



Cost Calculation Model Area Oriented Approach

Tool for financial management





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[Manual: Cost Calculation Model: Area Oriented Approach v2.0](#)

[Software: Cost Calculation Model: Area Oriented Approach v2.0](#)

1 Introduction

1.1 General

In January 2012 AgencyNL/ Soil+ of the Dutch Ministry of Infrastructure and Environment commissioned Grontmij Netherlands BV by letter (reference: mela0001/2012.00008) to develop a Cost Calculation Model Area Oriented Approach (CCM: AOA) (Dutch: Rekenmodel – Nazorg – Beheer). This model is to assist in determining the costs and incomes of the implementation of an Area Oriented Approach plan. The model is available in both Dutch and in English and is build for parties who intent to implement AOA-plan or developing such an plan.

The Cost Calculation Model: AOA provides a standard to assist in an objective consideration of the costs for an Area oriented Approach. The model assists the financial consideration in decisions about AOA locations, both in planning phase and during transfer to management phase. Besides the import of regular cost the model also includes a method on how to deal with financial windfalls or setbacks in decision making.

AgencyNL and its Dutch partner the Municipality of Utrecht participate in the European CityChlor project, operating under the INTERREG IV B program for Northwest Europe. The Utrecht remediation approach for an AOA – the “Biowasmachine” – is a pilot in this CityChlor project. From this position the initiative for a cost calculation model is initiated as a part of the “Socio economic” work package; giving financial preconditions for a AOA and support to design and implementation phase of an AOA approach. The scope of this report is to give a short presentation the CCM: AOA and background readings to the building process of the model. The report can be used as an introduction for new users of the model.

1.2 Advantages of the Area Oriented Approach Cost Calculation Model (AOA:CCM)

Due to the development of case-oriented remediation to area-oriented approach, multi-year management for the area has increased. This involves obligations and expenses that go beyond one-off remediation expenses, because management activities must be performed on a multi-year basis. There is often a disagreement about determining the management expenses, which may result in a delay in the execution and transfer.

The AOA:CCM provides a standard to support an objective assessment of management options or after-care. The model assists in the financial assessment of decisions on individual and area-oriented management locations both during the planning phase and during the transfer to the management phase. AOA:CCM is not a decision-making model; the model serves to support the capitalisation of multi-year management and after-care. This makes the costs clear.

Some features of the AOA:CCM:

- AOA:CCM is a flexible program that can be used for an overall first finger exercise in order to make expenses clear, for negotiations in buyout situations or for a detailed calculation of the annual management and/or after-care expenses which may serve as a financial basis for a proposed area-oriented approach;

