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# Improving social sustainability through stormwater collaboration

An interview study to map how collaboration affects the city's ability to improve social sustainability through stormwater projects

Master's thesis

CARL PETERSSON  
NILAS SPARRSTRÖM

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DEPARTMENT OF COMMUNICATION AND LEARNING IN SCIENCE

CHALMERS UNIVERSITY OF TECHNOLOGY  
Gothenburg, Sweden 2021  
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CARL PETERSSON

NILAS SPARRSTRÖM

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Supervisors: Sebastian Rauch, Division of Water Environment Technology  
Carl Johan Carlsson, Division for Language and Communication

Examiner: Samuel Bengmark, Department of Mathematical Sciences

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Department of Communication and Learning in Science

Chalmers University of Technology

SE-412 96 Göteborg

Sweden

Telephone + 46 (0)31-772 1000

Göteborg, Sweden 2021

# Abstract

## Improving social sustainability through stormwater collaboration

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Due to climate change, rainfalls are expected to increase, both in numbers and intensity, in the future. This creates a need for better stormwater management and parts of that need to be on the surface since there is a need for sustainable management and because the traditional pipe-based solutions underground will no longer suffice. With the increased use of surface solutions comes the need to build multifunctional areas that improve the social sustainability of cities at the same time as the stormwater issues are solved long-term. But multifunctional solutions demand more collaboration between the different municipal departments responsible for planning and building cities. This report aims to answer the question of how collaboration affects stormwater projects' abilities to increase social sustainability in a city, and which difficulties need to be considered for the projects to succeed. This is accomplished by looking at the situation in Gothenburg through interviews with representatives from the technical departments, and by observing workshops where the issue of social sustainability is discussed. Some of the major findings were that there is a lack of understanding between the departments; the goals regarding social aspects are not clear enough; stormwater is considered too late in the planning process which drastically decreases the projects' possibilities to bring in social aspects; lack of city space complicates implementation of socially sustainable solutions; it is difficult to quantify the social gains which makes it difficult to get funding for these types of projects. However, a number of these issues could be helped by the planned reorganisation of the departments which will enable people of different expertise to work closer together. With a more holistic view, and with a focus on the residents well-being during the planning phase, a lot more could be done for improving social sustainability, and the measures that are taken could have greater effect.

**Key Words:** Blue-Green, Collaboration, Cross-Disciplinary, Interdisciplinary, Social Sustainability, SSM, Stormwater, Water Management

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# Nomenclature

*BKA - Child Impact Assessment (Swedish: Barnkonsekvensanalys)*

*KoV - Recycling and Water Department (Swedish: Kretslopp- och Vatten)*

*LOD - Local Stormwater Treatment (Swedish: Lokalt Omhändertagande av Dagvatten)*

*MCDA - Multi-Criteria Decision Analysis*

*PoN - Parks and Nature Committee (Swedish: Park- och Naturförvaltningen)*

*SBK - Urban Planning Department (Swedish: Stadsbyggnadskontoret)*

*SKA - Social Impact Assessment (Swedish: Social konsekvensanalys)*

*SSM - Sustainable Stormwater Management*

*TBL - Triple Bottom Line*

*TINK - Accessibility, inclusion and norm-critical analysis (Swedish: Tillgänglighet, inkludering och normkritisk analys)*

*TK - Traffic Division (Swedish: Trafikkontoret)*

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# 1 Introduction

This report aims to investigate how collaboration between municipal actors in Gothenburg works in stormwater projects and how better collaboration could increase the project's possibility to work with social sustainability issues. It is written for RISE Research Institutes of Sweden, within the project TINK (Swedish: *Tillgänglighet, inkludering och normkritisk analys*). In TINK, RISE investigates the possibilities of using open stormwater solutions to increase the social sustainability in city areas.

Social sustainability in cities can be increased by creating attractive urban environments and by providing areas for exercise and recreation that are accessible for everyone, regardless of age, socio-economic status, or disabilities. There has lately been a shift in stormwater projects with an increased use of blue-green infrastructure that provide ecological benefits by going back to natural ways of treating the water locally. Blue-green infrastructure is the use of vegetation, open water and natural processes such as retention, infiltration and evaporation as stormwater management. These solutions have an, often unused, potential to increase social sustainability as well, by serving multiple purposes. The planning of multi-purpose stormwater solutions, however, often demands a close collaboration between municipal actors and individuals with different aims, objectives, backgrounds and knowledge, which can be a demanding task, especially with a tight time schedule.

## 1.1 Background

Before getting too deep into the topic of this report, the expression *social sustainability* needs to be defined. The most commonly used definition of sustainable development comes from the so-called *Brundtland Report* (United Nations, 1987): “*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*” (p. 37). Social sustainability is often mentioned as one of three pillars of sustainable development, together with economic and environmental. They are said not to be mutually exclusive, that is to say that one cannot exist without the other. The social part of sustainable development could be seen as everything that has to do with the well-being of humans, both physically and mentally. While social aspects such as ending poverty and hunger undoubtedly are very important, this report focuses on the problems that can be counteracted through the creation of good public spaces in the city. This includes space for exercise and recreation as well as using the water as a possibility to create experiences for the residents.

