

Bathymetric Survey Checklist

Quick reference for beginner to intermediate data collectors | August 2026

Use this as a field-preparation tool—not a full survey specification. Adapt it to agency SOPs, safety requirements, equipment, software and accuracy needs. Complete project-specific control, water-level, CTD or depth checks whenever required by the approved method.

Before You Head Out

Step	Check	What to Verify	Where to Check / Record
1	Confirm the objective	Survey area, depth range, coverage, deliverables, accuracy, access and permits.	Project scope; reviewer confirmed.
2	Confirm project settings	Coordinate system, units, vertical reference, time reference, water-level method and file naming.	Project Manager / geodesy settings.
3	Review the line plan	Preliminary lines, cross/check lines, boundaries, safe routes and launch/recovery locations.	Line Editor / project line files.
4	Inspect and pack equipment	Platform, GNSS, depth/heading sensors, radios, cables, mounts, batteries, storage, spares and backup media.	Equipment list / hardware template.
5	Review field safety	Weather, water conditions, hazards, communications, PPE, staffing and stop-work criteria.	Safety plan / team briefing.

At the Site: Before Data Collection

Step	Check	What to Verify	Where to Check / Record
1	Open the correct project	Project, date, planned lines, storage location and active file-naming convention.	Project Manager / project folder.
2	Set up control (opening checks)	Set up RTK base and rover. Record antenna height and control details; check a known point when required.	GNSS controller.
3	Record starting water level	Record tide, stage or water-level reference, including measurement time and location, when corrections are used.	Water-level logger or field log.
4	Assemble and verify the platform	Secure sensors, antennas and cables. Confirm draft, offsets and alignment match the configuration; remeasure after mounting changes.	HARDWARE setup.
5	Connect all devices	Confirm required data streams, time synchronization, communications, battery level and recording space.	HARDWARE connections; SURVEY device status.
6	Complete required field checks	Measure sound speed/CTD and complete a bar or known-depth check when required by the equipment, site or method.	Sound-speed/depth display and field log.
7	Run a test line	Verify GNSS, depth, heading, coverage, communications and raw-data logging before production.	SURVEY map, data displays and logging status.

During Data Collection

Step	Check	What to Verify	Where to Check / Record
1	Follow the approved line plan	Run planned lines at a safe, consistent speed and direction appropriate for the platform and site.	SURVEY navigation map / planned lines.
2	Monitor quality continuously	Monitor GNSS quality, depth, heading, timestamps, communications, gaps, unusual readings and recording status.	SURVEY status and data-display windows.
3	Watch coverage and gaps	Confirm the intended area is covered; re-run missed or questionable sections while still on site.	SURVEY map / matrix or coverage display.
4	Record field events	Note obstructions, debris, turbulence, shallow areas, equipment changes, interruptions and repeated or abandoned lines.	Event/target notes or field log.
5	Repeat checks when needed	Repeat sound-speed, depth, water-level or control checks after equipment movement, changing conditions or unexplained data shifts. Stop and investigate questionable data.	Relevant display, hardware status and field log.

End of Day

Step	Check	What to Verify	Where to Check / Record
1	Complete closing checks	Record end-of-day water level and control/reference checks when required; note changes from the start.	GNSS controller, water-level record and field log.
2	Stop logging and verify files	End recordings cleanly. Confirm expected raw files exist, have reasonable sizes and use correct names.	SURVEY logging controls / raw-data folder.
3	Complete field notes	Record operators, equipment IDs, times, conditions, checks, issues, adjustments and lines needing review.	Field log / project notes.
4	Perform a quick QA review	Review track lines, coverage, gaps, dropouts, spikes and time/position/depth consistency. Identify rework before leaving when possible.	SURVEY playback / editor / project files.
5	Back up all records	Copy survey, echo sounder/ADCP, GNSS, CTD/sound-speed, water-level, notes and photos to a second location.	Project folder and backup location; verify two copies.
6	Secure equipment and site	Recover, power down, clean, dry and charge equipment. On the final day, retrieve temporary sensors and download their complete records.	Equipment log / sensor software.

HYPACK Quick Reference

Task	Typical HYPACK Area	What to Verify
Project settings	Project Manager / geodesy settings	Coordinate system, units, vertical reference and project folders
Hardware and offsets	PREPARATION > HARDWARE SETUP	Devices, connections, platform setup, sensor offsets and draft
Lines and boundaries	Line Editor / project line and border files	Primary lines, cross/check lines and navigation boundaries
Live data and logging	SURVEY map, status/data windows and logging controls	GNSS, depth, heading, communications and active raw-data file
Coverage and files	SURVEY map/matrix plus current raw-data folder	Missed areas, expected files, naming and timestamps

Menu names and displays may vary by HYPACK version, license and hardware configuration. Use an approved project template when available.

