

WATER RESOURCES MANAGEMENT

- Assessment
- Planning
- Engineering advisory
- Digital monitoring





Practical water solutions for resilient development

Daira Sabz International Consulting and Engineering Group supports public authorities, development partners and businesses in understanding, protecting and managing water resources. We connect hydrogeology, environmental assessment, engineering advisory and geospatial analysis to help clients plan reliable water services and manage water-related risks.

Our water resources services address groundwater and surface water, catchment management, water quality, irrigation efficiency, flood and drought resilience, infrastructure performance and digital monitoring. Each assignment is tailored to the local regulatory framework, available evidence and the needs of water users.

From field evidence to management decisions

We assess the resource, evaluate demand and risks, develop practical options, support procurement and implementation, and establish monitoring and operating procedures. The result is a clear basis for investment, allocation, environmental protection and long-term planning.



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• Our Approach and Delivery Structure

Water security depends on more than a source or a structure. Reliable services require evidence on availability and quality, appropriate engineering, workable institutions and monitoring that informs action. Integrated water management also considers livelihoods, ecosystems and equitable access.

1.1 - A coordinated service model

- **Resource assessment:** establish baseline conditions, quantify available evidence and identify seasonal variability and uncertainty.
- **Planning and options appraisal:** compare technical alternatives, costs, environmental effects and operational requirements.
- **Engineering advisory:** prepare or review technical concepts, specifications and implementation arrangements within the agreed professional scope.
- **Monitoring and management:** build information systems, operating procedures and reporting tools that support decisions.

Table 1. Delivery structure and client groups

Delivery element	Role
Germany office	International coordination, technical advisory, design review, quality assurance and client reporting.
Afghanistan office	Local coordination, field assessments, stakeholder engagement, supervision and locally authorized implementation.
Specialist partners	Licensed engineering, drilling, laboratory analysis, instrumentation or software expertise where required by the assignment.
Client groups	Water authorities, municipalities, utilities, NGOs, development agencies, agricultural organizations, infrastructure developers and mining or industrial operators.



1.1 - Services matched to the local context

We agree the responsible contracting entity, specialist team and applicable approvals at inception. Field methods, design criteria and technology choices are adapted to terrain, security, power supply, communication coverage, operator capacity and maintenance access. Engineering signatures, contractor qualifications, laboratory accreditation and statutory approvals are confirmed for each jurisdiction and scope. Company management-system certification does not establish laboratory accreditation or approval for every specialist activity.

2

• Groundwater and hydrogeology

We support clients in assessing aquifer conditions, locating and evaluating groundwater sources, understanding abstraction pressures and protecting groundwater-dependent users and ecosystems.



2.1 - Assessment and investigation

- Well and spring inventories with unique identifiers, coordinates, construction details, ownership or operator records and operating condition.
- Hydrogeological mapping using geology, geomorphology, existing borehole logs, field observations, GIS and remote sensing.
- Groundwater-level monitoring, seasonal trend assessment and evaluation of pumping-related drawdown and recovery.
- Design and supervision of pumping tests; interpretation of discharge, drawdown and aquifer parameters with documented limitations.
- Groundwater quality assessment and identification of salinity, contamination pathways and source-protection priorities.
- Recharge and abstraction assessment, conceptual aquifer models and numerical modelling through suitably qualified specialists when justified.



2.2 - Management and protection

We develop groundwater management options, monitoring networks, source-protection measures and abstraction-control recommendations. Sustainable abstraction assessments consider recharge, storage changes, hydraulic connectivity, water quality, existing users and ecosystem requirements. Metered pumping volumes alone cannot establish a sustainable yield.

Table 2. Typical groundwater outputs

Client requirement	Typical deliverable
Understand the resource	Hydrogeological baseline, conceptual model and evidence-gap register.
Assess water sources	Well inventory, pumping-test interpretation and source-options assessment.
Manage abstraction	Metering plan, demand assessment and allocation-support analysis.
Protect the aquifer	Risk map, source-protection recommendations and monitoring programme.

2.3 - Managed aquifer recharge

Where appropriate, we assess recharge options such as infiltration basins, check dams or recharge wells. Feasibility considers source-water quality, geology, clogging, land availability, downstream effects and approval requirements. Site investigation and a monitored pilot should precede wider implementation.



3 • Surface water and climate resilience

3.1 - Catchments and water availability

We assess catchment characteristics, rainfall and runoff, river flows, sediment processes, land use and water demands. Depending on data availability, services include hydrological monitoring design, water-balance assessment, flow-duration analysis and scenario-based evaluation of seasonal supply reliability.

3.2 - Flood risk and drainage

- Flood hazard screening and hydrological and hydraulic modelling, with calibration or validation where observations are available.
- Floodplain and exposure mapping for settlements, roads, bridges, agricultural land and critical infrastructure.
- Drainage and culvert capacity assessment; review of crossings, outfalls, erosion protection and sediment-management needs.
- Flood risk reduction options combining structural measures, nature-based approaches and land-use planning.
- Early-warning requirements, thresholds, communication protocols and coordination with responsible authorities.

