

Equalization of the costs and benefits of sustainability measures in area development: two cases to bring new focus

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Abstract

In area development the implementation of sustainability measures is often considered difficult and subject to devaluation of the original ambitions. One of the main reasons for this concerns the costs and benefits of those measures. Some measures require high initial investments, while the return on those investments sometimes takes up to several decades. Another reason is that some measures require investments of stakeholder A, while stakeholder B receives the benefits, and stakeholder C will be confronted with the negative environmental impacts. In such cases making decisions is not always easy.

This paper presents the first outcomes of a Climate KIC PhD study. The goal of the study as a whole is to support climate proof area development by systematically analyzing the role of costs and benefits of measures in the design, development and decision making process, and – based upon the results – by formulating recommendations for improvement. Questions to be answered include, how should the various stakeholders, as mentioned above, be taken into account? Besides this, the study tries to find answers related to impacts beyond the geographical boundaries and/or the timeframe of a project.

The first part of the study concerns an evaluation of two Dutch reference cases in which sustainability has been one of the leading goals. The first case is the (re)development of a large part of the city of Delft. The second case concerns Schiphol Trade Park, a new industrial area to be developed the coming years nearby Amsterdam Airport Schiphol.



This paper consists of a description of the cases, as well as the outcomes of interviews conducted with various stakeholders. The results are meant to bring the next part of the study into focus: what are the real problems to be solved?

Keywords: area development, climate mitigation and adaptation, costs and benefits, equalization, sustainability measures, stakeholders, synergies, urban planning.

1 Introduction

From its origin, sustainability measures lead to societal improvements, either in economical, environmental or social terms. Defined as a process or transition strategy rather than an end in itself, sustainability has not yet been identified with a unified theory or approach. Sustainable development is a moving target: knowledge, technologies, and skills are still being developed every day. In fact, sustainability often relies on the management of transitions – a shift to doing things differently – that tends to be specific to each site, rather than a constant recipe or ‘one size fits all’ type of solution. One way of addressing the complexity of the task at hand, often used these days, is through certification standards. Certification programs can cover most of the aspects of urban (property-) development, including setting targets for site decontamination, use of recycled materials, brownfield redevelopment, provision of public transport, options to discourage fossil transport use, energy consumption and efficiency in buildings, water recycling and waste management. There is however a certain risk attached to this development. Urban sustainability should be more: plans will have to be tied together in an integrated approach with surrounding projects as a total concept within a structure supporting flexible and continuous processes of change.

Within such a large, integrated and complex context, until now it is hard to implement sustainability measures. This is, of course due to various reasons. One of the main reasons concerns the valuation, equilibration and equalization of advantages and disadvantages. Every measure has its pros and cons, which often are hard to compare:

- Offshore wind farms as a climate mitigation measure result in the reduction of CO₂-emissions. The same measures can also hinder bird routes and free view over sea, and while they are easier to realize than wind farms on land, at least to some extent, building and maintenance costs are higher;
- Increasing the height of a dike as a climate adaptation measure often affects cultural, nature or landscape values. Every other water protection measure, whether or not part of the so-called ‘multi-layered safety approach’, has its own positive and negative impacts. Those impacts influence the cost/benefit ratio of the measure;
- Some measures require high initial investments, while the return on those investments can take tens of years;
- Some measures require investments of stakeholder A, while stakeholder B receives the benefits and stakeholder C will be confronted with nuisance and/or negative environmental impacts.



Sometimes sustainability measures are not implemented because of the high initial investments, despite the potential advantages on the long term. The other way around can also be the case: sustainability measures are implemented, thanks to not taking into account the impacts and cost effects of the measures themselves. As is the case in the example described in Box 1.

Box 1: Wind turbines St. Philipsland

[Based on articles in the Dutch journal Binnenlands Bestuur and the Dutch newspaper de Volkskrant]

In 2011 five wind turbines have been built in the area of St. Philipsland, a village in the province of Zeeland, the Netherlands. In 2013, the municipality of Tholen has decided the so-called 'WOZ-value', which is a basis for local taxes, of 24 dwellings within a distance of 1000 meter of the turbines has declined with an average of €40,000.