Pause and investigate before continuing if... GNSS quality degrades; depth or heading becomes missing or erratic; sensors move; communications or logging stops; timestamps do not align; conditions change materially; or a test/check line does not agree. A short pause is usually faster than rebuilding a day of unusable data.

Bathymetric Survey Project Scope

Project / Site		Survey Type	River / Dam / Estuary / Other
Client / Authority		Datum / Projection	GDA2020 / MGA2020 Zone ____ / AHD or project datum
Prepared by		Survey Standard	Client specification / IHO S-44 order / internal QA
Date / Revision		Status	Draft / Approved / Field Issue / Final

How to use this checklist

Work through the phases in sequence. The final column is intentionally blank for project-specific status, notes, evidence, document references, acceptance criteria or responsible person. Accuracy values should be defined by the client specification, survey classification and site-specific uncertainty budget rather than treated as universal fixed tolerances.

Workflow Overview

Plan	Design	Mobilize	Acquire & QA	Process & Deliver
Define scope, standard, deliverables, datums and approvals.	Prepare line plan, survey control, water-level strategy and method selection.	Confirm people, vessel, equipment, safety, permits and backups.	Collect bathymetry/topography data, monitor water levels, review survey coverage and back up data daily.	Apply corrections, validate QA, create surface elevations, report uncertainty and issue deliverables.

1. Project Definition & Scope

Establish what the survey needs to achieve before selecting methods, accuracy targets, equipment or deliverables.

Checklist Item	Requirement / Description	Project Notes / Status
Project purpose / use case	Confirm whether the survey is for storage capacity, sedimentation assessment, hydrodynamic modelling, dredging, construction, asset inspection, navigation, compliance, or baseline mapping.	
Survey environment	Classify the primary environment: river, dam/reservoir, estuary, coastal fringe, canal, quarry, intake/outlet pond, or mixed environment.	
Survey extent	Define upstream/downstream limits, reservoir boundary, water edge, topographic buffer, exclusion zones, and any priority structures or reaches.	
Client specification	Confirm client requirements for accuracy, deliverables, reporting, naming conventions, coordinate system, and data formats.	
Applicable standard / survey order	Nominate the applicable project specification, internal QA procedure, and where relevant an IHO S-44 survey order or equivalent classification.	
Target accuracy and uncertainty	Set horizontal and vertical accuracy targets from the project specification and define how uncertainty will be checked, reported, and accepted.	
Deliverable requirements	Confirm required outputs such as bathymetric surface, contours, cross sections, XYZ points, CAD, GIS, volume calculations, report, metadata and raw/processed datasets.	
Stakeholders and approvals	Record landholder, authority, waterway manager, dam operator, environmental, navigation, safety, and client approval requirements.	

2. Desktop Review & Planning Inputs

Compile all available information needed to design a safe, efficient and technically defensible survey.

Checklist Item	Requirement / Description	Project Notes / Status
Existing plans and data	Collect previous bathymetry, topographic surveys, LiDAR, aerial imagery, as-constructed drawings, river cross sections, dredging records, and asset information.	
Survey area dimensions	Confirm length, width, surface area, channel width, expected depth range, shallow margins and navigable limits.	
Access constraints	Identify boat ramps, launch sites, locked gates, restricted areas, private land, low bridges, shallow entries, vegetation, reeds, mangroves and overhanging trees.	
Operational constraints	Identify shutdown windows, reservoir operating rules, dam safety exclusions, construction interfaces, navigation traffic, tidal timing and work-hour restrictions.	
Historic water levels	Obtain operational, seasonal, flood, drought, tidal, reservoir level and gauge records where available.	
Flow and tide information	Review river discharge, current and forecast flows, tidal predictions, tidal range, observed tide data, and survey windows.	
Weather and environmental forecast	Assess wind, rain, storms, heat, water clarity, turbidity, salinity, sediment concentration, debris and expected acoustic conditions.	
Permits and authority approvals	Confirm national parks, fisheries, protected waterways, CASA/UAV, maritime, environmental and site-specific permits.	

3. Geodesy, Datums & Survey Control

Lock down the spatial reference framework before field acquisition so bathymetry, water levels and topography reduce to a common datum.

