduction and Data Presentation	The methods used to reduce raw data to sounding datum.

Term	Definition
Survey Control Mark	A monument that provides a physical realisation of one or more datums.
Standard Survey Marks ( <b>SSM</b> )	A survey control point of known vertical and horizontal coordinates. Refer to: <a href="http://www.landgate.wa.gov.au/business-and-government/specialist-services/geodetic">http://www.landgate.wa.gov.au/business-and-government/specialist-services/geodetic</a>
Tide Gauge	A device for measuring the change in sea level relative to a datum. Refer to: <a href="http://www.midwestports.com.au/Seaview.aspx?WebPageId=53">http://www.midwestports.com.au/Seaview.aspx?WebPageId=53</a>
Vertical Datum	The value normally referenced to benchmarks. The Vertical datum that has been used at the Geraldton Port is: Geraldton Lowest Astronomical Tide 2007 2.608 m below benchmark DoT 301 0.55 m below AHD 1971

### 13.2 ABBREVIATIONS

For the purposes of this Guideline the following abbreviations apply:

**Table 6 – Abbreviations**

Abbreviation	Meaning
AHD	Australian height datum – Commonly used in reference to Australian Height Datum 1971 (AHD71)
AHSCP	Australasian Hydrographic Surveyors Certification Panel
AS	Australian Standard
AS/NZS	Australian/New Zealand Standards
BM	Benchmark
CASA	Civil Aviation Safety Authority
CD	Chart datum
DUKC	Dynamic under keel clearance
GCG94	Geraldton Coastal Grid 94
GDA94	Geocentric Datum of Australia 1994
GNSS	A Global Navigation Satellite System(s) – a generic term for satellite-based positioning systems
HAT	Highest astronomical tide
IHO	International Hydrographic Organisation
LANDGATE	Landgate's Geodetic Team – provide a range of services to the surveying and spatial industries
LAT	Lowest Astronomical Tide
LSLB	Land Surveyors Licensing Board of WA
MGA	Map Grid of Australia
MSL	Mean sea level
MWPA	Mid West Ports Authority
NGRS	National Geospatial Reference System

Abbreviation	Meaning
PFD	Personal flotation device
PPE	Personal protective equipment
RL	Reduced level
SSSI	Surveying and Spatial Sciences Institute
SSM	Standard survey marks
THU	Total Horizontal Uncertainty
TVU	Total Vertical Uncertainty
UTM	Universal Transverse Mercator projection
A-Spec	A-SPEC is a common specification for the supply of digital data relating to 'As Constructed' infrastructure assets (not used by MWPA but by most local government councils)
HSEQ	Health And Safety, Environmental and Quality

## 14 Monitoring, Evaluation and Review

This document is required to be reviewed every two years from the last scheduled review date.

Minor updates made within this two-year period, will not be taken as a *full review*.

The Document Custodian is responsible for conducting the review in accordance with **Controlled Documents Review and Approval Process Work Instruction**.

## 15 Administration

Document Custodian: GIS Administrator  
 Document Approver: Information, Communications and Technology Manager  
 Approval Date: 26 May 2026  
 Document Review Period: 2 yrs

## Appendix A1

### GIS Standard Checklist MWPA workers, contractors and third parties.


EXAMPLE ONLY



### SPATIAL DATA CHECKLIST FORM

This Form is associated with the Spatial Data and Surveying Technical Guidelines.

The purpose of this Form is to assist MWPA staff, contractors, and third parties address key aspects of spatial data submissions.