The local action group Windmolens-Nee (No Wind turbines) demands compensation for the loss of value. 'Wisse Wind', the investment company of the wind turbines, appoints the municipality of Tholen as the stakeholder who has to pay for it. Wisse Wind is a collaboration of an entrepreneur from outside the province and three local farmers, the landowners. Alderman Peter Hoek of the municipality already declared the investors have to compensate the loss of value due to the initiative.

Until now (January 2014) it is not known who will pay the bill. In case the investor will be declared responsible the costs of the wind turbines will increase with tens of percent's. The costs will even be higher in case an impact distance (of visual pollution, noise and drop shadow) of 1500 meter will be taken into account. In the case of St. Philipsland another 200 dwellings will be part of the negotiations. It would mean a doubling of the investment costs.

Recent studies in the Netherlands confirm the statement that the decision making process on (sustainable) urbanization is not optimal. The CPB/PBL report 'Plannen voor de Stad' (Plans for the City) [1] states that social cost benefit analysis (SCBA) is being used in urban development projects more and more. Application of the SCBA instrument structures the process and may lead to better plans. However, according to the authors of the report, there is also criticism. Sometimes those involved in urban development projects do not recognize their plans in the outcomes of an SCBA. Or the impression exists that not all effects of an urban development project have got a place in the SCBA. In response, CPB/PBL developed two new instruments, namely the 'Plan objectivering' and the 'Agglomeratie-exploitatie'. Among others, scientists are explicitly invited to use the instruments and to reflect on possible improvements and / or extensions of the instruments.

Another relevant study by Giezen *et al.* [2] reported from their study on land use policy and sustainable development the following:

- The interests of a landowner will not always run parallel with the collective interests of sustainability;
- The operationalization of the concept of sustainability in practice often leads to tensions, problems and dilemmas. A compact, dense development for instance is beneficial to the protection of green space, but at the same time it leads to greater pressure on the quality of the urban environment (noise, air quality, risk);
- An other complicating factor is that sustainability can be reviewed at different scales, but each of these scales leads to other problems, actions and responsibilities;



- Sustainability measures are taken not only for the short term, but should also be useful in the longer term. This imposes specific requirements on the possibilities to finance the measures, given the payback period. Sustainable spatial development should be flexible, adaptable to changing opportunities and needs.

Giezen *et al.* [2] based their research on interviews and case descriptions (Rijenburg and Oosterwold), and come to the proposition that the core problem in sustainable spatial development is that in land transactions for new developments various parties can earn a lot of money. To solve this problem a series of strategies to affect the system barriers are mentioned, including the equalization of costs and benefits.

2 Starting points, goal, questions and methodology

The main starting points of the PhD study are:

- Not all of the costs and benefits of sustainability measures are taken into account in the decision making process of area development.
- The ‘forgotten’ costs and benefits concern:
 - ‘Soft’, sometimes not measurable aspects, such as the loss of landscape value;
 - Other stakeholders than those involved in the decision making process (e.g. future generations);
 - Impacts elsewhere (beyond the project boundaries).
- The before mentioned (daily) practise leads to sub-optimal choices.

The goal of the study is to support climate proof area development by systematically analyzing the role of costs and benefits of measures in the design, development and decision making process, and – based upon the results of it – by formulating recommendations for improvement.

The main question is how to incorporate costs and benefits of sustainability measures in the design and decision making process of area development (in order to realize climate proof cities)? Sub-divided into the sub-questions:

- How do we take the various stakeholders into account?
- How do we deal with impacts and stakeholders outside the scope of the project?
- How do we discount short en long-term effects?
- How can we equalize the costs and benefits of measures?

The first part of the study concerns an evaluation of two Dutch reference cases in which sustainability has been one of the leading goals. The first case is the (re)development of a large part of Delft, Delft-Zuidoost. The second case is Schiphol Trade Park, a new industrial area nearby Amsterdam Airport Schiphol.