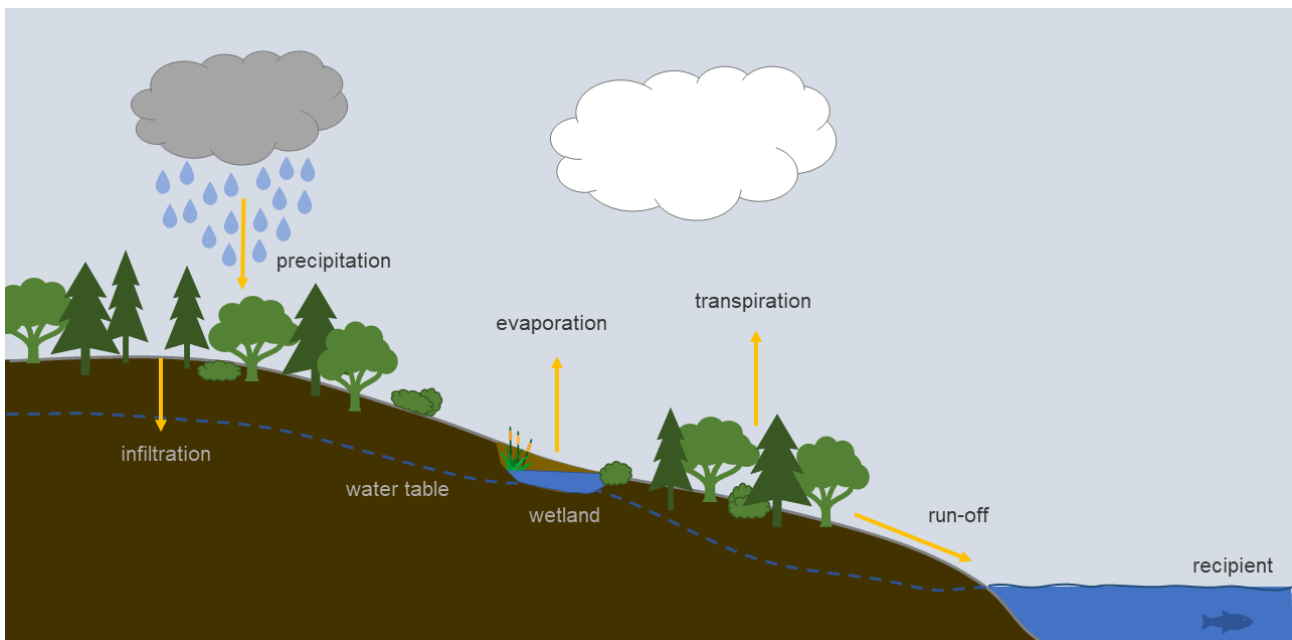
In Sweden, 19% of the population have, at some point, been diagnosed with depression and 14% say that they are currently feeling a lot of stress (Folkhälsomyndigheten [FHM], 2020). At the same time 52% are overweight and that number is increasing (FHM, 2021). Swedish cities are growing, in 2015 85% of Swedes lived in urban areas, the same number was 50% in 1930, and that number is still increasing (SCB, 2015). Green spaces in urban areas can provide a relatively low-cost contribution to improving and maintaining physical and mental health by providing opportunities to access nature for the citizens (Lundy & Wade, 2011).

Traditionally, stormwater and landscape questions have been completely separate. But when the ecological and climate issues have grown in importance, the different disciplines have become closer connected. In cities, where more green areas are desirable, it should therefore be possible to improve social and ecological aspects with multifunctional stormwater solutions. One way of doing this is to take a step back and take inspiration from how nature deals with excessive water.

### 1.1.1 Sustainable stormwater management

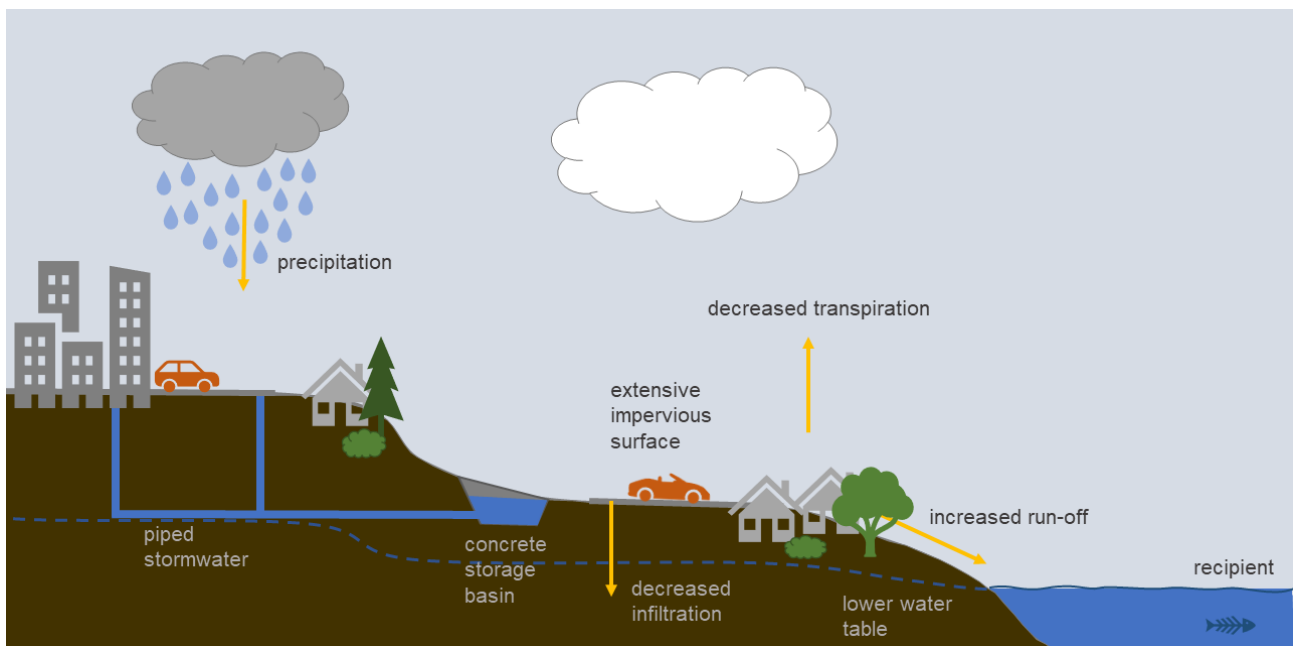
In nature, most water from rainfall infiltrates the ground, but the rainfall that hits impervious materials such as exposed rock and rainfall that overwhelms the infiltration capacity of the ground runs off from the area to the *recipient*, the watercourses to which stormwater or sewage water is led, as part of the natural hydrological cycle, further described in figure 1. In sparsely populated areas, people can easily live in harmony with this natural phenomenon. When population density increases, however, the need for stormwater management occurs, not least because of the increased use of impervious materials at the expense of natural vegetation that could infiltrate the water. The water increases the risk of flooding and washes away pollutants that risk ending up in receiving recipients (Holman-Dodds, 2007). The traditional way of dealing with these flows is to try to get the water away from the urban area as quickly as possible through channels and pipes, as described in figure 2.

Figure 1 describes a natural cycle, where rain falls and infiltrates the permeable ground and becomes groundwater. Some of the rain flows on or below ground to wetlands and recipient water bodies. The rest of the rain becomes water vapor through evaporation from water bodies and transpiration from plants.