Section 1. Details of Person / Entity Submitting Data		
Company Name	Landgate	ABN/ACN 51 824 753 656
Contact Person	John Smith	Position Chief Surveyor
Contact Email	Peter.brown@landgate.wa.com.au	Phone 9888708
Postal Address	Postal Address	
Applicant's Signature		Sign (Paste) Date: 2 November 2021
Section 2. Purpose for Submission of Data		
Data submitted for the Lidar survey over Oakajee area as per Project LAN05-11-2021 outline plan		
MWPA Project Reference	MWPA0005	
Data Title	Lidar Survey data - November 2021	
Section 3. Compliance Checklist		
Data Transmittal Summary Form Completed	<input checked="" type="checkbox"/> Map elements include: title, north arrow, graticule labels, scale, publication dates, CRS, legend, map author/publisher <input checked="" type="checkbox"/> Maximum and minimum coordinates (project area extents) <input checked="" type="checkbox"/> Base map data source (topographical or operational)	<input checked="" type="checkbox"/> Spatial data list submitted, and formats specified <input checked="" type="checkbox"/> Map symbology layer or legend submitted <input checked="" type="checkbox"/> Location source accuracies and spatial limitations specified <input checked="" type="checkbox"/> Coordinate Reference Systems specified
GIS / Spatial Data Submitted	<input checked="" type="checkbox"/> Data formats compatible with ESRI GIS software or AutoCAD (shapefile or file geodatabases [gdb]; GeoTiff, 3D models I3S) <input checked="" type="checkbox"/> Coordinates Reference System specified, or projection files supplied. GDA2020 / GDA94 or GDA2020 UTM Zone 50 (indicate zone number)	<input checked="" type="checkbox"/> Different features illustrated as individual files fully attributed and specifying a feature type field and all files combined in a single .zip file <input checked="" type="checkbox"/> Key attribute and metadata elements captured
Data Transmittal or Uploading of Files	<input checked="" type="checkbox"/> For big datasets a secure ftp site or link for data submitted provided to MWPA with login credentials and cc <a href="mailto:gis.admin@midwestports.com.au">gis.admin@midwestports.com.au</a> <input checked="" type="checkbox"/> Data to be removed from temporary transmittal folders once copied	<input type="checkbox"/> For small datasets email .zip file to recipient and cc <a href="mailto:gis.admin@midwestports.com.au">gis.admin@midwestports.com.au</a> <input checked="" type="checkbox"/> Key attribute and metadata elements captured
<b>Data Completeness</b>		
<input type="checkbox"/> Complete <input checked="" type="checkbox"/> Partial <input checked="" type="checkbox"/> Preliminary (final version to follow)		

## Appendix A2

### Existing Data – Lists of Common Spatial Data Outputs Submitted

#### A2.1 Hydrographic Survey and Bathymetry Data

Item	Title	Format
1	Fishing Boat Harbour Geraldton, Hydrographic Survey July 2019	Sketch
	<a href="https://www.midwestports.com.au/profiles/midwestports/assets/clientdata/documents/general/hydrographic_survey_july_2019.pdf">https://www.midwestports.com.au/profiles/midwestports/assets/clientdata/documents/general/hydrographic_survey_july_2019.pdf</a>	<a href="#">Link</a>
2	WA939 – Geraldton (WA Department of Transport)	Sketch
	<a href="http://www.transport.wa.gov.au/imarine/nautical-charts.asp">http://www.transport.wa.gov.au/imarine/nautical-charts.asp</a>	<a href="#">Link</a>

#### A2.2 General – Survey Control Points

Item	Title	Format
1	Benchmark and SSM Survey Control Points	Sketch
	<a href="https://www2.landqate.wa.gov.au/bmvf/app/waatlas/">https://www2.landqate.wa.gov.au/bmvf/app/waatlas/</a>	<a href="#">Link</a>

#### A2.3 Asset Infrastructure and Services Survey Pick Up Data

1. Examples: Road network; Stormwater network, Utilities network for Electricity; Gas
2. Infrastructure assets pickup for assets including Buildings and Bollards
3. LIDAR ASSET Survey data

#### A2.4 Aerial Imagery Survey Data

1. RPA – Drone aerials (Orthophoto mosaics, 3D and Point Cloud, digital surface models)
2. Fixed wing aerial - (Orthophoto mosaics, 3D and Point Cloud, digital surface models)
3. Contours and Elevation Points