The evaluation consists in both cases of desk research and in depth interviews with representatives of the main stakeholders. In the Delft Case the municipality, the Real Estate Department of the University of Technology (TUD; being one of the shareholders in the area), the regional water board, a local interest group and two project developers, were interviewed. In de Schiphol Trade Park Case also

the municipality and the regional water board were interviewed. Besides this an environmental interest group, a private project development company and the Breeam assessor for Schiphol Trade Park were interviewed. Last but not least a representative of Schiphol Area Development Company (SADC) was interviewed. SADC is responsible for the commercial development of terrains around the airport. It has four shareholders: the municipalities of Amsterdam and Haarlemmermeer, the province of North Holland and Schiphol Group.

For a structural approach of the interviews a questionnaire has been used. The questionnaire consisted of five sub parts: General, Sustainability, Climate Mitigation and Adaptation, Costs and Benefits, and Decision Making. The General part and the Sustainability part were meant to get insight in the interests and point of views of the stakeholders interviewed: from what perspective do they look at (the equalization of costs and benefits of) sustainability measures? The last three parts were more content specific: what kind of climate measures has been discussed in the specific case, how did costs and benefits play a role? And how did all of this influence the decision making process?

3 Reference cases

3.1 Delft Zuidoost

Delft is a city of approximately 100,000 inhabitants in the western part of the Netherlands, in between Rotterdam and The Hague. The south east part of the town, quite close to the ancient city center, hosts the Delft University of Technology (TUD). In 2012 the number of students at the TUD was approximately 17,500. The TUD as well as its neighbor, the Inholland University of Applied Sciences, expect further growth.

Besides the universities the Delft Zuidoost area also houses several residential neighborhoods, such as the 'Zeesheldenbuurt' and the 'Wippolder', see Figure 1. These residential areas were built in the 20th century. In recent years some blocks with student apartments have been built too. Altogether Delft Zuidoost is a mixed used area with houses, schools, companies, museums, a large graveyard, water, green, and infrastructure. The university is the largest player, both in visibility as well as in terms of land ownership and functionalities.

In order to address the expected need for space, the Municipality of Delft started making land use plans. One of the first plans, for the northern part of the area, failed. Residents in the surrounding areas objected to the plan and – in the end – after court ruling [3] the preparation of the plan was said to be insufficient. One of the arguments was the plan did not meet the national environmental law: being part of a larger development an Environmental Impact Assessment (EIA) should have been prepared for this land use plan.

As a result, a new planning process started. This time, from the beginning, there was a close collaboration between the main stakeholders, among which the Belangenvereniging TU-Noord, an interest group of inhabitants. Also from the beginning, the environmental impacts were assessed by an EIA.



The final EIA [4] was approved by the independent Netherlands Commission for Environmental Assessment (NCEA) [5] and by the board of the Municipality of Delft. One of the conclusions of the EIA was that, within the environmental standards for air quality and noise, it is possible to realize the necessary 4800 new dwellings, of which 3000 student homes. For each of the specific sub locations some restrictions apply, but by taking into account enough distance (zoning) between the main roads and the building lots it is allowed to create new living areas on each of the locations.