Checklist Item	Requirement / Description	Project Notes / Status
Horizontal datum	Specify the horizontal datum, typically GDA2020 for Australian projects unless the client requires another datum.	
Projection	Specify the map projection and zone, for example MGA2020 Zone 55 where appropriate for the site location.	
Vertical datum	Confirm AHD, Chart Datum, local datum, dam operating datum, or project datum; define all transformations and datum relationships.	
Geoid model	Specify the geoid model, for example AUSGeoid2020 for converting GNSS ellipsoid heights to AHD where appropriate.	
Existing control marks	Verify suitability, condition, stability, accessibility, published coordinates/heights and datum compliance of existing marks.	
Benchmark locations	Identify stable benchmarks suitable for water-level observations, datum transfer, check shots and water level logger ties.	
New control marks	Establish additional marks where existing control is inadequate, unstable, inaccessible or poorly located for water-level transfer.	
Control survey method	Define GNSS RTK, static GNSS, total station, digital level, or combined methods needed to meet the required accuracy.	
Independent checkpoints	Plan independent horizontal and vertical checks to validate GNSS, network RTK, local base station, benchmarks and datum transfer.	
Network RTK coverage	Assess mobile coverage, correction service reliability, baseline/network quality, multipath risk and loss-of-fix areas.	

4. Survey Design & Method Selection

Convert the project specification into a practical acquisition plan that matches the environment and required resolution.

Checklist Item	Requirement / Description	Project Notes / Status
Bathymetric methodology	Select SBES, MBES, ADCP-supported bathymetry, remote boat, manual sounding, UAV/LiDAR integration or hybrid methods.	
Survey coverage	Select full-coverage grid, transect-based survey, longitudinal profiles, targeted structure mapping, or a combination based on purpose.	
Line plan	Define transects, grid lines, longitudinal lines, infill lines, shore-parallel lines, edge mapping and no-go areas.	
Line spacing / data density	Set transect spacing, sounding density and final surface resolution from project objectives, depth variation, morphology and required modelling resolution.	
QA check lines	Plan cross-lines or repeat lines to verify consistency; define percentage of total survey effort and acceptance criteria.	
Edge and shallow-water mapping	Define methods for water edges and shallow/inaccessible zones, such as GNSS RTK, total station, wading, UAV photogrammetry, LiDAR or manual sounding.	
Structure and obstacle mapping	Plan additional coverage around spillways, intake towers, bridges, culverts, jetties, wharves, pipelines, debris, rocks and submerged hazards.	
Topographic extent	Define bank, foreshore, embankment, levee, floodplain, dam wall, structure and maximum water-level extents to be captured.	
Environmental limitations	Document impacts from aquatic weeds, turbidity, suspended sediment, salinity stratification, flow velocity, tidal influence and vessel wake.	
Line plan review / approval	Review the design with the project lead and client where required before mobilization.	

5. Water-Level & Flow Management

Define how water levels, tidal influence and water-surface slope will be observed and applied to reduce soundings.

Checklist Item	Requirement / Description	Project Notes / Status
Water level datum	Confirm reference datum and relationships between AHD, Chart Datum, local gauge datum, reservoir datum and project datum.	
Gauge location	Identify gauge sites that are stable, accessible, representative of the survey area and suitable for benchmark ties.	
Benchmark tie	Survey staff gauges, water-level sensors or water-level reference points to AHD or the project datum.	
Survey water levels	Record water levels at the start and end of each survey day and whenever conditions change significantly.	
Continuous monitoring	Deploy pressure sensors/loggers or use validated gauge data where water levels vary during the survey.	
Monitoring duration	Define monitoring before, during and after field acquisition to support reliable reduction and QA.	
Tidal surveys	For estuary/coastal work, define tide gauges, tidal datums, predicted/observed tides, tide windows and spatial variation in tide levels.	
Reservoir operating levels	Record Full Supply Level, Minimum Operating Level, dead storage level, current storage level and operational changes during survey.	
Flow conditions	Record river discharge, flow velocity, changing stage, safety limits and impacts on vessel handling and data quality.	
Water-surface slope	For river reaches, determine whether water-surface gradient requires multiple gauges or staged water-level correction.	

6. Resources, Equipment & Mobilisation

Confirm the people, vessel, instruments, logistics and backup systems required to execute the approved survey design.