#### A2.5 Conceptual Design and As Constructed Models

1. 2D and 3D Design models
2. Engineering Structure Models

#### A2.6 Environmental Monitoring Survey Data

1. Shoreline/ Coastline Monitoring Survey Data
2. Dust Monitoring
3. Ground Water Monitoring
4. Environmental Water/Soil Sampling

[https://www.midwestports.com.au/profiles/midwestports/assets/clientdata/documents/general/hydrographic\\_survey\\_july\\_2019.pdf](https://www.midwestports.com.au/profiles/midwestports/assets/clientdata/documents/general/hydrographic_survey_july_2019.pdf)

**A2.7 Project Specific Spatial and Survey Data**

- Benthic Habitat Mapping
- Dredging hydrographic surveys
- Coastal Monitoring Surveys

**A2.8 Nautical and Navigational Charts**

WA939 – Geraldton (WA Department of Transport)

<http://www.transport.wa.gov.au/imagery/nautical-charts.asp>

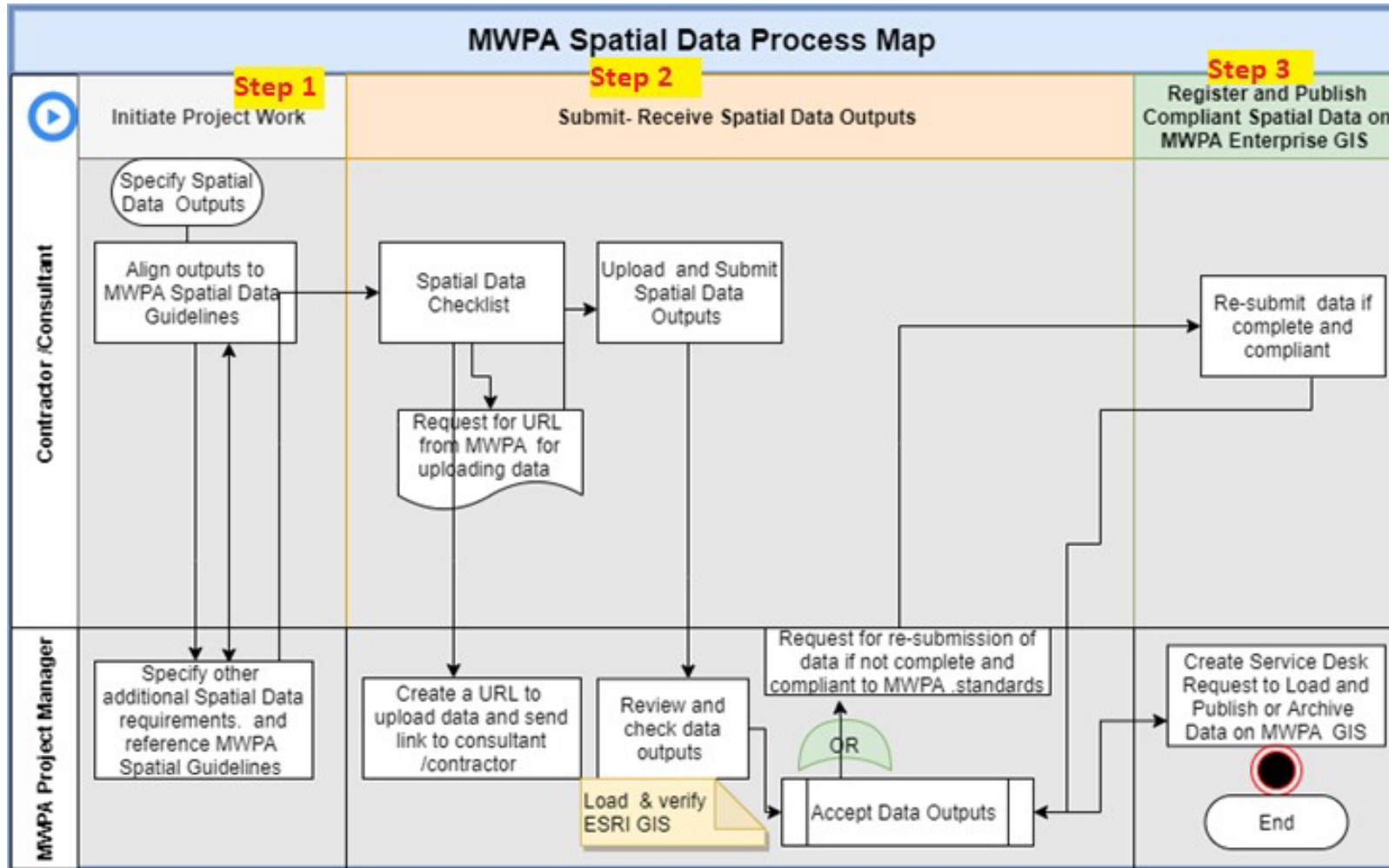
AUS81 – Geraldton (WA Department of Transport)