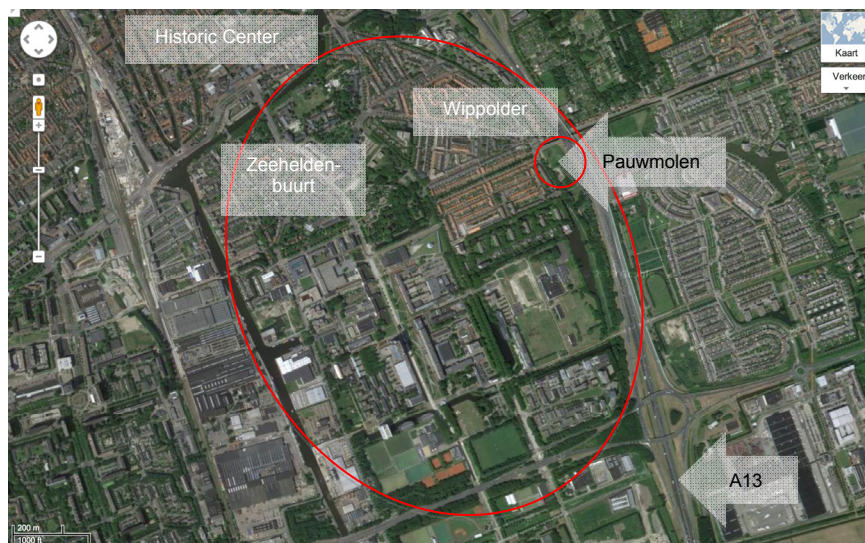


Figure 1: Delft Zuidooost.

The first more detailed land use plan the EIA had to support concerned 'Pauwmolen', a small piece of land close to the highway A13. At that time it had the highest priority as a developer was prepared to invest in a new building with both social and student houses.

The EIA listed three main points of attention for Pauwmolen. The juxtaposition to the A13 was one of those three: without specific measures such as noise barriers and noise sheltered loggia's the plan could not meet the noise standards. The second point of attention concerned water control. In accordance with the standards of Delfland Water Board, anticipating on the impacts of climate change, the project should include some additional water measures, like additional water retention facilities and green roofs. The third point of attention concerned the ecological impacts of the plan, as the Pauwmolen location is part of the Ecological Structure of Delft. Although the ecological values were not high at that moment, the location had certain ecological potentials. Therefore compensation was needed and measures were developed to improve water quality and to create a green environment.

The aforementioned measures became part of an – in Dutch – ‘*anterieure overeenkomst*’, which is a voluntary agreement between the developer and the municipality. According to this agreement the developer declared to design and build the building while the municipality declared to prepare a new land use plan. The developer has to pay for the extra measures, as well as for some of the site preparation costs (such as a part of the costs of the EIA). On December 15, 2011 the local board of the municipality of Delft established the Pauwmolen land use plan [6].

Besides the legal points of meeting noise and air quality standards the EIA made clear further attention has to be paid for the livability of the area, especially regarding the water structure and green space. Therefore a number of initiatives were taken.

In 2011, as a direct follow-up of the EIA for Delft Zuidoost, the project ‘Groen Blauw Delft Zuidoost’ started. The local board of the municipality decided not to wait for new individual developments, but to elaborate integrated solutions for the whole area in order to solve the problem of shortages in water and green in the Zuidoost area. In this ‘Groen Blauw’ project various stakeholders in the area collaborated and prepared a so-called ‘Kansenkaart’, a map with challenges and potentials, resulting in 180 concrete measures. It shows the opportunities for the whole area to create green spaces and improvements in the water structure [7].

Part of the ‘Groen Blauw’ Project was the participation of Delft in TEEB City. The Economics of Ecosystems and Biodiversity (TEEB) is a global initiative which focuses on economic benefits of biodiversity including the growing cost of biodiversity loss and ecosystem degradation. TEEB presents an approach that can help decision-makers recognize, demonstrate and capture the values of ecosystem services and biodiversity [8]. In the Netherlands, as a contribution to this initiative, ‘TEEB City’ has been developed. TEEB City is a tool to integrate the societal benefits of green and water measures in the decision making process of urban planning. The Delft Zuidoost area (re)development was one of the pilots for the development of this tool [9]. In short, TEEB City takes the economical advantages of green and water measures in public space into account in decision making in order to make better decisions. The tool helps to calculate the life cycle costs and benefits (see Box 2) of measures. It also helps to define the beneficiaries of the measures. By including those beneficiaries in the design process, in brainstorming etcetera, and persuading them to become co-investors, the measures can become more feasible.