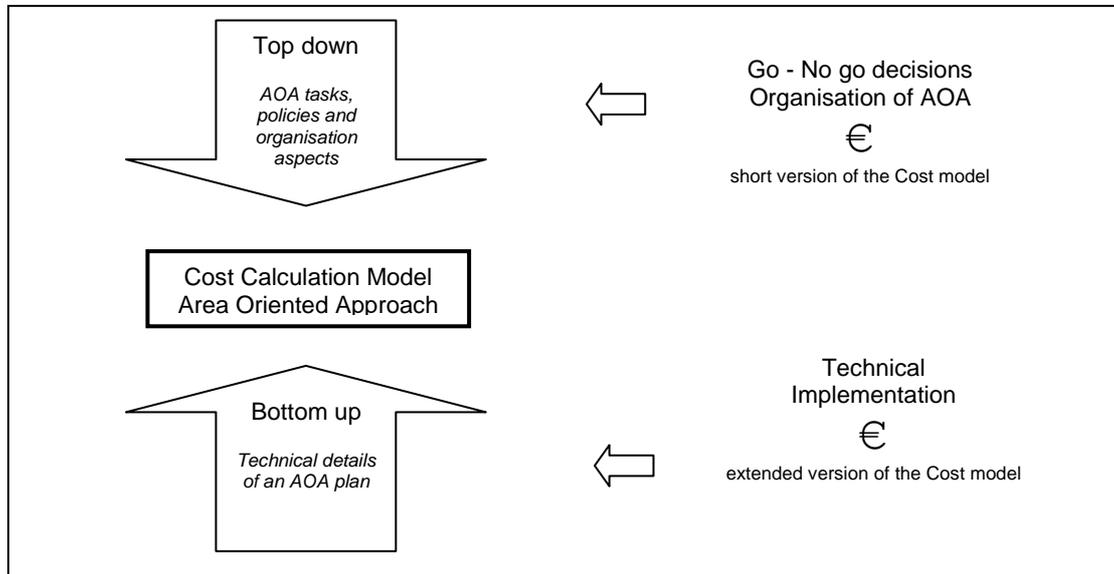
- The built-in sample estimates give a sense of the cost items you may be dealing with within various forms of management projects;
- AOA:CCM supports the realisation of a generally accepted structure of the budget financing;
- The built-in sensitivity analysis will allow you to gain an understanding of the effect of changes to certain parameters on the allocated funds. For instance, you can adjust the interest and inflation rate, but also the frequency with which you carry out certain activities. You can use this option, for example, to determine the effect of lower maintenance frequencies, to compare options of alternative measurement methods, or to determine whether a longer useful life will have a significant effect on the total net present value;
- AOA:CCM supports the clarification and qualification of risks for management options, which results in clarity to support the decision-making process;
- The chance of overestimating or underestimating the management expenses is reduced, because too many aspects are included in the cost estimate;
- It offers clear reports that provide you with information about the costs of your management project. They show both the annual costs and the amount to be reserved at the start of the project when you proceed from a one-off funding by means of a fund, for example;
- Apart from a quick entry of regular cost items, it is also possible to enter basic indicators;
- A feature of the application is to enter risks, windfalls and buyout agreements. These can be used to make the effect of a buyout payment transparent.

1.3 Scope and preconditions of the Model

The CityChlor project initiated the development of the CCM: AOA. The aim of the model is to facilitated both the 'top down' and 'bottom up' approach in the design and implementation of an AOA (figure 1):

- *Top down*: offering a structured guidance in the design process of a AOA plan. It is likely that all AOA tasks, policies and the choice of which party will be the responsible party for the implementation of the plan will be at least be discussed in the preparation;
- *Bottom up*: support the development of AOA plans in calculating the costs of the development of a AOA plan and the implementation of the plan.

Figure 1.1: The 'top down' and 'bottom up' approach in the design and implementation of an AOA



Technically, the scope of the model is a generic tool to be used for a user specific situation. The tool should meet the facility of a ready to use 'fill in form' using a standard set of cost elements. On the other hand, the model offers the possibility for user specific tailoring e.g. by adding or erasing specific cost elements or own categories of costs.

The focus of the model as it is, is restricted to activities to be carried out implementing an AOA plan as far as the scope of the Dutch Soil Remediation act reaches. However by adding or erasing cost elements the model can be used anywhere, and adapted to local laws and requirements. Activities which are likely to be combined with the implementation of an AOA plan, e.g. exploitation of an Aquifer Thermal Energy Storage or production of drinking water, are not included (but can be added to the model by the model user).

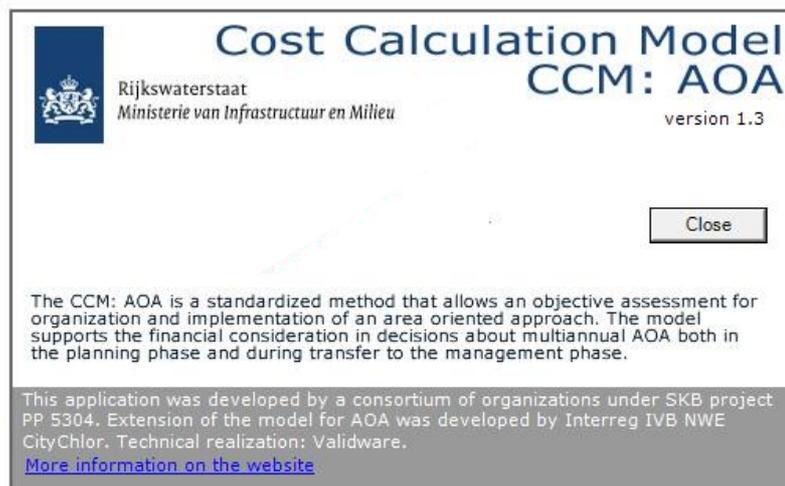
The benefits of an AOA are pre-incorporated in the model to a certain level of detail as the benefits can have much more benefits than offering an efficient solution for complex soil remediation situations in urban areas.