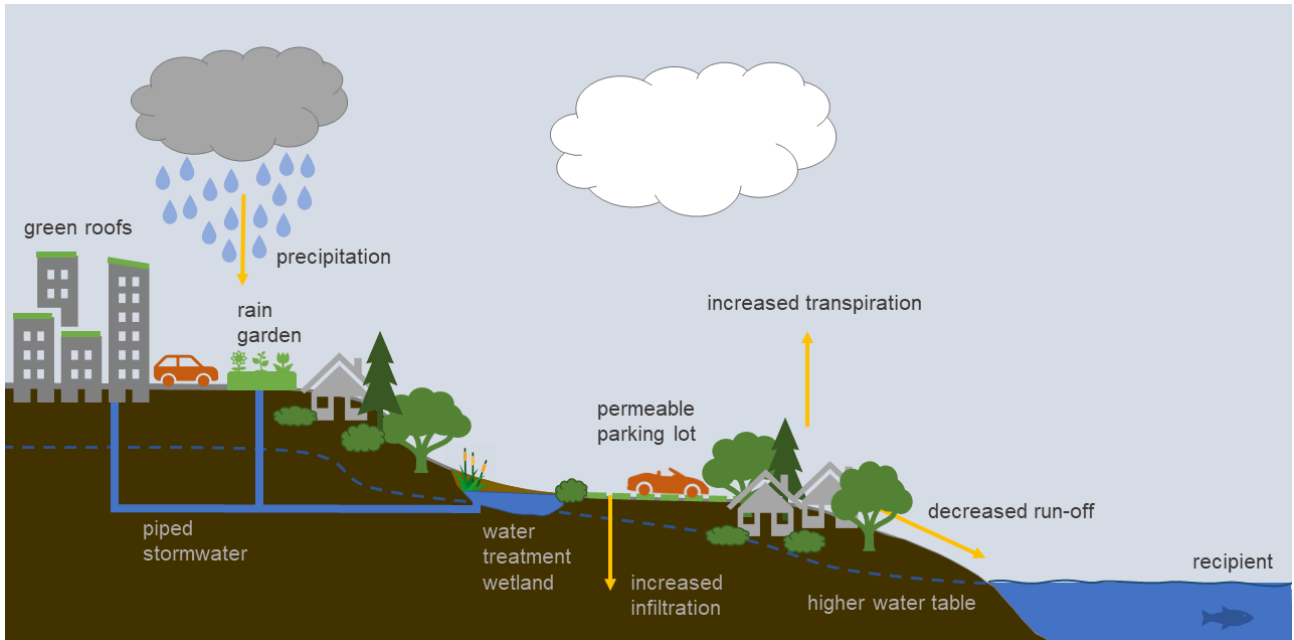
**Figure 1:** Natural stormwater cycle

Figure 2-3 show two water cycles with human intervention, but with two different approaches. Figure 2 describes how the water cycle is affected in an urban area with a lot of impervious materials. Less vegetation decreases transpiration and less water infiltrates the ground, leading to a lowered groundwater table. Instead the run-off increases because of extensive impervious areas, leading to pollutants ending up in the recipient. Some stormwater from roofs and other impervious areas might go through pipes to manmade storage basins without treating capacity, or to a treatment plant in a combined system. The flow might be high, resulting in risks for flooding or less effective treatment, during heavy rains.



**Figure 2: Pipe-based stormwater management**

Figure 3 shows a water cycle where natural phenomena are mimicked through blue-green stormwater solutions. Green roofs and rain gardens treat and detain rainwater before sending it to a constructed wetland that can filtrate the water for pollutants. Permeable surfaces lead to increased infiltration and a maintained water table while increased vegetation leads to increased transpiration and decreased run-off.



**Figure 3:** Blue-green, multifunctional stormwater management

In Gothenburg, 20% of the city is drained through a combined system where the stormwater runs, together with sewage water from households and industries, to the city's sewage treatment plant *Ryaverket*. The increased flow due to the stormwater decreases the treatment efficiency which leads to an increased amount of nitrogen, phosphorus and biological material in the recipient. After unusually heavy rainfalls, the capacity of the treatment plant can even be exceeded, with the release of untreated stormwater and wastewater as a result (Calgaro et al., 2018). A separate system leads the stormwater directly to the recipient without affecting the treatment of the wastewater. The quality of the stormwater at the specific site decides if there is a need for on site treatment before it is led to the recipient.

On top of the decreased treatment efficiency with dated, undersized pipes, the issues of flooding are expected to get even worse due to rising sea levels and increased and more irregular rainfall because of climate change (Föreningen Sveriges Stadsbyggare, Svensk Försäkring, & Svenskt Vatten, 2017). The problems are believed to be most prominent in already troubled areas, but new problem areas will arise as well, and this will further increase the need for sustainable stormwater management.

A more sustainable alternative to the traditional methods of dealing with stormwater is an integrated approach where the pollution content of the water and its effects on the receiving water is taken into account and taken care of locally, in a way that mimics how nature is taking care of the problem (Blom et al., 2017). This blue-green infrastructure increases the resilience to heavy precipitation in urban areas and can improve all three aspects of sustainability: ecological, social,

and economical. These alternative methods have increased in popularity during the last 40 years and have many names and forms. The Swedish denomination is *Lokalt Omhändertagande av Dagvatten* (LOD) which means *local stormwater treatment*.

## 1.1.2 The situation in Gothenburg

Gothenburg is a growing city with segregation issues (Göteborgs stad, 2014). To tackle these problems the city uses the document *Strategy for Gothenburg 2035* (Swedish: *Strategi för Göteborg 2035*), that aims to densify the city, especially in the cohesive city areas outside the city centre. The aim is to bind the city together and make more people live closer to work, grocery stores, schools, bus stops, and other things that make everyday life a little easier. The strategy, together with the comprehensive plan, is supposed to show how the city wants to develop long-term, and be a basis for priorities. This section further describes how the city of Gothenburg is currently working with social sustainability in relation to the built environment and stormwater management. It is mainly based on policy-documents from different municipal actors involved in the projects.

### 1.1.2.1 Strategy for increased social sustainability in Gothenburg

In the document *Grönstrategi för en tät och grön stad*, the Parks and Nature Committee (Swedish: *Park- och Naturnämnden*, PoN) explains how the city is trying to be more socially and ecologically sustainable with the help of vegetation in the city area (Park- och naturnämnden, 2014). The document lists goals and strategies regarding vegetation and sustainability. The goals are divided into social and ecological goals. One of the strategies is to ensure good access to parks and nature areas for all residents of the city. It contains guidelines for what good access is for different types of green areas. According to the guidelines there should be a larger nature area and a city park within 30 minutes with public transportation from every home. There should also be a district park within a 15 minute walk and a small residential park within 300 meters. The residential park is the type of green area that is most relevant for the multifunctional stormwater solutions discussed in this report.

There is research showing that inviting urban areas can improve trust between people, reduce fear and conflict, and in the long run even segregation (Boverket, 2010). Therefore it is important that there are green areas, available for everyone, spread out over the city. This is especially important for children, elderly people, and others who have a hard time transporting themselves. The Swedish National Board of Housing, Building and Planning (Swedish: *Boverket*) describes multifunctional areas as an opportunity to combine the national goals of improving the populations health and well-being with sustainable stormwater solutions. The goal is to decrease the amount of impervious surfaces when planning for new building sites. Within that goal is also a need to replace existing impervious areas. Historically, stormwater management has been focused on purification of stormwater and increasing biodiversity. Now there is a need for multifunctional solutions that can at the same time prevent flooding, help biodiversity, and provide green areas or parks for recreational purposes.