Box 2: Possible benefits of green and blue

More wellbeing: increasing value of real estate, both housing and offices
 Less inundation: less repair costs
 Improvement of air quality (capturing of fine particles): increase of health
 More social security: less movement costs, less misdemeanour costs
 More leisure in your own neighborhood: less travel expenses
 Less energy consumption as a result of green roofs



In the pilot of Delft Zuidoost the 180 measures of the ‘Groen Blauw Delft Zuidoost Project’ were part of new calculations. The estimated benefits amounted €27 million, while the costs were estimated as €17 million. This was an interesting outcome, but so far it didn’t result in implementation of all listed measures. At the moment, only a small number of opportunities, the quick wins, have been executed. The TUD has created a green roof on one of its faculties. It added 300 m² green surfaces to the area. DUWO, a housing corporation for students, has opened the Kanaalhof, a small park, for public. The municipality has redesigned the Zuidplantsoen into a ‘biodiversity garden’. And, last but not least, various water banks have been made more accessible for animals and plants (nature friendly). For most of the measures however, the implementation process still has to start. Actually, to minimize the costs they rely on possibilities for creating synergies.

3.2 Schiphol Trade Park

In 2006 an integral vision on the development of the Schiphol Region was established. The ambitions of this vision were elaborated in the so-called Masterplan ‘ACT Beyond Logistics’ (Amsterdam Connecting Trade) [10]. The area is meant to become a place for people, goods and information to be connected in a stimulating and sustainable environment.

A next step towards a sustainable area development was the development of a guide for implementing ambitions towards sustainability. The ‘Guidance Duurzaamheid ACT’ [11] distinguishes three themes: 1) spatial design, 2) energy, water and resources and 3) mobility and accessibility. The spatial design section is about the realization of a resilient green- and water structure, smart clustering of functions (for industrial ecology purposes) and the strategic zoning of transport systems (separate structures). The second topic aims at a self-sufficient system regarding these essential ‘streams’ in 2040: an area that doesn’t rely on energy and water from outside and that doesn’t produce waste. Mobility and accessibility as the third theme has multimodality as a keyword: for people it aims at increasing the use of public transport as well as the use of bikes and for goods the use of other transport systems (high speed cargo trains, wheel based transport modes and transport by ships).

The approximately 347 hectares ‘A4 Zone West’, recently renamed ‘Schiphol Trade Park’ (STP), is one of the four main parts of ACT. It is meant to become “the most sustainable business park in Europe” [11]. It is located nearby Hoofddorp, only a few kilometers from the center of Schiphol Airport (see Figure 2).

In the coming 25 years two-thirds of the area will be transformed from agricultural land use into a business park for clean logistics, bio based economy and research and development. The other part will become a landscape park (among which, the ‘Geniedijk park’, which is part of the Defense Line of Amsterdam, which is since 1996 part of Unesco’s World Heritage List). On July 14, 2011 the so-called ‘Integraal Ontwikkelingsplan (IOP) A4 Zone West’ (integrated development plan A4 Zone West) [12] was established, with a list of 27 sustainability measures as an annex. This plan is being used as a guide for the



further development of STP. It is a dynamic model, which consists of a main structure for the whole area. Apart from that some more specific elements for the first phase have been pointed out.

In 2012 the GEM A4 Zone West C.V., which is the development company for STP, and the Municipality of Haarlemmermeer subscribed a covenant to secure the further implementation of the 27 sustainability measures of the IOP [13]. A few months later a covenant was created to emphasize the role of the regional water board, in this case 'Rijnland Water Board' [14]. With this covenant the GEM A4 Zone West CV and Rijnland Water Board agreed upon the ambition to realize a resilient and sustainable water system. Also, this second covenant secured the establishment of a (sustainable) water plan.