The project team building the tool used input from the Dutch 'UP Gebiedsgericht beheer' affiliates, CityChlor- team members, best practices in the Netherlands by using experience from already made cost calculations and of course expertise of the team members. Using this input all best practices were used to develop the model. The CCM: AOA model is a general design, which makes it applicable for all situations where insight in the costs of an area oriented approach over several years is needed.

The CCM: AOA is developed using the cost calculation model aftercare ‘Renabo’ developed by SKB (‘Stichting Kennisontwikkeling en Kennisoverdracht Bodem’, a Dutch program for sustainability and soil) and maintained by Soil+ (figure 1.2).

The Renabo cost calculation model is facilitated by AgencyNL, Unit Soil+ of the Dutch Ministry of Infrastructure and Environment. AgencyNL facilitates in updates, FAQ’s etc. The model is tested and multiple parties are using the model on a daily basis. The cost tool is developed to support the financial of organisations having a long term maintenance task offering financial planning, detailed analyses facilities and a need for calculation of net present value of e.g. long term investments for aftercare. As the model is facilitated by AgencyNL, cost calculations can be exchanged between parties, offering a maximum of transparency and if needed learning effect for other parties in the Netherlands.

Figure 1.2: Opening screen of the Cost Calculation Model; Area Oriented Approach





1.4 Reading instructions

This report describes the scope and backgrounds of the CCM: AOA. Also a hard copy of the cost structure of the model is included in the report.

As the CCM: AOA is developed as a module in the Renabo cost calculation tool, the scope of this report is not a user manual of the software. This report, however, is a description of how the model was created and how it is built.

This report includes the following sections:

- Chapter 2: Building process and backgrounds;
- Chapter 3: Presentation of the CCM: AOA.

2 Building process and backgrounds

2.1 Model building steps

The CCM: AOA is developed implementing subsequent steps.

The First step in the project was an inventory and analyses of already available AOA cost calculations. Cost calculations of four parties were made available. These calculations are partly based on already implemented AOA activities and partly on estimations. After evaluating the example calculations a structured questionnaire was made by Grontmij assessing key points as points of interest are: innovative techniques for smart monitoring, risks assessment and cost calculation, possible 'hidden costs' (costs not often seen in AOA calculations but has to be made when implementing an AOA). Using this questionnaire members of four individual AOA organisations were interviewed. The scope of the interview was to get background information on the cost elements, an evaluation of most important costs elements, cost elements which were left out or allocated to other parties. The result of the analyses and interviews was used to get a better focus on the cost model.

Bases on the previous steps the third step was to develop a draft generic set of cost elements assessing all specific types or situations of AOA. All elements in the process of development, implementation and evaluation of an AOA were addressed in the first draft cost model. This draft cost model was presented in a half day workshop. The workshop was attended by individual AOA organisations, specialists AOA and representatives of theCityChlor-project. The workshop was technically facilitated by the client. Annex 1 gives a list of participants of the workshop. Scope of the workshop was to get consensus on the cost structure and discussions ready to use solutions on point of non-consensus.

Based on the results of the workshop the original model AOA was revised and send to the client for comments.

Finally the model AOA was used to develop a CCM: AOA which was implemented in the Renabo cost calculation tool. No further checks or validations on the Renabo tool were made as this model has been used for several years by specialists in soil remediation. The model can thus be used for calculations of AOA. For this reason, the model name changed to CCM: AOA.