The Urban Planning Department (Swedish: *Stadsbyggnadskontoret*, SBK) in Gothenburg is using a tool called *Social impact assessment* (Swedish: *Social konsekvensanalys*, SKA) to evaluate the

social consequences for an area in the city (Stadsbyggnadskontoret, 2016b). It does so based on four main concepts for social aspects that are very similar to the social goals in *Grönstrategi för en tät och grön stad*. The first one is called *Cohesive City* and is about reducing social inequality and segregation by mixing activities, densifying the city, and creating meeting places for people. PoN discusses the same thing but emphasizes the role of parks and nature areas as meeting places. The second aspect is called *Interplay* and zooms in on the importance of good meeting places and PoN emphasizes the importance of green and attractive city areas where people want to spend time and meet other people. The third aspect, *Identity*, is about how SBK and PoN work towards making the residents of the city identify as citizens of Gothenburg and help them find a feeling of cohesion. The concept *Cohesive City* discusses the questions more in general while *Interplay* describes the importance of having lots of different green areas where people feel at home and want to spend time. The fourth and last aspect is called *Everyday life*, and SBK describes how it is important to have a built area where the citizens are able to do all the important tasks of everyday life, like going to work, picking up kids from school, and shop for food, but also to have areas for exercise and recreation. PoN focuses on the health aspect and emphasizes the importance of parks and nature areas to get people to do physical outdoor activities.

Based on these four main concepts, the SKA analysis tool works as a support throughout the whole planning process for identifying and sorting the most important social aspects. Early in the planning process, knowledge about the area's social character in relation to the physical structure is gathered, and this forms the basis for the rest of the impact assessment. The three steps that form the SKA are called inventory, measures, and consequences. Social qualities and needs are identified, sorted, and listed in a priority list. Appropriate measures are then developed and the consequences from those are mapped and evaluated. This results in a foundation for measures that need to be taken to improve the area.

SBK has another, similar, tool called *Children impact assessment* (Swedish: *Barnkonsekvensanalys*, BKA) (Stadsbyggnadskontoret, 2016b). It is, as the name suggests, a similar tool aimed at the situation for children and young people. It consists of the same steps and main concepts as SKA but it emphasizes different important perspectives. The different perspectives are children's situation in regards to the building, the local environment, the district, the city, and the region. The need for a separate tool for children and their situation is said to be because they are affected by the built environment to the same extent as adults, but without having any possibility to affect its design.

*Rain Gothenburg* is an initiative from the city that aims to take advantage of the possibilities of rain and to, with the help of art and design, make Gothenburg *the world's best city when it rains* (Göteborgs stad, 2021). The work towards this vision is divided into three main parts: *experience rain*, *manage rain*, and *creative methodology* (Thoms Ivarsson, 2020). The first one is about using the fact that people usually want to take cover from rain. But instead of just constructing rain cover, the area should be designed so that people can experience the rain in various ways, without getting wet. When building the first *rain playground* in the city, shown in figure 4, this was done by constructing big leaves from which the water could pour onto other leaves before reaching the ground. The leaves protect the parents while the kids can play with the water and in the puddles. The second part is about stormwater management, which of course needs to be done sustainably through retention and natural treatment in *the world's best city when it rains*. The last part is about

combining the first two in creative ways that arouse desire and interest from the public, before presenting information on, for example, why the chosen solutions are good for the environment.



**Figure 4:** *The Rain Playground*

#### 1.1.2.2 Stormwater management in Gothenburg

Local stormwater treatment (LOD) is the preferred method in Gothenburg, when possible. The handbook for municipal stormwater planning and administration, *Dagvatten, så här gör vi!* (Göteborg Stad, 2010) states the following:

*When new areas are planned the following principles should be followed:*

- 1. Stormwater should be treated as locally and as close to the source as possible to minimize the occurrence of flows and pollutants.*
- 2. Stormwater from impervious areas should be delayed and, if necessary, treated through LOD, before being diverted to ditches, recipients or pipes.*
- 3. As a last resort the water could be diverted directly to the sewer system. (p. 17, authors translation)*

In Sweden, municipalities are responsible for stormwater planning and do so through their different departments. SBK handles building permissions and land development as well as comprehensive and detailed planning (Cettner, 2012). The comprehensive plan is not legally binding but delivers an overall strategy for how to develop the detailed plans, which in turn are binding and states how land and water areas should be used. Other municipal actors that are included in the work with stormwater issues are the departments for environment, public health, and technical service

departments: the Recycling and Water Department (Swedish: *Kretslopp- och Vatten*, KoV), the Traffic Division (Swedish: *Trafikkontoret*, TK), and PoN. All of these departments are funded by taxes, except for KoV which is instead funded by a separate water and sewage fee. The most important legislation for strategic water management is the *Planning and Building Act* (Swedish: *Plan- och bygglagen*, PBL) which presents rules and guidelines and can be used to resolve conflict between different interests regarding water management. The municipalities have some freedom to introduce their own strategy on how to manage stormwater issues and can therefore choose whether or not to prioritize sustainable solutions.

A reorganisation of the tax funded departments (TK, PoN and SBK) is planned but the final decision is yet to be made, KoV is unlikely to be included in the new organisation, but since it is not decided yet, this report will address the main idea of the reorganisation without too much notice being taken of the details of which departments will be included in the final decision. There will most likely be four new committees with different responsibilities: physical planning, exploitation, implementation and management, linked to land and buildings respectively. In the reorganisation, strategic planning within urban development along with traffic and transport will be moved from the municipal board to the new physical planning committee. A key question in the reorganisation is to find a clear way of collaborating amongst the new committees (Göteborgs Stad kommunstyrelsen, 2021).

## 1.2 Aims and objectives

The aim of this thesis is to examine collaboration and communication amongst all the municipal actors, from different disciplines, who are active within various stormwater projects to see if there exists any problems preventing the projects' possibility of improving social sustainability in a city. The report is intended to be used as support to identify and prevent difficulties in future projects and that way make interdisciplinary collaboration easier.

## 1.3 Clarification of the issue

The purpose of this thesis is to map out how collaboration between actors from different disciplines within stormwater projects works, and to investigate how this affects the project's ability to increase social sustainability in a city.

Sub-questions:

- What cooperation difficulties can be identified and what do they look like?
- What changes to the way the municipal departments are working could improve the possibility to increase social sustainability through stormwater projects?