**A2.9 Other Departments or Third Parties Acquired Data**

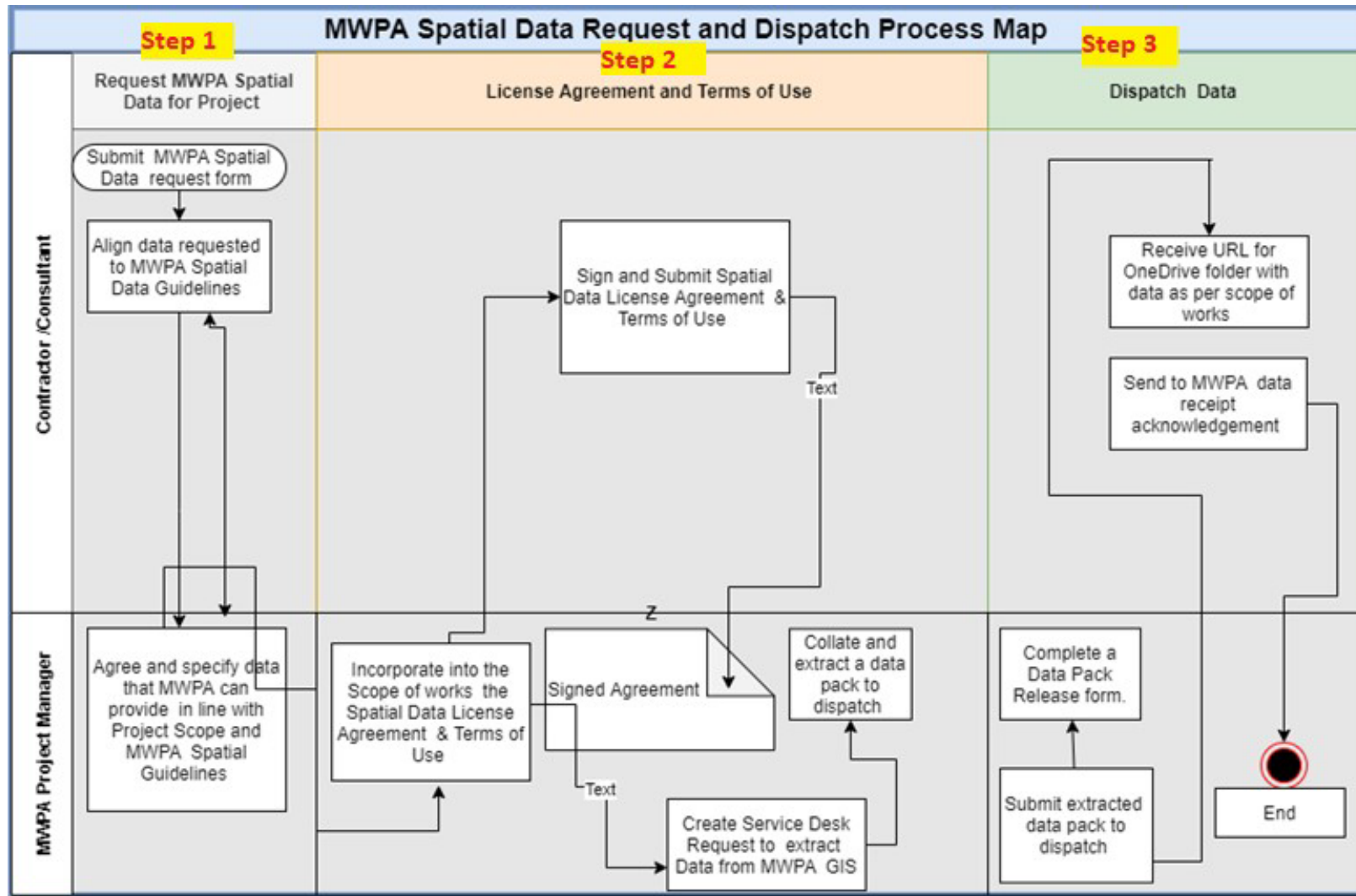
1. Landgate Generated Data
2. Department of Transport (DoT) Data
3. Other Third Parties Generated Data