A user manual is not developed as the Renabo user manual covers the tool-handling and the context sensitive help screens give background on the specific cost elements presented by the cost model. Section 3 of the manual is only up-graded to explain how to select the AOA models, short and extended versions. The embedding of the CCM: AOA is implemented by the Renabo software engineer of Validware.

2.2 Model Backgrounds

This section gives some backgrounds to the Cost model. Input for is background comes from an workshop held on march the 27th, 2012 in Utrecht, The Netherlands. The workshop was attended by representatives of municipalities having made steps in implementing AOA and cost calculations send by these municipalities and therefore given input on the best practices of AOA in the Netherlands. In the workshop a draft version of the Cost model was presented and points of discussion were put forward. The workshop was preceded by interviews with some of the workshop participants. The interviews gave background information to the site specific cost calculations and points of discussion for the workshop. This section of the report gives a comprehensive summary of the workshop as far as it gives generic backgrounds to the Cost model.

Site specific costs for preparation of an AOA plan including the process of building an agreement with multiple other public and / or private parties can be considerable. Although not included in the initial CCM, these costs are included in the final model.

Insight in the costs for preparation of an AOA can be very important when negotiating with third parties. These negotiations can cover e.g. retributions of financial benefits, contribution to the AOA or financial clearance of remediation actions of groundwater pollutants.

Of course political decisions need to be based on all cost aspects including detailed insight information of costs for the run-up phase to an AOA.

'Hidden costs' are costs to be made by the (local) government responsible for e.g. checks and restrictive measures during the implementation phase and handling procedures of evaluating AOA plans. Furthermore it was not clear whether an AOA necessarily will lead to an extra effort for local governments. During the workshop it was therefore concluded that these costs should not be a part of the CCM, as these tasks are a part of the work standard package of authorities.

During the workshop a discussion was held on what party should be made responsible for the implementation of an AOA. From the discussion it was clear that the CCM: AOA should not make any guidance to this discussion. On the other hand it was stated that the CCM: AOA should facilitate this discussion by offering an overview of possible tasks to be implemented by the organization responsible for the implementation of an AOA

In most cases the details of an AOA will be area specific. An extended version of the cost model, giving much details of possible elements of an AOA, will facilitate most users. Easy to implement user specific cost elements should be possible. A short version of the cost model might be useful for not-technical top down discussions.

Calamities or unforeseen events that need to be reacted upon including the costs are difficult to predict. Poor experience can be used as input. It is up to the user and his insights in the local conditions and circumstances to give more input in this part of the CCM: AOA. A detailed overview of possible calamities or unforeseen events is not given as it goes beyond the scope of the Grontmij assignment.

AOA is not necessary only restricted to multiple contaminated plume assessment. Depending on the local conditions a business plan can be developed for the exploitation of the groundwater, in the slipstream assessing the groundwater quality. The CCM: AOA can be of assistance for the development of the business plan.

3 Presentation of the Cost Calculation Model

The CCM: AOA is based on the 'plan-do-check-act' structure.