To answer these questions the situation in Gothenburg is investigated through interviews and observations.

## 1.4 Delimitations

The report aims to examine collaboration and communication with the perspective of social sustainability and will therefore not consider ecological or economical aspects, other than when it is relevant for the collaboration issues. Most of the interviewees were based around Gothenburg but are assumed representative for people working in similar stormwater projects all over Sweden. However, there are some differences between municipalities when it comes to procedures and decision paths. These differences are believed to be most clear when comparing municipalities of different sizes. Furthermore, dialogue with citizens will not be considered, only communication amongst the municipal actors who are active in the stormwater projects, and neither will collaboration with landowners and consultants from the private sector.

## 2 Theory

This chapter contains earlier, international, research on the topics of social sustainability and interdisciplinary collaboration in relation to stormwater projects. It begins by describing barriers preventing social sustainability in urban areas and then moves on to describe specifically how dysfunctional collaboration stands in the way of social sustainability. It ends by describing how successful collaboration brings the potential to improve social sustainability through stormwater projects.

### 2.1 Barriers preventing social sustainability

Within the TINK project, which this report is a part of, RISE investigates methods to develop urban environments in a way that withstands forces of nature and at the same time improves social sustainability (RISE, 2021). A prerequisite for reaching social, ecological and economical goals and at the same time handling the stormwater issue in a sustainable way is effective cross-disciplinary collaboration. Stormwater management is often associated with conflicts of interests which Andersson et al. (2017) discusses in their report, which is part of the TINK project. One of the conclusions is that interdisciplinary collaboration is especially important in the early stages of stormwater management projects. There must be a clear agreement saying which actors are responsible for different parts of the project to ensure effectiveness. Furthermore the report lists seven obstacles to sustainable stormwater solutions:

- 1. Insecurity around performance and cost.**
- 2. Insufficient technical standards and guidelines.**
- 3. Fragmented responsibilities.**
- 4. Lack of institutional capacity.**
- 5. Lack of legislative mandate.**
- 6. Lack of funding and effective market incentives.**
- 7. Resistance to change.**

A number of these obstacles directly relate to communication between different actors involved in these types of projects. Cettner (2012) also lists a number of barriers to sustainable stormwater planning. One of the reasons is that stormwater simply is not a high enough priority, something that is supported by Qi & Barclay (2021). Apart from that she also found collaboration and communication to be important factors. For example she mentions unclear responsibilities, low interest in knowledge sharing, and that stormwater becomes a drainage issue, meaning that stormwater management is viewed as a technical issue instead of as an opportunity for sustainable development. Barbosa et al. (2012) addresses similar issues with the addition that the culture of cooperation is limited in the water management field and an integrated approach is needed from the start.

Qiao et al. (2018) conducted a literature review to identify the challenges to implementing sustainable stormwater management (SSM) as a solution to reduce flooding and bring multi-benefits to human lives. Their findings are summarised in the list below:

- **Unclear leadership and responsibilities**  
*Different studies recommend motivated individuals, local authorities, landscape architects, and other involved departments to take a leading role earlier in the planning stage.*
- **Researchers as brokers**  
*Researchers should build long-term relationships and spread technical knowledge to increase the probability for sustainable solutions to be built.*
- **Stakeholder participation**  
*The SSM solutions should have economic incentives that make both the involved private stakeholders and local authority benefit from the solutions.*
- **Lack of funding**  
*Funding for implementing and managing SSM is not always enough, which is a crucial problem.*
- **Lack of evidence on what SSM costs**  
*Unclear cost data is an important factor for unwillingness to spend money on SSM solutions. It is easier to calculate cost and performance for conventional piped drainage.*
- **Lack of space**  
*Because urban densification is happening in many cities, space is limited. However, there are examples when land shortage has led to innovative solutions for SSM.*
- **Lack of knowledge**  
*Problems could include lack of ability to identify environmental and social values or lack of awareness of SSM solutions. Better knowledge sharing could decrease this issue.*
- **Lack of incorporation of SSM in legislative mandates**  
*Existing regulations and plans are often supporting the implementation of new piped solutions instead of SSM. A good solution would be to restructure the governance structure.*
- **Lack of SSM standards**  
*There are insufficient standards and guidelines for planning, constructing and maintaining SSM. This is a big obstacle that needs to be overcome.*

As already mentioned, planning, and especially planning in early phases, should be a high priority in sustainable stormwater projects. It is important to understand the complexity of water management and to see all the different actors and their interests (Arnö & Pellegrini, 2017). Furthermore, existing infrastructure, residents' interests and the topography must be considered parts of the same system. Without a holistic perspective there will be great difficulties in achieving the sustainability goals. To overcome the obstacles to sustainable stormwater management the different stakeholders need to be convinced that this is an urgent issue and there is also a need for more research about the economical aspects. The writers also suggest that Gothenburg could benefit from better structures when it comes to defining responsibilities.

## 2.2 Interdisciplinary collaboration

Many of the barriers listed above are related to interdisciplinary collaboration in one way or another. This section investigates why interdisciplinary collaboration is necessary, which barriers can be found and how they can be conquered.

### 2.2.1 Why interdisciplinary collaboration?

Most major cities in the world face urban water management challenges relating to drinking supply, stormwater, and wastewater. Furthermore, the effects of climate change and finite resources will require innovative solutions resulting from interdisciplinary collaboration, according to Smith (2009). He then describes how constructed wetlands have been used worldwide to improve the quality of drinking supply, stormwater, and wastewater but how engineers tend to focus on function over form. At the same time landscape architects have used water to decorate the urban landscape without using the treating potential of the water. Smith points to the potential of creating attractive communities while gaining educational, recreational, and ecological benefits when combining engineering, ecology, and landscape design in cross collaborative urban water projects.

In the book *Towards a sustainable future - visions for 2050*, Struck (2012) wrote a chapter named *Visions of Green Technologies in 2050 for Municipal Resource Management* where he presents a vision of a holistic resource management approach when it comes to water in cities. He believes that technologies that are today denominated *green technologies* will in 2050 be considered just *technologies*, since they will have become the norm. They will add aesthetic, ecological, economic, educational, recreational, and social benefits to society. The approach consists of the idea that different aspects of society such as air, amenities, energy, water management, solid waste, transportation, and urban development have to be viewed as parts of the same system instead of different areas as is currently the case. This will require collaboration and integration between what is today considered separate municipal departments, with their own agendas and cultures, and even the development of completely new roles. To reach the potential benefits a holistic view has to be adopted early in the planning stages and kept throughout the projects. Since people from different departments with different skill sets have to work together they will need to rely on funding from many different sources. Different departments will need to have equal representation and plan as one entity to provide the most benefit with the most efficient use of cost and labour.