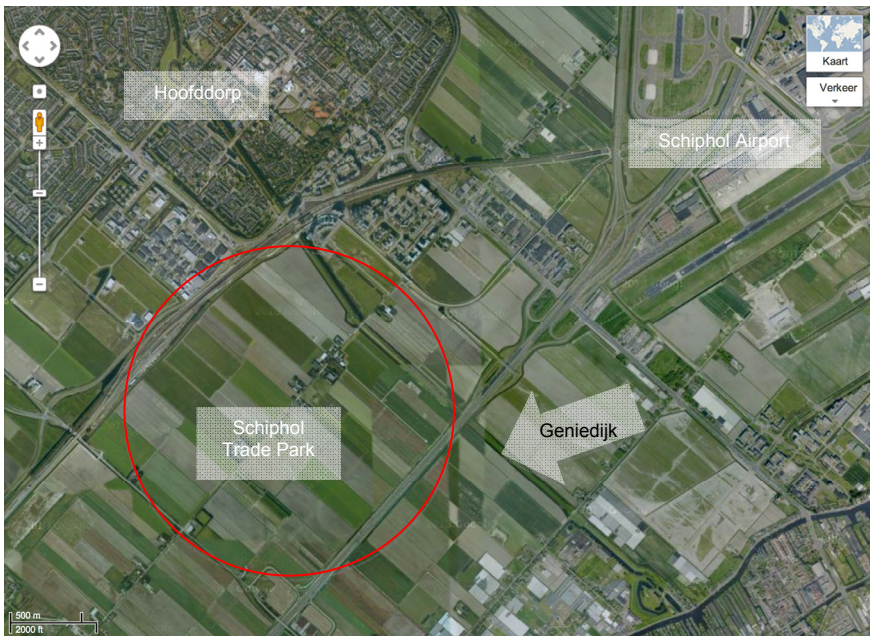


Figure 2: Location for the development of Schiphol Trade Park.

Based on the IOP a land use plan including an Environmental Impact Assessment (EIA) was developed. At first the independent Netherlands Commission for Environmental did not agree with the original EIA [15]. Without more information about the usefulness and necessity of the development the land use plan could not be established, according to the Commission. The municipality therefor decided to submit an addendum to the EIA [16]. This resulted in a positive advice [17].

At the moment of writing this paper, January 2014, the land use plan including a sustainable water plan is expected to be established in the middle of February 2014. Also a progress report on the implementation of the 27 sustainability measures and a BREEAM Assessment Report are to be

finalized soon. BREEAM (Building Research Establishment's Environmental Assessment) is a world wide used method for measuring the sustainability performances of buildings and projects. The GEM A4 Zone West hopes STP will be assessed as an 'excellent' project.

4 Results

The case studies and in particularly the interviews with stakeholders related to these, have generated a lot of information and ideas. In this section the results will be summarized in accordance with the four sub questions in section 2. Section 5 will give a reflection on it.

Stakeholders

The Delft case has further confirmed that it is very important to involve stakeholders early in the planning process. Otherwise the risks of delay and additional preparation costs are high. In the case of STP from the beginning relatively many stakeholders were involved, partly because major stakeholders were already shareholders of SADC.

In Delft it was decided not to establish the agreements formally. In STP covenants were drafted. Whether or not these solutions work in practice will only be known in future. It would be interesting to monitor the developments.

Geography

Delft initially disregarded the confluence with developments in the vicinity of the project. This was punished by court. Also in the development of 'Pauwmolen' it was necessary to look beyond the project itself: the development could possibly have impact on the coherent Ecological Structure of Delft as a whole. The EIA of STP showed that the impacts go up to a distance of over 10 km. Due to nitrogen emissions of industry and traffic negative effects may occur in 'Natura 2000' areas. Because of this unexpected stakeholders come into the picture and – as a result of it - unexpected measures were needed. For both cases, the effects of traffic played an important role in the EIA's. Traffic, almost by definition, exceeds the boundaries of a project.

Finances

Both cases show that it is not for every stakeholder business as usual to take into account all of the costs of management and maintenance within the planning phase. In Delft at least one of the developers puts question marks at the usual method for discounting future costs and benefits (Net Present Value). The unpredictability of inflation is one of the reasons. In STP the use of the method of TCO (Total Costs of Ownership) is being promoted, but – as said before – not every stakeholder is prepared for it.

Equalization

The application of TEEB City in the Delft case has led to the conclusion that the agreed sustainability measures may have strong revenues. However, these benefits are not readily available, since they sometimes end up with stakeholders other than the investors. Perhaps a form of value capturing can offer a solution.



In STP the establishment of a ‘gebiedsfonds’ (a fund to support area development) is currently under consideration. Purpose of this fund is to avoid future decay by using new financing tools.