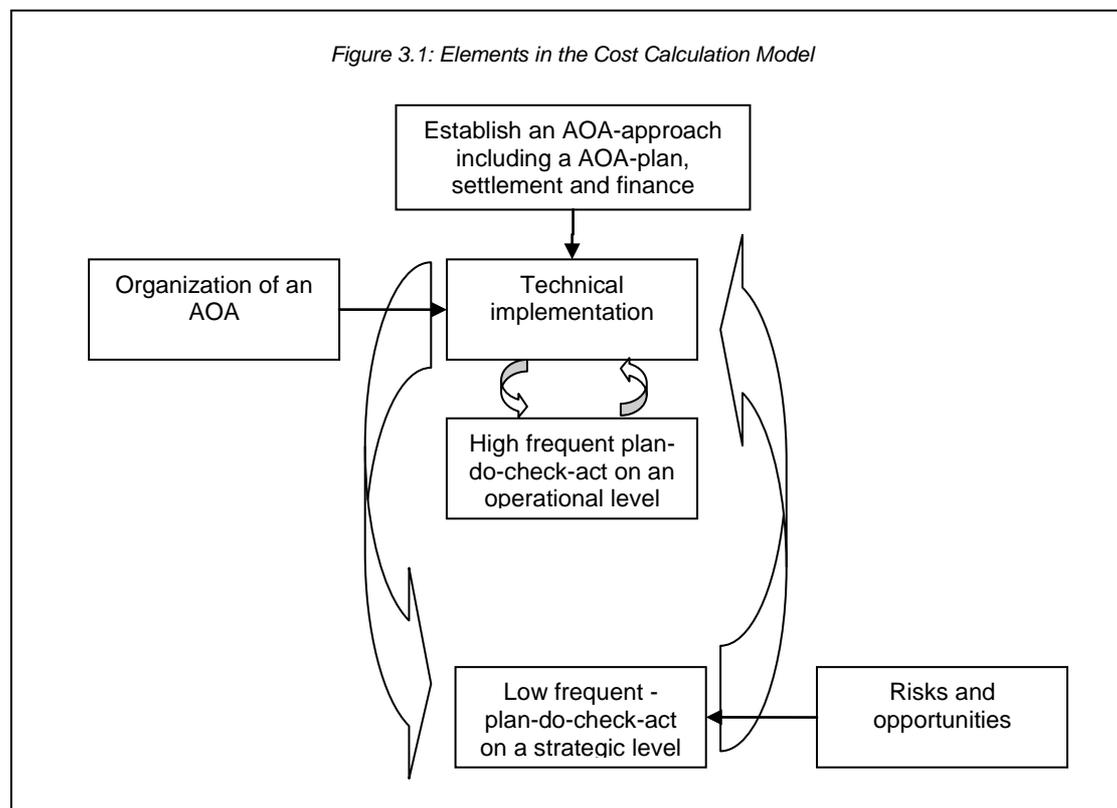
Figure 3.1 illustrates the elements in the Cost calculation model. Two 'plan-do-check-act' structure can be recognized.

1. A high frequent evaluation circle assesses the operational technical processes of an AOA. Activities are implemented on a daily basis and can be executed by a third party. Example activities are: monitoring of the planes of compliance and the need for corrective measures.
2. A low frequent evaluation circle assesses the strategic considerations for further implementing an AOA. It is likely that these activities are to be executed by the party responsible for the implementation of the AOA plan. Activities are implemented on e.g. a yearly or daily basis. Example activities are: change in functional use of the groundwater e.g. for ATEs systems, food industry, strategies in risk assessment of other parties.

Each of the elements in the structure is a separate group of cost elements.

Note.

One of the present day discussions are on the parties that should be responsible for the implementation of AOA plans. The cost model and its 'plan-do-check-act' structure might be useful as a technical input for these discussions.





In table 3.1 the cost elements of the CCM: AOA are shown, including an explanation or background for each individual element. This table shows the *extended version*. For facilitating the first steps in the process to develop and implement an AOA, a *short version* is developed. In this short version the two lowest levels of the cost structure are left blank.

Table 3.1: Cost elements of Area Oriented Approach (AOA)

Subject	Explanation
<p><u>Establish Area Oriented Approach</u></p>	<p>Process, official and administrative activities resulting in a covenant / Letter of intention (LOI) / contract between public and / or private parties</p>
<p>Local policy</p> <ul style="list-style-type: none"> Coordination by local authorities Actor analyses Process manager 	<p>Administrative precondition for an Area Oriented Approach</p> <p>Coordination by local authorities</p> <p>Inventory of agendas and opportunities to synchronize these agendas</p> <p>Alignment of individual interests within organization of decision holder of other parties</p>
<p>Letter Of Intention (LOI)</p>	<p>Process of coming to a LOI including costs as coordination local authorities, decision, investigation and consulting</p>
<p>Area Oriented Approach-plan</p> <ul style="list-style-type: none"> Conceptual Site Model Inventory of sites Development of Area Oriented Approach-plan Monitoring system 	<p>Development of an Area Oriented Approach-plan</p> <p>Conceptual model describing and visualizing all sources of pollution, pathways of spreading and potential risks / receptors due to the spreading. The model is based on data such as geology, hydrology, biology en geochemistry of the soil</p> <p>Inventory of sites</p> <p>Development of Area Oriented Approach-plan</p> <p>Monitoring system</p>