Increased ecological focus when it comes to stormwater management has made *one-size-fits-all* solutions less relevant than before (Holman-Dodds, 2007). Instead the solutions have to be adapted to the local site specific conditions when it comes to soils, ecotypes, and typography. This results in a need for new multidisciplinary approaches where engineers, designers, and developers have to collaborate throughout the whole planning and design phase in comparison to the traditional stormwater solutions that were managed as afterthoughts to development. She also mentions how this greater reliance on interdisciplinary communication puts higher demands on the collaboration ability of the involved groups and disciplines.

Barbosa et al. (2012) is also acknowledging the social sustainability opportunities that come with stormwater solutions and describes how different city departments have to work in close collaboration and consider spatial planning, urban renewal, traffic, recreation, education, culture,

maintenance and management of public areas when they plan for the solutions. When these stakeholders are included and able to collaborate there emerges an opportunity to improve social, educational and environmental conditions in the area. However, this sort of collaboration is seldom problem free since unexpected institutional barriers are common and the involved actors are not used to cooperating.

## 2.2.2 Barriers to interdisciplinary collaboration

A review of open water solutions in urban landscapes, by Lundy & Wade (2011), presents a range of benefits from such solutions, of which the ones called cultural services are most relevant for this report. They refer to studies that show how green spaces in cities can help reduce obesity and mental illness by providing space for recreation and exercise. They also describe how open water in urban areas helps this phenomenon by adding intrinsic value to spaces and thus making people more likely to actually use and enjoy them. They further explain the importance of viewing bodies of water as multifunctional components of urban space and how you have to look at it as a holistic system to be able to benefit from cultural and ecological services. This demands a multidisciplinary approach, both from researchers and stakeholders in specific projects. However, transdisciplinary research within this field is still mostly existing in the periphery of scientific advancement due to a history of dealing with water issues in isolation from other urban functions and spatial requirements. They end their conclusion with the following statement: *“Ensuring quality-of-life for future generations facing an uncertain future is a challenge unlikely to be fully addressed by one discipline alone. The opportunity to fully exploit this approach to collaborative working should not be lost”* (p.666).

Verouden et al. (2016) take on a different question when it comes to collaboration in interdisciplinary projects aimed at developing socio-technical approaches to public problems. They discuss the role of silence by reviewing existing empirical material as well as looking at a specific case study. They identified three functions that silence played within the project: securing group performance, dealing with relationships within the group, and managing conflicts of interest. To secure a workable situation the parties are often trying to avoid contradicting each other which leads to an impaired exchange of information. By keeping silent to avoid being misinterpreted and losing their face in front of the other group members they also create a feeling of not being heard by the others. This also leads to uncertainty about what people really think and the group gets fragmented. By trying to avoid conflicts and not create a bad reputation for their organisation they keep silent and unintentionally create tension that could lead to reinforced contradictions and more conflicts. All this leads to a weakened collaboration and simple standard solutions being picked over innovative ones that could have led to increased sustainability.

Another finding that could potentially affect the issue of quiet actors is mentioned by both Shifflett et al. (2019) and Andersson et al. (2017). They found that the water management projects often have a few individuals that are responsible for most innovative solutions. These key players are particularly motivated and it raises the question about what would happen without them, according to Shifflett et al. The same thing was found by Qiao et al. (2018) in their literature review, that it is of importance to have case frontrunners for sustainable stormwater management projects since the leadership is often unclear.

### 2.2.3 Opportunities for improving interdisciplinary collaboration

So far this report has focused on difficulties when it comes to interdisciplinary collaboration. However, there are several findings in the literature that suggest different ways to improve. To start, Brown et al. (2015) lists these five principles on how to organize to better tackle sustainability issues within stormwater projects:

- **Forge a shared mission**
- **Develop *T-shaped* researchers**
- **Nurture constructive dialogue**
- **Give institutional support**
- **Bridge research, policy and practice**

A shared mission gives a sense of purpose and the participants can see how both their own and the others' expertise is needed to ensure progress. *T-shaped* means that the researchers should have a broad understanding of similar fields on top of their expertise which makes collaboration with other disciplines easier. When it comes to nurturing a constructive dialogue, research shows that there are usually three steps before interdisciplinary communication works as well as possible. New people in interdisciplinary projects tend to take a bigger role than they should since they believe that their own field is the most important. After some time they see the importance of other fields and become more passive before the last step when they find a good balance between the two. Institutional support is of course a prerequisite for constructive interdisciplinary collaboration. The last principle describes how long-term connections between academics, politics, and industry have the potential to grow interdisciplinary collaboration. Partly because the industry usually does not consider which discipline they collaborate with as long as they get results, something that the universities and policymakers could learn from.

Cole et al. (2018) suggests a different framework based on the combination of a triple bottom line (TBL) approach, where social, ecological, and economical aspects are all considered right from the start, and a multi-criteria decision analysis (MCDA) for simplifying prioritization of measures, further described in section 4.1.2. They call this combination CRTM (collaborative, risk-informed, TBL-MCDA). The point is to create a transparent and agile process where cooperation between different actors is encouraged. This goes hand in hand with the thoughts of forging a shared mission with *T-shaped* researchers and bridging different fields that Brown et al. (2015) discusses. Another conclusion from Cole et al. is the importance of involving different actors early in the planning process and avoiding too much focus on the technical side of things.

With the increased implementation of blue-green stormwater solutions there is also a need to find suitable locations for this type of project, to get the greatest possible gains. Fryd et al. (2012) have developed a planning framework to aid in this decision making. Through workshops, where the main stakeholders are represented they collaborate to analyze potential areas for blue-green solutions to see which areas could bring the greatest benefits. This relies on collective learning among the different stakeholders since they all have different competences that are needed. For example, engineers have expertise in some areas, architects in other areas and planners have to consider all the relevant aspects to find a holistic, sustainable solution. The overall idea is that this will result in a converging process where all actors develop a similar view of the issue. However, if this is going to succeed, Miller (2009) points out that these types of projects with many different

actors involved must provide time and space for the different actors to develop relationships and build trust over the disciplinary boundaries. In the long run this will, hopefully, create more sustainable solutions and the project members will see how all the different perspectives aid in driving the project forward.

## 3 Method

In this chapter the methodology that was used in the project is described. In short it consisted of observations of a few workshops conducted by RISE and interviews with people who are in some way involved in either stormwater projects in Gothenburg, social sustainability issues, or both.