## Appendix B – Spatial Data Process Map

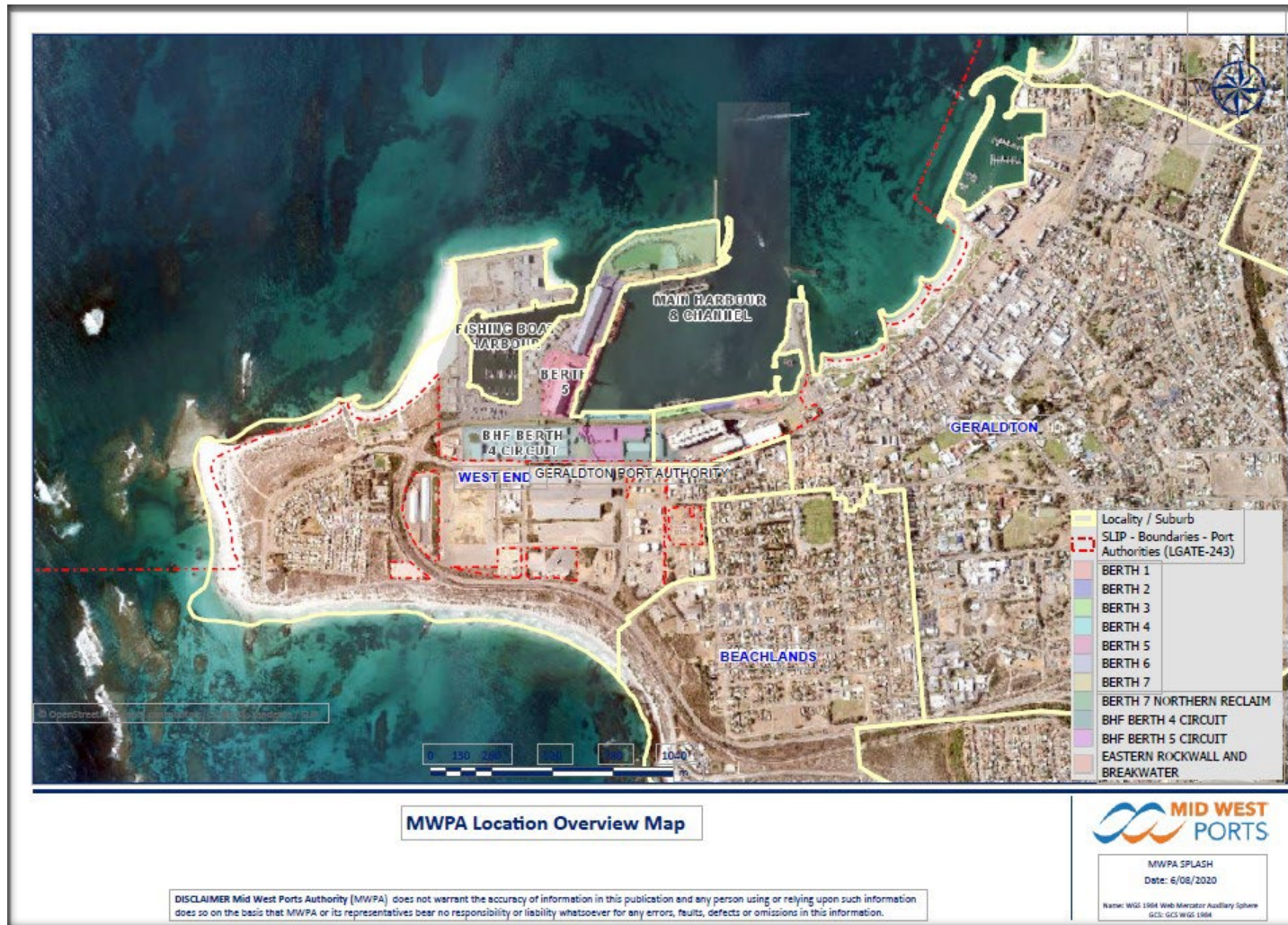
### Data Submission Process Map



## Appendix C – Spatial Data Request and Dispatch Process Map



## Appendix D1 – Location Map Overview Map



## Appendix D2 – Detailed Feature Map



## Appendix E

GIS Data Request Form – **EXAMPLE ONLY**



### SPATIAL DATA REQUEST FORM

This Form is associated with the Spatial Data and Surveying Technical Guidelines.  
The purpose of this Form is to capture key information to support effective and quick response to spatial data extraction process.

SECTION 1. DATA REQUEST HEADER INFORMATION							
MWPA Contact Person	John Smith	Date Requested	29 November 2021				
Requested by	John Biden	Requester Contact Phone	045577719				
Name of Organisation	Delta Technologies	Requester Contact Email	vprince@delta.com.au				
MWPA Project Title	Ferry Jetty Project 2021	MWPA Project Number	Project Number				
Data Transmission upload link <small>(provide secure link to upload the data)</small>	https://www.delta.technologies.com.au/ftp.site						
Spatial Data Request Summary							
Multi Beam Lidar and Bathymetry data model for rockwalls to cover areas around TBH Eastern Rockwall for Ferry Jetty Project.							
SECTION 2. SPATIAL DATA DETAILS							
Item No.	Spatial Data Layer Name	Spatial Data Details – Description	Version	Publication Extract Date	Original Source of GIS Data	Format	Spatial Extent