Effective warnings require observations, forecasts and clear procedures for early action; the response arrangements are as important as the technical platform.



3.3 - Drought and climate adaptation

We assess drought exposure, historical variability and projected climate risks using locally relevant datasets and explicit assumptions. Options include demand management, diversified sources, storage, leakage reduction, efficient irrigation and ecosystem restoration. Scenario analysis informs robust choices rather than treating a single forecast as certain.

3.4 - Irrigation and agricultural water management

Services include irrigation water-demand assessment, conveyance-loss analysis, scheduling advisory, water-user engagement and appraisal of improved irrigation technologies. We examine water and energy use together, including solar pumping and the risk that lower pumping costs increase total abstraction.

2.3 - Watersheds and ecosystems

We support catchment restoration, erosion control, riparian protection and assessment of environmental flow needs. Nature-based measures are selected for local soils, rainfall, land tenure and maintenance capacity, with monitoring to assess their performance.



4 • Water quality and infrastructure

4.1 - Water quality and environmental safeguards

- Sampling plans for groundwater, rivers, springs, supply systems and wastewater, using risk-based parameter selection.
- Field measurements and coordinated laboratory analysis with sample identification, preservation, chain of custody and QA/QC records.
- Assessment against the applicable use-specific standards and permit requirements; clear separation of measured results and interpretation.
- Pollution-source identification and assessment of agricultural, municipal, industrial and mining-related risks.
- Water-related ESIA inputs, mitigation measures, environmental management plans and compliance monitoring.

4.2 - Water supply and sanitation advisory

We support feasibility assessment and technical review for wells, intakes, pumping systems, storage, distribution networks and treatment options. Services can include demand estimation, hydraulic analysis, equipment specifications, BOQs, tender documentation and independent supervision. Treatment choices are based on source-water quality, operating skills, residuals management and life-cycle costs.



4.3 - Wastewater and reuse

We assess wastewater generation, collection, treatment and reuse opportunities. Options appraisal considers receiving-water sensitivity, reuse quality requirements, public-health protection, energy demand and sludge management. Reuse schemes require appropriate treatment, monitoring and approval for the intended application.

4.4 - Mining and industrial water management

We support site water balances, clean and contact-water separation, dewatering assessments, process-water reuse, pollution prevention and closure planning. Tailings-related water assessments are coordinated with geotechnical and dam-safety specialists; independent specialist review is arranged where required.

Priority	What we assess
Technical suitability	Source reliability, capacity, hydraulic performance and treatment needs.
Operational viability	Energy use, spare parts, staffing, maintenance and life-cycle costs.
Environmental performance	Abstraction impacts, discharges, sludge, erosion and ecosystem effects.
Climate resilience	Flood exposure, drought sensitivity, redundancy and safe access.





• Smart metering and groundwater information systems

The team brings together field assessment, engineering design and digital-systems expertise. Remote telemetry and a Groundwater Metering Information System (GMIS) can provide water authorities with regularly updated, quality-checked records of groundwater abstraction, supporting monitoring, allocation, compliance assessment and long-term planning.

5.1 - What the system does

A flow meter measures the rate and accumulated volume of water pumped through a discharge pipe. A data logger records readings and timestamps. A telemetry unit transmits the records through an appropriate communication network. GMIS links these readings to well locations, asset records and, where authorized, permit and allocation information.

Table 4. Components of a groundwater metering system

Component	Function
Well register and GIS	Identify each well and associate records with a verified location.
Flow meter	Measure discharge rate and cumulative abstracted volume.
Data logger and power	Record timestamped readings and retain data during communication interruptions.
Telemetry	Transmit data at agreed intervals using available network coverage.
GMIS and dashboard	Validate, store, display and report records; flag exceptions for review.
Optional level and quality sensors	Add groundwater-level, pressure or quality information where needed.

5.2 - Turning measurements into decisions

If a pump operates at a constant 20 m³/hour for six hours, the extracted volume is 120 m³. GMIS can summarize daily and monthly volumes, show abstraction patterns on a map and flag records that exceed an assigned threshold. Any compliance finding requires verification against valid records and applicable conditions.

A meter records abstraction, not the remaining aquifer reserve. Sustainable allocation requires hydrogeological assessment alongside abstraction and groundwater-level data. “Continuous monitoring” may involve frequent measurement and periodic transmission; the intervals must be specified.

6 • Digital system implementation and operation

6.1 - Field assessment and system design

We begin with a verified well inventory and inspect pipe layout, discharge range, water quality, power, access and network coverage. Meter selection considers accuracy, installation requirements, operating conditions and maintenance. The design defines the data model, communication intervals, interfaces and acceptance criteria.

6.2 - Data quality and verification

- Confirm well identity, meter serial number, location, units and timestamp conventions before commissioning.
- Check meter calibration evidence and installation conditions against the approved specification.
- Compare local readings, transmitted records and dashboard values during trial operation.
- Flag missing records, duplicate timestamps, implausible jumps and declining or reset totalizer values.
- Retain original readings and distinguish corrected, estimated and validated data through documented audit trails.
- Investigate exceptions and record corrective actions before using results for compliance decisions.