5 Reflections

The PhD research started with the assumption the design and decision-making process of area development is, until now, not always optimal. This assumption was confirmed in literature and in the analyzed cases. The second part of the study will focus on the following subjects:

Instruments and the use of it

Until now management and maintenance costs often are forgotten in cost estimations. This problem can be solved by systematically taking Life Cycle Costs (LCC) into account. A serious problem however is that LCC relies on economical predictions (e.g. of prices). The economical crisis of the past five years approved that economical predictions have their restrictions.

Like already mentioned in section 1 also the so-called ‘Social Cost Benefit Analysis’ has its restrictions. Is the recently developed ‘Agglomeratie-exploitatie’ an interesting alternative, or a useful addendum to it?

Potential future benefits often are not directly available for use. The TEEB Tool is an interesting instrument, especially for mapping future values and value keepers. But can it also be beneficial for deciding about equalization?

Value capturing and participation

In urban planning it is common for stakeholders to participate in discussions and decision-making. The next step, at least for some stakeholders, would be to participate in paying. Are people prepared to pay for measures to improve the general livability? See the tendency in the development of wind turbine locations: landowners and also residents can participate and benefit from it.

Decision making and implementation

Are intentions to cooperate, like in the Delft case, enough for making progress towards sustainability or do we need strict agreements (covenants, regulations, etc.) like in the STP case? Is it justified to rely on future synergy possibilities? What happens when there are no initiatives to attach to? These are question to address in the follow up.

References

- [1] Romijn, G. & Renes, G., Plannen voor de Stad, Een multidisciplinaire verkenning van de effecten van verstedelijkingsprojecten op het functioneren van een stad, Centraal Planbureau/Planbureau voor de Leefomgeving, March 2013.
- [2] Giezen, M., Driessen, P.P.J., Spit, T., & De Gier, T., Grondbeleid en Duurzame Ruimtelijke Ontwikkeling, Universiteit Utrecht, Faculteit



- Geowetenschappen en Faculteit Recht, Economie, Bestuur en Organisatie, May 2013.
- [3] Dutch Council of State, Administrative Jurisdiction Division – case number 200800791/1, May 20, 2009.
 - [4] Arcadis Nederland BV, Project-MER Bestemmingsplannen Delft Zuidoost, 24 February 2011.
 - [5] Commissie voor de milieueffectrapportage, Bestemmingsplannen Delft Zuidoost, Toetsingsadvies over het milieueffectrapport en de aanvulling daarop, rapportnummer 2387-96, July 25, 2011.
 - [6] Gemeente Delft, Bestemmingsplan Pauwmolen, December 15, 2011.
 - [7] LUZ architecten and MBDSO, GroenBlauw Delft Zuidoost, January 2012.
 - [8] www.teebweb.org.
 - [9] Green pays with TEEB City, Local authorities reason, reckon and earn with the benefits of nature and water, 2012.
 - [10] Schiphol Area Development Company, Masterplan ACT, June 2008.
 - [11] Programmabureau ACT, De weg naar een duurzaam werklandschap (Guidance Duurzaamheid ACT), November 2009.
 - [12] GEM A4 Zone West, Integraal Ontwikkelingsplan A4 Zone West, established by the board of the Municipality of Haarlemmermeer at July 14, 2011.
 - [13] GEM A4 zone west CV and gemeente Haarlemmermeer Convenant Duurzaamheid A4 Zone West, , April 23, 2012.
 - [14] GEM A4 zone west CV and Hoogheemraadschap van Rijnland, Convenant Duurzaam Watersysteem A4 Zone West, April 23, 2012.
 - [15] Arcadis Nederland BV, MER Bestemmingsplan A4 Zone West, February 13, 2013.
 - [16] Adviesbureau Willie Fikken, Aanvulling MER Bestemmingsplan A4 Zone West, October 3, 2013.
 - [17] Commissie voor de milieueffectrapportage, A4 Zone West, gemeente Haarlemmermeer, Aanvullend toetsingsadvies over het milieueffectrapport, rapportnummer 2604-111, November 4, 2013.