Subject	Explanation
<p>system layout design implementation monitoring plan</p> <p>Scope inventory and assessment</p> <p>Free rider procedure</p>	<p>system layout design implementation monitoring plan</p> <p>Inventory and assessing of partner interests and opportunities</p> <p>Procedures to be applied in the case of free riders who are making use of the opportunities an Area Oriented Approach offers as an alternative for the classical Soil remediation approach</p>
<p>Financing</p>	<p>Participation fee for the Area Oriented Approach, partner internal budgeting or subsidies</p>
<p>Soil remediation measures</p>	<p>Classical Soil remediation measures focused on reducing leaching of sources or (in specific cases) focused on plume remediation. Participation of Decision holder in an existing groundwater remediation or groundwater extraction (in case ending this jeopardizes the Area Oriented Approach)</p>
<p>Convenant/Administrative instruction/contract</p> <p>Draft text and decision making</p> <p>Administrative settlement</p>	<p>Covenant/Administrative instruction/contract</p> <p>Drawing up the text of the covenant/administrative instruction/contract and decision making within the organization of the partners</p> <p>Administrative settlement of Area Oriented Approach-tasks in an administrative decision or instruction</p>
<p>Transfer of responsibility / implementation administrative management</p>	<p>Organization responsible for the implementation of the Area Oriented Approach is moved forward for starting the actual management of the Area Oriented Approach</p>

Subject	Explanation
<p>Geohydrological model</p> <p style="margin-left: 200px;">maintenance</p> <p style="margin-left: 200px;">model use</p>	<p>Monitoring and evaluation groundwater flow (direction, speed etc.)</p> <p>Recalibration of the model, bases on new data.</p> <p>Costs made by the organization responsible for the implementation of the Area Oriented Approach to make the model available for use by third parties. Note. Fees can be charged for the settlement of these costs.</p>
<p>Information management</p>	<p>Management of information related to the Conceptual Site Model and procurement to third parties</p>
<p>Periodic evaluation of the Conceptual Site Model</p>	<p>Periodic evaluation and fine tuning of the Conceptual Site Model based on new (monitoring)data. The evaluation is focused on a better understanding of the risks (spreading and violation of the PoC's) and the need / effectiveness of (extra) remediation measures</p>
<p>Soil remediation measures</p>	<p>Implementation of (additional) soil remediation measures based on the periodic evaluation of the Conceptual Site Model. Remediation measures can be either proactive or reactive</p>
<p>Evaluation effectiveness</p> <p style="margin-left: 200px;">NA potent ion</p> <p style="margin-left: 200px;">assessment soil (additional) remediation measures</p>	<p>Evaluation effectiveness of (additional) soil remediation measures including a cost / benefit analyses</p> <p>Assessment and evaluation of natural attenuation capacity in relation to spreading risks of pollutants in groundwater</p> <p>Evaluation effectiveness of (additional) soil remediation measures</p>

Subject	Explanation
Soil remediation plan	Cost for design a plan to implement (additional) soil remediation measures
Implementation of (additional) soil remediation measures <ul style="list-style-type: none"> interception groundwater pollutants reactive barrier water treatment stimulated NA monitoring evaluation report 	Implementation of the measures <ul style="list-style-type: none"> interception: installation, operational costs including water treatment and project management reactive barrier water treatment stimulated NA monitoring progress and effectiveness of remediation measures Evaluation of remediation measures including need of fine tuning. Measures are evaluated in the context of effectiveness in a Area Oriented Approach
Data management	Management of data regarding the remediation measures and data sharing with other parties (if requested / needed)
<u>Area Oriented Approach-management - Organization aspects</u> Operational cost of the organization responsible for the implementation of the Area Oriented Approach Communication <ul style="list-style-type: none"> general communication Communication with future groundwater users 	Organisational aspects of Area Oriented Approach <ul style="list-style-type: none"> Project management office, IT-infrastructure, communication hardware, staff, et cetera Contact centre for inquiries and active communication with third parties who are involved in the use of the area general communication Procedures when using groundwater, costs/benefits settlement procedures, legal aspects