### 3.1 Workshops

Esaiasson et al. (2012) suggest that observations are a good method when you suspect discrepancy between what people say and what they actually do. For this report, where the topic is collaboration, it was desirable to listen to discussions on the topic that is investigated. Three workshops organized by RISE around a project in Angered, a socio-economically vulnerable area in the outskirts of Gothenburg, were observed and notes were taken, and afterwards the official workshop notes were received. The focus of the workshops was multifunctional blue-green stormwater solutions to improve social aspects and representatives from several municipal departments: KoV, SBK, PoN, TK, the Social Administration (Swedish: *Socialförvaltningen*) and the Elderly, Nursing and Care Administration (Swedish: *Äldre samt vård- och omsorgsförvaltningen*). RISE and a consulting architecture firm were also present. The number of attendees at every workshop is shown in Table 1. Results from the observations are intertwined in section [4.1.2](#) where the project is described in greater detail.

**Table 1:** *Workshop attendees*

<b>Workshop</b>	<b>Attendees total</b>	<b>Attendees from municipal departments</b>
I	15	12
II	14	8
III	13	9

As mentioned, RISE organised the workshops which is the reason that the authors of this report were invited. The workshops were considered good examples of collaboration regarding the scope of this report. Thanks to RISE being the organiser there was also a possibility to gain access to their notes and thoughts afterwards. The authors of this report were only observing the discussions and took notes separately which could be compared to the ones from RISE. Directly after each workshop was finished the notes were summarized, this to ensure that the information was valid. Then the final analysis was made after the interviews were finished. This method for observations clearly resembles what Esaiasson et al. (2012) suggests to be the most important steps of the observation process: *choose setting, gain access, early observations, focused observations, notes, and completion*,

## 3.2 Interviews

The major part of this study consisted of qualitative semi-structured interviews. All interviews were around 60 min long. Semi-structured interviews were chosen to get advantages from both unstructured and structured interviews, as described by Cohen (2006). It consists of two-way communication where the interviewees get the freedom to talk somewhat freely and therefore often result in not just answers, but also the reasoning that lies behind the answers. It also enables the interviewers to use an interview guide where questions can be prepared beforehand to make sure that all relevant aspects are being brought up in all interviews. This also results in reliable and comparable data and therefore facilitates comparison between the different interviews.

All interviews were based on the same interview guide, found in [Appendix 1](#). Depending on the interviewees background the interview guide was adjusted to focus more on either collaboration or more on social aspects of stormwater, but all interviews touched on both areas. The guide was also adjusted to revolve more around the specific department that each interviewee is working for and to take into account whether the interviewee had attended the Angered workshops or not. The interviews were a mix of informant and respondent interviews (Esaiasson et al., 2012). In the informant part, the interviewees were asked to describe their role, their department, and give the relevant facts with the purpose of providing an understanding of how the situation is today. Thereafter followed the respondent part of the interviews. The interviewees were then allowed to talk more freely about their view on how the stormwater projects should be in an ideal world, give suggestions on what could be improved and tell their personal opinion on the issues.

In total, eleven interviews were conducted. The interviewees were working for the different municipal departments that are involved in the work with stormwater issues: KoV (Recycling and Water Department), SBK (Urban Planning Department), PoN (Parks and Nature Committee) and TK (Traffic Division), or for the research institute RISE (RISE Research Institute of Sweden). As Esaiasson et al. (2012) suggests, it was attempted to find central sources for the first interviews, and then let the interviewees refer to other people of relevance. Therefore, the first interviewees were people with a strategic role and holistic perspective. These persons then pointed further to people in more specialized roles who worked directly in the type of projects that were examined. The goal was to talk to at least one person from every actor listed above. Table 2 shows how many from every department was interviewed.

**Table 2: Interviewees**

<b>Department/ actor</b>	<b>Number of interviewees</b>	<b>Description</b>
Recycling and Water Committee	4	People in both strategic and more specialized roles.
Parks and Nature	1	Strategic perspective.
Traffic Division	1	Project perspective.
Urban Planning Department	3	People in both strategic and more detailed planning roles.
RISE	2	Project managers with background in municipal departments.

All of the interviews were recorded and during the interviews one person acted as interviewer and the other one as secretary. As Cohen (2006) suggests, it is difficult for the interviewer to take proper notes during an interview, therefore the secretary live transcribed the interview. Afterwards the interviewer and the secretary listened to the recording and corrected eventual mistakes. At the slightest insecurity about what the interviewee meant by a specific statement, the recordings were listened to again and at a few times the interviewees were even asked through e-mail to clarify their statements. This procedure was considered as reliable as a traditional transcription, even though it was done in a shorter amount of time. After making sure that the transcription was correct the notes were sorted by topic in an excel-sheet to facilitate the analyzing process. The answers within each topic were then compared to find similarities and differences and became the foundation for the results chapter. During this sorting, the authors added comments, cross-references between different interviewees and questions, and preliminary interpretations. This method is supported by Esaiasson et al. (2012).

When all interviews were made the analysing process continued, but more in depth. The material from the interviews was compared to existing literature and this is the basis for the discussion sections.

### 3.3 Ethical considerations

While conducting the interviews, several ethical considerations had to be done. Firstly, the confidentiality of the interviewees were considered to be of highest priority, to ensure honest answers and to respect the privacy of the interviewees. The idea was that if confidentiality was not guaranteed, the interviewees might not want to, for example, talk about employees or colleagues in a way that might be perceived as criticism, in fear of reprisals. The importance of confidentiality is emphasized by The Norwegian National Research Ethics Committee (2015): *“In essence, confidentiality in the relationship between researcher and research subject is to be regarded as an obligation for the researcher and a right for the research subject. Everyone has a right to restrict the access of others to certain types of information about their person. Respect for the individual must be borne in mind here, because personal data can be actively misused.”*

A risk that Esaiasson et al. (2012) names *“Interviewer effect”* is that the interviewer affects the answers. Interviewees have a tendency to adjust their answers to fit what they think is *correct*. In this case, when social sustainability is talked about in the interviews one can suspect that the interviewees tend to answer questions in a way that make them appear more familiar with the issue than they actually are. Simply since they believe this is what the interviewer *wants* to hear. Another, similar risk, arises from the fact that the information presented in the theory chapter was gathered before the interviews. This could potentially lead to a biased view from the authors of this report which might have affected the summary of the interview answers and the discussions. These were two problems that were considered impossible to fully avoid.