1	AU032021_MWPAGeraldton_MBES_DWG	Multi Beam Lidar and Bathymetry 3D Data model for rockwalls for the TBH Eastern Rockwall.	#	1/11/21	MWPA20-091: Rock Walls Survey(EGS)	DWG	Geraldton Port Rockwalls
2	Layer name	Description	#	date	Source	Format	Ext
3	Layer name	Description	#	date	Source	Format	Ext
4	Layer name	Description	#	date	Source	Format	Ext
5	Layer name	Description	#	date	Source	Format	Ext
6	Layer name	Description	#	date	Source	Format	Ext
7	Layer name	Description	#	date	Source	Format	Ext
8	Layer name	Description	#	date	Source	Format	Ext
9	Layer name	Description	#	date	Source	Format	Ext
10	Layer name	Description	#	date	Source	Format	Ext
11	Layer name	Description	#	date	Source	Format	Ext
12	Layer name	Description	#	date	Source	Format	Ext
13	Layer name	Description	#	date	Source	Format	Ext
14	Layer name	Description	#	date	Source	Format	Ext
15	Layer name	Description	#	date	Source	Format	Ext
SECTION 3. MWPA GIS/DRAWING CONTROLLER USE ONLY							
Document Transmittal No.	GIS-28-10-21-MBES	Date Data Dispatched	29 November 2021				
Spatial Data Dispatched by	Vitalis Chifamba						
SECTION 4. RECIPIENT ACKNOWLEDGEMENT							
Received and accepted by	Dave Johns	Signed					
Date Received	30 November 2021	Signed					
<b>NOTE:</b> MWPA Spatial Data dispatched for the sole purpose of enabling the requesting party or representative to develop, test, and support MWPA as per terms of contract for project or work.							
Please acknowledge receipt and acceptance of data, and email signed form to: <a href="mailto:gis.admin@midwestports.com.au">gis.admin@midwestports.com.au</a>							