Subject	Explanation
<p>Organization</p> <p>User restrictions groundwater</p> <p>project management</p> <p>transfer</p> <p>Information management</p>	<p>Communication tools</p> <p>internet site, user manual, publications</p> <p>Provide information regarding groundwater user restrictions</p> <p>Activities of organisation implementing the Area Oriented Approach</p> <p>person responsible for operation aspects of the Area Oriented Approach</p> <p>Transfer of legal duties for soil remediation to the organization responsible for the implementation of the Area Oriented Approach. Including transfer of financial funds.</p> <p>Public Information</p> <p>Site assessment</p> <p>Possibilities and preconditions of transfer</p> <p>Investigation or second opinion of a contaminated site including soil remediation costs</p> <p>Negotiations</p> <p>Decision on transfer</p> <p>Contract for the transfer</p> <p>Legal settlement</p> <p>Management agreement for transfer</p> <p>draft - final text of a contract</p> <p>Legal transfer of soil remediation duties of private party to the organization implementing the Area Oriented Approach</p> <p>Technical data</p> <p>Management of info related to Area Oriented Approach</p> <p>E.g. monitoring data, soil remediation results, pending remediations, monitoring system</p> <p>Contract management</p> <p>Contracts of transferred remediation duties</p>



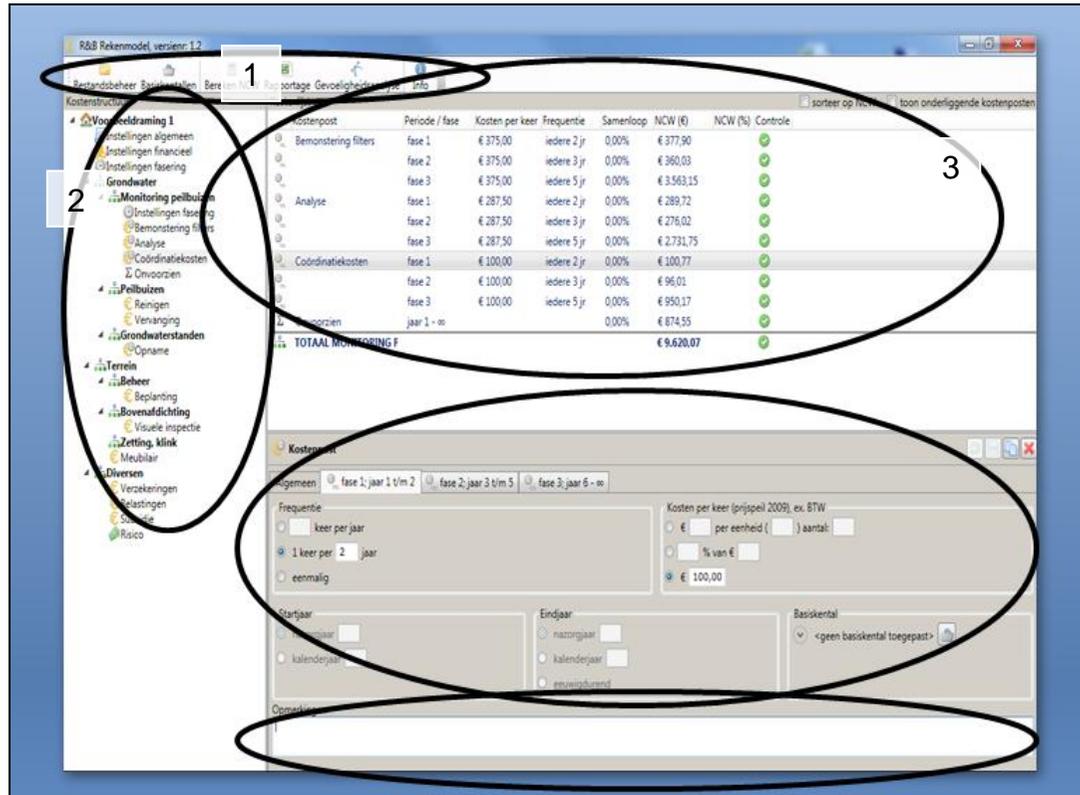
Subject	Explanation
Monitoring urban planning projects and groundwater use	Monitoring and anticipating on changes that may affect the Conceptual Site Model
User restrictions	Policy and instructions to facilitate user restrictions of the groundwater
Handling third party groundwater activities	Agreement with third parties regarding the use of groundwater. Financial benefits can be settled in this agreement
Financial management	Financial aspects of the implementation of an Area Oriented Approach
Administration costs	Basic costs for financial administration
Incoming funds	Income of transfers and settlements of financial benefits
Accountant	Costs for independent financial checks
<p><u>Area Oriented Approach-management - Periodical evaluation Area Oriented Approach</u></p> <p>Technical evaluation Area Oriented Approach</p>	Evaluation of Area Oriented Approach benefits
Analyses and evaluation	Periodical analyses of technical status or progress of the Area Oriented Approach approach and basic evaluation of the principles and strategy of the Area Oriented Approach
Integral analyses of the Conceptual Site Model	Evaluate Area Oriented Approach using monitoring data, Conceptual Site Model and remediation measures
Monitoring plan	Evaluate is the Conceptual site Model meets the new data. In necessary fine tuning of the model. Evaluation and modification of the monitoring plan

