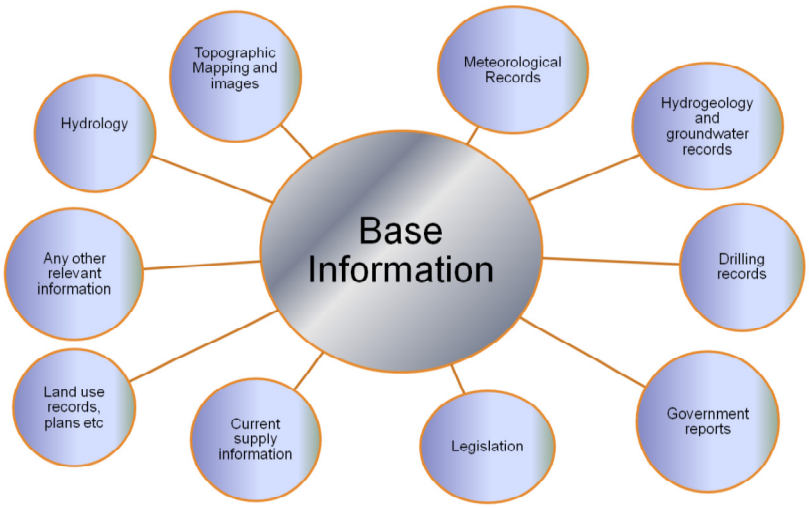
Royal HaskoningDHV
Enhancing Society Together

Source Water Vulnerability Assessment (SVA)
Safeguarding water for industrial and residential estates



Services

- Source Water Vulnerability Assessment
- Audits and licensing
- Water management programs
- Effluent Reuse and clean production programs

Process

Multi disciplinary study to identify risks and provide solutions to safeguard water sources

Application

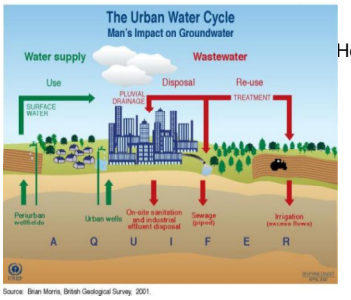
- New and existing industrial estates
- Real Estate Development

What is a Source Water Vulnerability Assesment?

A SVA aims to identify and assess potential risks that may jeopardize sufficient water availability of desired quality for industrial facilities or real estate developments. In a SVA these risks are assessed from a wide range of angles such as physical, environmental, social, political, economic, regulatory and consumer's perception. The outcome of a SVA is a Source Water Protection Plan that safeguards water sources for the short, medium and long term.

Why do industrial and residential estates need an SVA?

Availability of sufficient and good quality water sources cannot be taken for granted. In many places over abstraction of groundwater has resulted in subsidence and consequently in a substantial reduction of granted permits. At the same time, Public Water Utilities (PDAM) can often not guarantee a continuous flow of clean water to industrial and residential estates. Moreover, estates may compete with surrounding local communities putting them at risk of legal disputes and reputational damage. The SVA provides answers in how secure current water sources are and how these can be safeguarded in the future. Especially for new industrial and residential developments and SVA is a tool towards a sustainable water management system.



Heijboer, D. (Dirk)

Conceptual modelling

How does an SVA work?

A SVA may consist of several steps, depending on the specifics of the assessed site.

1. Data collection to gather all base information as shown in the figure below. Typically this phase requires talks with industries themselves on growth scenarios and ambitions, local authorities (permits), public water utilities (available water capacity and applied technologies) and surrounding communities. It also includes evaluation of the current water management facilities, including process water treatment and wastewater treatment;
2. Undertake a ground water investigation of the existing wells. These may comprise both hydraulic test programs and water sampling and testing;

3. Conduct a land use survey (desktop and field based). Neighbouring activities and facilities may put a risk at both water availability (e.g. presence of other water demanding industries) or quality (illegal discharge of neighbouring industrial estates, petrol station or over abundant pesticide use by farmers);
4. Development of a hydro geological Model, that helps to predict:
    a. Ground water zones of influence (catchment boundaries);
    b. Groundwater recharge locations;
    c. Judgements on groundwater recharge and discharge, yields and;
    d. Possible affects on or by external stakeholder wells;
5. Source Water Vulnerability Assessment. Based on current water supplies, growth demands, available internal and external water sources and neighbouring activities the assessment is done, identifying and quantifying risks comprising physical, environmental, social, political, economic, regulatory and consumer's perception;
6. Source Water Protection Plan. The SVA is used to formulate measures that mitigate identified risk and secure water sources. Plans may include:
    a. Physical interventions: e.g. additional required or abortion of deep wells or additional buffer capacity, update of Standard Operating Procedures;
    b. Partnerships: e.g. Contracts with public water supplies or community engagement plans;
    c. Sustainable production or water management plans: water saving and effluent reuse schemes.

Evaluation of process water treatment

Deep well evaluation

Who needs a SVA?

A SVA is recommended for all industries and estates that:

- Want to open new or extent existing estates;
- Are located in water scarce areas that may jeopardize "business as usual";
- Aim to implement a cost effective sustainable water management system to safeguard future businesses.

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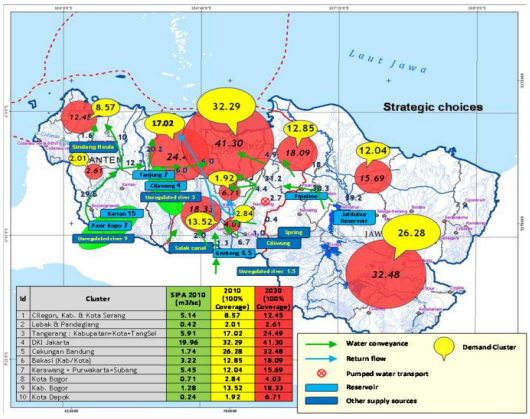
WWTP O&M and assessing effluent reuse possibilities



Strategic water planning