## Appendix F

### MWPA GIS Data Use Licensing Agreement – EXAMPLE ONLY



## SPATIAL DATA LICENSING AGREEMENT For the use of digital information acquired from Mid West Ports Authority

This Agreement is made on 25 November 2021 between the Mid West Ports Authority, (ABN 73 384 989 178), of 298 Marine Terrace, Geraldton, Western Australia, 6530 ("MWPA" or "the Licensor"); and

("the Licensee") John Smith representing Xmouth Consulting Pty Limited

Regarding the supplied Information, the details of which are set out below:

("the Information") Multi beam 3D data Model for the Eastern Breakwater (Model presented in DWG format) data clipped to the extents of the Eastern Breakwater 15m buffer.


The parties agree as follows:

1. The Licensor grants to the Licensee a licence to use the Information supplied exclusively for the following purpose:

Design and Construction works for the Ferry Jetty as per the terms of Project MWPA-JR -0017

2. The Information (and all intellectual property rights in the Information including but not limited to copyright, patents, trademarks, and other protections in relation thereto) shall at all times remain the property of the Licensor. The Licensee acknowledges and agrees that the Information (including the intellectual property rights therein) is owned exclusively by MWPA and the Licensee has no other licence or right to use the Information except as set out in this Agreement. The Licensee will co-operate with MWPA in performing whatever actions MWPA may require in obtaining, sustaining, and confirming MWPA exclusive ownership of the Information and the intellectual property rights therein.
3. The Licensee agrees to keep the Information confidential at all times. The Information shall not be used for any other work undertaken by the Licensee, or assigned, sub-licensed, disclosed, copied, or dispatched to any other person for any purpose without the prior written consent of MWPA.
4. Subject to obtaining MWPA's written consent as set out in clause 3, all products and documentation produced by the Licensee shall bear a logo and text acknowledging the Licensor as the source and owner of the Information and the Licensee will provide proof of this to the Licensor on demand.
5. The Licensor and its respective servants, agents, and officers shall not be held liable for any action, proceeding, claim, suit or demand arising from or otherwise relating to the use of the Information by the Licensee or in relation to the interpretation or accuracy of the Information.
6. The Licensee will indemnify and keep indemnified the Licensor and its respective servants, agents, and officers from and against all actions, proceedings, claims, suits or demands whatsoever which may at any time be brought, maintained or made against the Licensor and/or any of its respective servants, agents or officers arising from the use of the Information by the Licensee or otherwise relating to the interpretation or accuracy of the Information.
7. The Licensee acknowledges and understands that it is being provided with the Information at its own risk and that the Licensor has, in good faith, made every reasonable effort to ensure that the Information is accurate, complete, current and reliable. The Licensee further agrees and acknowledges that the Licensor makes no warranty or representation about the accuracy, completeness, currency or reliability of the Information. Before relying on the Information, the Licensee agrees to independently and carefully evaluate the accuracy, currency, completeness and reliability of the Information for its own purposes and agrees to obtain appropriate independent professional advice relevant to its particular circumstances and its use of the Information.
8. This Agreement is governed by the laws of Western Australia and the parties irrevocably and unconditionally submit to the exclusive jurisdiction of the courts of Western Australia and courts entitled to hear appeals therefrom.