Subject	Explanation
<p style="text-align: right;">Need of (additional) remediation measures</p> <p>Report of the analyses and evaluation</p>	<p>Evaluation of the need of additional remediation measures</p> <p>Technical report of the status of the Area Oriented Approach needed for strategic choices regarding the Area Oriented Approach</p>
<p>Strategic evaluation Area Oriented Approach</p> <p>management summary</p> <p>strategic decisions</p> <p>informing decision holder</p>	<p>Periodical strategic analyses of the Area Oriented Approach and basic evaluation of the principles and strategy of the Area Oriented Approach</p> <p>Management summary describing the general status and developments of groundwater quality and possible needs of changing the Area Oriented Approach</p> <p>Informing administration regarding the status and possible needs of changing the Area Oriented Approach</p> <p>Informing decision holder. In case a change in the Area Oriented Approach has been put forward, possibilities of a change in the Area Oriented Approach is discussed</p>
<p>Rephrasing the Area Oriented Approach</p>	<p>Rephrasing or phasing out of the Area Oriented Approach; Area Oriented Approach not fit for purpose any more</p>
<p><u>Risks and Opportunities</u></p> <p>Rephrasing the Area Oriented Approach</p>	<p>Analyses of risks and opportunities of Area Oriented Approach</p> <p>To anticipate of facilitate functional use of the groundwater</p> <p>Events (positive or negative) that require adaptations of the aftercare plan. E.g. technical, juridical, functional use and economical site related changes.</p>



Subject	Explanation
Subsidies	Revenues of the Area Oriented Approach
Participation fees	Subsidies
Financial Benefits of the Area Oriented Approach	General fees when participating the Area Oriented Approach
Transfer fees	Calculated by the CityChlor "Financial benefits-model of an area-oriented approach" Note. Model in progress
Fees for use of the geohydrological model	Fees paid by third parties in case a remediation is transferred from third party to the Area Oriented Approach
Settlement of concurrence	Fees paid by third parties Benefits due to concurrence of activities

Figure 3.2: Overview of how the AOA cost model is translated into CCM: AOA



Key

- 1: CCM: AOA tools
- 2: Cost structure
- 3: Detailed results of the cost calculation
- 4: Details for each individual cost element
- 5: Free user input field. Used in the Cost model to give back-grounds on the individual cost elements

Image: CCM: AOA screenshot

Annex 1: Workshop participants

List of participants of the March, 27th 2012 workshop “Costs of AOA”.
Location: office of AgencyNL, Unit Soil+ at Utrecht

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