Checklist Item	Requirement / Description	Project Notes / Status
Personnel competency	Confirm qualified hydrographer, surveyor, coxswain, UAV pilot if applicable, processing lead and support personnel with relevant certifications.	
Survey team structure	Define number of teams, roles, work hours, fatigue controls, supervision, daily briefings and escalation points.	
Vessel and deployment	Confirm vessel type, draft, stability, payload, mounting options, launch/recovery method, towing requirements and suitability for site conditions.	
Vehicles and trailers	Confirm 4WD capability, towing capacity, access route, parking, turning areas, permits and fuel requirements.	
GNSS equipment	Prepare RTK base, rover, network subscription, antennas, tribrach's, poles, mounts and accessories.	
Echo sounder system	Prepare SBES or MBES system, transducer, mounting brackets, acquisition software, cables and offset measurements.	
Motion and heading sensors	For MBES or dynamic vessel operations, confirm IMU/MRU, heading sensor, latency settings, patch test requirements and lever-arm offsets.	
Sound velocity equipment	Prepare sound velocity profiler or sensor where sound speed variability may affect bathymetric accuracy, particularly MBES, estuaries and saline/brackish water.	
Water level equipment	Prepare pressure loggers, staff gauges, stilling wells/mounts, barometric compensation method and benchmark tie equipment.	
Topographic equipment	Prepare GNSS RTK, total station, UAV, laser rangefinder, levels, rods, targets and accessories as required.	
Power and computing	Prepare field laptops, acquisition computers, processing workstation, chargers, vehicle power, batteries, generators, external monitors and spare media.	
Backup systems and spares	Prepare spare GNSS RTK, depth sensor, laptop, batteries, antennas, chargers, cables, connectors, memory cards and alternative positioning method.	
Accommodation and logistics	Confirm accommodation, remote field base, camping/vessel-based requirements, meals, communications coverage and daily productivity targets.	

7. Health, Safety & Environmental Controls

Confirm that field acquisition can be completed safely and in accordance with site, company and regulator requirements.

Checklist Item	Requirement / Description	Project Notes / Status
Risk assessment	Complete site-specific risk assessment addressing vessel work, water hazards, remote work, weather, terrain, wildlife, contamination and manual handling.	
Safe Work Method Statement	Complete SWMS/JSA and ensure the crew understands controls, stop-work triggers and task-specific hazards.	
Communication plan	Define check-in/check-out procedure, phone/radio/satellite coverage, emergency contacts, escalation timing and lone/remote work controls.	
Emergency response plan	Confirm nearest medical facility, rescue services, evacuation route, muster point and incident reporting process.	
Vessel safety equipment	Confirm PFDs, EPIRB/PLB, first aid kit, throw rope, fire extinguisher, navigation lights, anchor, bailer and required maritime safety gear.	
Severe weather criteria	Define go/no-go thresholds for wind, lightning, rain, flood rise, visibility, heat, tide/current and vessel operating limits.	
Environmental controls	Confirm spill kits, washdown/biosecurity controls, refueling method, protected vegetation/fauna constraints and waste management.	
Access and public interface	Manage landholder permissions, public exclusion, signage, spotters, navigation traffic, construction interfaces and security clearances.	

8. Pre-Survey Field Checks & Calibration

Complete controlled checks before production data collection begins each day so issues are corrected in the field.

Checklist Item	Requirement / Description	Project Notes / Status
GNSS configuration check	Verify coordinate system, datum, geoid, projection, correction source, survey control coordinates, antenna heights, logging settings and project files.	
Control validation	Verify control marks with independent checkpoints, confirming results meet horizontal and vertical tolerance before acquisition.	
Echo sounder calibration	Complete bar check for SBES, transducer draft verification, offsets and acquisition settings.	
MBES calibration	Where applicable, complete patch test, latency check, sound velocity profile, motion/heaving validation and offset confirmation.	
Water level setup	Install loggers/gauges, benchmarks ties, record initial readings and confirm time synchronization.	
System time synchronization	Confirm GNSS, acquisition computer, echo sounder, motion sensor and logger times are synchronized or offsets are known.	
Trial line / shakedown	Run test lines to verify sounding quality, positioning, bottom tracking, data logging, coverage and operator workflow.	
Daily field briefing	Review hazards, weather, line plan, access, communication checks, roles, emergency plan and stop-work criteria.	

9. Field Acquisition & Daily QA/QC

Collect survey data to the approved plan while checking quality each day so issues are corrected in the field.