Signed for and on behalf of the LICENSEE by:	
John Smith	Chan Lee
Officer Name	Witness Name
	
Officer Signature	Witness Signature
Date 2 November 2021	

Signed for and on behalf of the LICENSOR by:	
Julie King	Lily James
Officer Name	Witness Name
	
Officer Signature	Witness Signature
Date 2 November 2021	



## Appendix G

GIS Data Dispatch/Release Form – **EXAMPLE ONLY**



### SPATIAL DATA DISPATCH FORM

This Form is associated with the Spatial Data and Surveying Technical Guidelines. The purpose of this Form is to capture key information as a record of spatial data dispatched to external, or in exceptional cases, to internal parties.

Section 1. Data Dispatch Header Information							
MWPA Contact Person	John Smith	Date Requested	28 October 2021				
Data Dispatched to	John Biden	Recipient Contact Phone	045577719				
Name of Organisation	Delta Technologies	Recipient Contact Email	vprince@delta.com.au				
Data Dispatched to							
MWPA Project Title	Ferry Jetty Project 2021	MWPA Project Number	Project Number				
Data Transmission upload link (provide secure link to upload the data)	https://www.delta.technologies.com.au/ftp.site						
Spatial Data Request Summary							
Multi Beam Lidar and Bathymetry data model for rockwalls to cover areas around TBH Eastern Rockwall for Ferry Jetty Project.							
Section 2. Spatial Data Details							
Item No.	Spatial Data Layer Name	Spatial Data Details – Description	Version	Publication Extract Date	Original Source of GIS Data	Format	Spatial Extent
1	AU032021_MWPAgeraldton_MBES_DWG	Multi Beam Lidar and Bathymetry 3D Data model for rockwalls for the TBH Eastern Rockwall.	#	12/10/21	MWPA20-091: Rock Walls Survey(EGS)	DWG	Geraldton Port Rockwalls
2	Layer name	Description	#	date	Source	Format	Ext
3	Layer name	Description	#	date	Source	Format	Ext
4	Layer name	Description	#	date	Source	Format	Ext
5	Layer name	Description	#	date	Source	Format	Ext
6	Layer name	Description	#	date	Source	Format	Ext
7	Layer name	Description	#	date	Source	Format	Ext
8	Layer name	Description	#	date	Source	Format	Ext
9	Layer name	Description	#	date	Source	Format	Ext
10	Layer name	Description	#	date	Source	Format	Ext
11	Layer name	Description	#	date	Source	Format	Ext
12	Layer name	Description	#	date	Source	Format	Ext
13	Layer name	Description	#	date	Source	Format	Ext
14	Layer name	Description	#	date	Source	Format	Ext
15	Layer name	Description	#	date	Source	Format	Ext
Section 3. MWPA GIS / Drawing Controller Use Only							
Data Transmittal No.	GIS-28-10-21-MBES			Date Data Dispatched 28 October 2021			
Spatial Data Dispatched By	Vitalis Chifamba						
Section 4. Recipient Acknowledgement							
Received and Accepted By	Dave Johns			Signed			
Date Received	10 November 2021						
<p><b>Note</b> – MWPA Spatial Data dispatched for the sole purpose of enabling the requesting party or representative to develop, test, and support MWPA as per terms of contract for project or work.</p> <p>Please acknowledge receipt and acceptance of data, and email signed form to: <a href="mailto:gis.admin@midwestports.com.au">gis.admin@midwestports.com.au</a></p>							

## Appendix H

**Figure 1:** Benchmark and SSM Survey Control Point Locations, Landgate – 224 updated on [Cadastral Control \(Point\) \(LGATE-224\)](#) webpage.