6.3 - Reliable and secure operation

System requirements address local data buffering, retry transmission, battery or solar-power autonomy, device protection, backup and restoration, role-based access and secure communications. Data ownership, retention, hosting, cybersecurity responsibilities and applicable privacy obligations are agreed with the client.

6.4 - Dashboards and management reporting

Typical views include mapped wells, abstraction totals, trends, reporting completeness, device status and flagged exceptions. Where reliable supporting data exist, the platform can integrate groundwater levels, water quality, pump operation and allocation records. A dashboard should clearly display the latest reporting time and data-quality status.

6.5 - Testing and handover

Acceptance tests cover equipment, communications, interfaces, data integrity, reporting, alarms, outage recovery and user permissions. Handover includes as-built records, asset registers, configuration details, O&M manuals, training, support arrangements and a documented maintenance schedule.

Typical outputs: survey database, meter installation designs, technical specifications and BOQs, GMIS requirements, interface documentation, test records, dashboards, operating procedures and training materials.

7 • Project delivery and quality assurance

The programme is agreed after scoping. Seasonal hydrology, access restrictions, permits, procurement lead times and laboratory turnaround are included in the schedule. Table 5 provides sequencing rather than a fixed completion period.



Table 5. Indicative work sequencing and review gates

Stage	Main activities and output
1 Inception	Confirm scope, approvals, stakeholders, data access, methods, staffing and workplan.
2 Assessment	Undertake surveys, sampling and investigations; issue validated baseline and data-gap findings.
3 Options and design	Compare alternatives; prepare designs or design reviews, cost estimates and specifications.
4 Procurement and implementation	Support technical evaluation, submittal review, supervision and inspection records.
5 Commissioning and handover	Test performance, close defects, train users and deliver operating documentation.
6 Follow-up	Review performance and monitoring results; recommend adjustments and maintenance.

7.1 - Staffing and equipment

An assignment may include a project manager, hydrogeologist, hydrologist, water or civil engineer, GIS analyst, environmental specialist, instrumentation and IT specialists, field technicians and an HSE focal point. Equipment is selected to the scope and may include GNSS devices, water-level meters, discharge instruments, multiparameter probes, sampling equipment, data loggers and approved PPE.

7.2 - QA and QC

We use approved methods, calibrated equipment, field checks, sample controls, documented calculations and independent technical review. Deliverables identify assumptions, missing data and uncertainty. Sampling QA/QC can include blanks, duplicates and laboratory checks proportionate to the analytical objectives. Findings and corrective actions are tracked to closure.

7.3 - HSE and environmental controls

Field plans address traffic, heat, waterborne hazards, remote working, electrical risks and work near open wells or watercourses. Installation works require appropriate isolation and safe excavation controls. Teams protect sites from spills, manage waste, minimize disturbance and respect consent and land-access arrangements.

7.4 - Risk management

Key controls include contingency access plans, alternate communications, spare instruments, seasonal sampling strategies and escalation procedures. Technical, cost and schedule risks are reviewed with the client at agreed milestones.

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• Relevant experience and specialist capacity

The assignments below are selected for their relevance to water resources services.

Table 6. Selected relevant assignments recorded in the corporate profile

Assignment	Water relevance
Aynak Copper Deposits ESIA, Logar, 2024	Water resources and geochemistry within the environmental baseline; waste and tailings assessment and mitigation
Baghdara to Aynak 220 kV transmission line ESIA, 2026	Watercourse crossings, erosion, slope stability and climate or disaster risks along the route.
Fazay-e-Sabz wastewater treatment IEE, Kabul, 2025	Environmental examination of wastewater treatment and associated mitigation measures.
Health-centre environmental monitoring, Herat, 2025; NESPAK and UNOPS	Water-quality monitoring alongside air and noise assessment and compliance reporting.

8.1 - Multidisciplinary delivery

The Group combines environmental, engineering, geospatial and project-management expertise. Specialist support is mobilized according to technical requirements, with clear responsibilities for fieldwork, modelling, design review, instrumentation, software integration and independent quality assurance.



8.2 - Quality Management and Relevant Experience

Daira Sabz International Consulting and Engineering Group combines multidisciplinary expertise, practical field experience and structured quality assurance to support clients worldwide. Our delivery approach draws on ISO 9001:2015 quality management and ISO 14001:2015 environmental management systems certified within the Group.

We bring together hydrogeology, engineering, environmental assessment and digital monitoring to develop practical water management solutions. Teams and delivery arrangements are tailored to each assignment, integrating international good practice with local requirements. Supporting certificates, project references and expert profiles are available upon request.



9.1 - Start with your water management challenge

Contact Daira Sabz to discuss a site assessment, feasibility study, monitoring programme, infrastructure review or digital water information system. We will define the scope, data needs, specialist inputs, deliverables and implementation arrangements before preparing an assignment-specific proposal.

Useful starting information includes location and intended water use; existing wells or infrastructure; available maps and monitoring records; water demand; regulatory or donor requirements; delivery expectations; and the main operational or environmental concerns.





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