Checklist Item	Requirement / Description	Project Notes / Status
Survey Control	Survey and verify control marks and independent checkpoints to ensure that survey control is within required horizontal and vertical tolerance.	Minimum, Start & End on each survey day
Bathymetric acquisition	Collect approved grid, transect, longitudinal, edge, structure and infill lines at appropriate boat speed and spacing.	
Topographic acquisition	Survey banks, water edge, break lines, structures, gauges, benchmarks, flood/FSL/HWM extents and relevant features.	
Photographic record	Capture site photographs of controls, gauges, access, structures, hazards, water conditions and key features.	
Survey logs	Maintain daily logs of personnel, equipment, settings, calibration, environmental conditions, water levels, incidents and issues.	
GNSS quality monitoring	Monitor RTK fixed status, correction age, PDOP/HDOP, satellite availability, baseline/network reliability and loss-of-fix areas.	
Coverage review	Review navigation tracks, sounding density, edge coverage, gaps, missed structures and line completion before leaving site.	
Check and repeat lines	Collect QA cross-lines, repeat transects or selected control checks to assess consistency and repeatability.	
Water level validation	Record / Verify water-level readings, logger operation, benchmark ties, time stamps and any rapid stage/tide changes.	Before & after bathymetry survey data collected on each survey day. Water level data must overlap bathymetry data
Daily data backup	Back up raw and processed field data to at least two separate storage locations and maintain file naming/version control.	
Issue register	Record limitations, data gaps, unsafe areas, equipment faults, access issues and agreed changes to the survey plan.	

10. Processing, Validation & Reporting

Transform field observations into defensible deliverables with clear metadata, QA evidence and documented limitations.

Checklist Item	Requirement / Description	Project Notes / Status
Data import and organization	Archive raw data, create working copies, apply consistent file naming, version control and processing folders.	
Position and datum reduction	Verify survey control data, compute misclosures, apply adjustments, benchmark ties	
Sounding correction	Apply draft, bar check/calibration, sound velocity, water level, heave/motion, latency and offset corrections as applicable.	
Data cleaning and outlier assessment	Review anomalous soundings, spikes, bottom tracking errors, positioning jumps, vegetation returns and environmental artefacts.	
Surface generation	Create TIN/grid/bathymetric model at the agreed resolution and document interpolation, filtering and gridding method.	
QA validation	Compare check lines, repeat lines, independent control, water-level data and final surface against tolerance and project specification.	
Uncertainty statement	Report achieved accuracy/uncertainty, data limitations, excluded areas, assumptions and any departures from specification.	
Volume and analysis outputs	Calculate storage, sedimentation, dredging quantities or cross-sectional metrics using agreed reference levels and methods.	
Deliverable export checks	Validate CAD, GIS, XYZ, contours, cross sections, surfaces, reports and metadata before release.	
Final report	Document methodology, equipment, calibration, datums, QA/QC, results, limitations, photos and deliverable index.	

Environment-Specific Considerations

Environment	Additional Planning Focus	Project Notes / Status
River	Priorities flow velocity, water-surface slope, hydraulic structures, longitudinal profile, changing stage, debris, tributary inflows and safe vessel handling.	
Dam / Reservoir	Confirm FSL, MOL, dead storage, current storage level, spillway/intake structures, dam wall exclusions, launch access, operating windows and sedimentation objectives.	
Estuary	Confirm tidal range, tidal datum, Chart Datum/AHD relationship, salt wedge, salinity stratification, channel migration, mangroves, navigation channels and tide windows.	

Recommended Project Acceptance Checks

Gate	Minimum Evidence	Sign-off / Notes
Before mobilization	Scope, line plan, datum/control, water-level method, safety controls, equipment list and permits approved.	
Before acquisition	GNSS/control checks, sounder calibration, water-level setup, time synchronization and shakedown line completed.	
Before leaving site	GNSS/control checks, coverage reviewed, QA lines collected, water-level data checked, photographs/logs completed and data backed up.	
Before delivery	Corrections applied, surface validated, uncertainty/limitations documented, exports checked and report completed.	

Technical References / Basis

Use the following references as a basis for project-specific requirements. Client specifications and statutory requirements take precedence where they are more stringent.

Reference	Relevance
IHO S-44 Edition 6.2.0	International Hydrographic Organization Standards for Hydrographic Surveys; relevant for hydrographic survey classification, positioning, depth, coverage, water levels and metadata.
GDA2020 / NSW Spatial Services	GDA2020 is the current Australian datum replacing GDA94 and is commonly required for modern GNSS-based Australian survey deliverables.
AUSGeoid2020 / Geoscience Australia	AUSGeoid2020 supports conversion of GNSS ellipsoid heights to AHD height estimates where appropriate, noting AHD is an onshore datum and near-shore limitations apply.