## 4 Results and discussion

The results and discussion are intertwined because of the subjective character of the issues investigated. To make it easier for the reader and to create a common thread through the chapter, it is divided into topic areas where the results are followed by a short discussion of the respective part. If nothing else is stated, the results are derived from the interviews and the authors' reasoning are found in the discussion sections. If nothing else is stated, the results are derived from the interviews and the authors' reasoning are found in the discussion sections. Firstly, the interviewees description of their respective departments and the issues that come with the existing divisions is presented. Then the focus shifts to collaboration in general and what possibilities and hindrances come with that. After that, the text moves on to difficulties regarding building a city with social sustainability in mind. The fourth part is about the differences between blue-green stormwater solutions compared to traditional pipe-based solutions.

### 4.1 Department roles

This section describes the organisation of the technical departments in Gothenburg and RISE, and their respective roles in relation to stormwater issues. It also describes what the interviewees think of the proposed reorganisation of the departments.

#### 4.1.1 The fundamental tasks

All of the different municipal departments have different goals and agendas. All interviewees gave their view on how the departments work with stormwater and social sustainability, which works as a complement to what was described in section [4.1](#). A summary of these findings is found here. SBK is responsible overall when it comes to planning the city area, this includes coordinating all physical planning when it comes to infrastructure, housing, and urban environment to name a few. The other departments have expertise in their respective areas. KoV is responsible for all water and waste issues in Gothenburg, including sewage, stormwater, and drinking water systems. When it comes to stormwater the department's task is to coordinate the stormwater issues, this includes stormwater investigations, solution proposals and anchoring their work with all the relevant stakeholders. PoN builds and maintains parks and nature areas to create a sustainable city. TK deals with mobility and handles roads, tram tracks, cycle paths, walkways and so on. They are therefore more included in stormwater issues since more and more solutions have moved above ground. Even though stormwater is mainly the responsibility of KoV, all the mentioned stakeholders need to be involved. To summarize, SBK have to consider stormwater management when planning for a new area, when it comes to blue-green stormwater solutions PoN is often involved in maintaining the finished area and TK are responsible for the city street network and must make sure that heavy rains do not stop people from moving around the city.

#### 4.1.2 RISE's role

When the interviewees from RISE were asked to describe their role in these issues they said that RISE should have a coordinating role in some projects: *"We usually think that when there is a problem that no actor sees as their responsibility, we can be there, gather stakeholders and say: Let's talk about this issue now."* Because they are an outside actor with no responsibilities towards the city they are free to contribute in what way they see fit. They work with verification, validation and certification depending on which expertise they have in the specific case. Since none of the municipal departments seem to look at the social aspects as their task, RISE can be an actor that brings the departments together to discuss and exchange knowledge and perspectives. One example is the workshops around the project in Angered, where they introduced the MCDA tool to compare different alternative stormwater solutions to representatives from the different departments.

During the workshops people from all, for this report, relevant departments were present, as well as people from a few other municipal actors involved in city planning. During the first workshop the MCDA exercise was conducted and the participants were asked to assign points to various social, ecological, and economical sustainability aspects, according to how important they found them. Social values were considered important by most participants, not least because the area is a low income area that is considered somewhat troubled. The exercise was done in groups of three to four persons and resulted in three proposed stormwater solutions being ranked based on how suitable they were considered to be. The proposal that scored the highest during the MCDA exercise was the one that took most social values into consideration, but it was also the most expensive one. The participants had various backgrounds and skill sets, and a good amount of time was spent discussing the issues and solutions from different perspectives. During the second workshop a map of the area was used to discuss and mark, for example, target points, nodes, important routes, boundaries, barriers and landmarks, to open up a discussion and to create a foundation for further development of the previously mentioned proposals. The last occasion was spent summarising the work. All three workshops revolved around open discussions and knowledge sharing, and everyone had the possibility to speak their mind, even though a few individuals stood for a majority of the talking.

All of the interviewees who took part in these workshops were predominantly positive towards the method. MCDA is a tool that the interviewed persons are not used to, but it was considered easy to use and comprehend. One person brought up that it is difficult to compare different values but MCDA makes it easier, but also gave some critique saying that the issue was isolated and simplified in an unrealistic way. But the obvious upside is the mixed groups where people with different experiences and interests get to express their opinions on the specific matter. Another positive aspect that was lifted is how MCDA makes it easier to remain objective when considering different alternatives, or as one interviewee described it: *"When twisting and turning different alternatives, it can be very hard to separate different values. It is complex and hard to structure the reasoning, but it was done well in the Angered project. I believe that it is a good way to move forward."*

### 4.1.3 Social sustainability within the departments

When it comes to social sustainability, that is a responsibility of everyone involved in planning and building in Gothenburg. KoV has a coordinating role in stormwater management, but in the interviews it has been brought up that solutions above ground make it a much more complex issue. It has also come up that not everyone at KoV view the social aspects as their responsibility, their task is to take care of water. But the person sharing this also mentioned that the social aspects are part of the common goals for all departments and on top of that said that open, multifunctional solutions are viewed as something they want to use anyway, simply because it is the best solution in many cases.

When SBK was asked to describe how they work with social sustainability the first response was that the issue needs to be broken down into smaller pieces since social sustainability and stormwater projects have no obvious connection. They also see great potential in multifunctional solutions but points at function first, with the main function being transportation and treatment of water. The social benefits that open multifunctional solutions bring to the city are difficult to quantify and calculate, and this makes them hard to compare to traditional pipe-based solutions. SBK, who are responsible for making detailed development plans, state that they can name an area as suitable for open blue-green solutions but it is usually up to someone else to make the final decision. Another person from SBK mentioned that it is their responsibility to coordinate the different municipal departments involved in these issues.

The interviewee from TK stated that: *"TK's regulations state nothing regarding stormwater. However, functioning roads is our task which means that there cannot be too much water. So we have to ensure proper run-off."* But the same person also said that there is a demand within the department to work with multifunctional solutions when possible.

### 4.1.4 Contradictory tasks

People from different departments do not always have a good understanding of the other actors' goals and agendas, and on top of that the different departments actually have contradictory goals in some cases. For example roads and traffic might prevent construction of parks due to lack of space. Everyone has different fundamental tasks to consider when the project gets started and no one has the overall responsibility when it comes to social values, and this makes things difficult. However, one interviewee, from KoV, said that there would be conflicts if several departments were working with social issues. One person also raised the budget-issue, with tighter budgets the departments simply cannot afford to work outside their scope. And, as mentioned earlier, none of the building departments has the social aspects as their top priority. Whatever is at the top of the agenda will be prioritized first and that which comes in afterwards will probably not be viewed equally as important. One interviewee from TK wished for more overlap between the departments: *"At TK, we have our rules and responsibilities, while SBK have their own, which can be totally different. There is too much difference and it would be better if there were some more overlap."* The person then kept describing: *"[A detailed development plan] is so complex that you have a hard time fulfilling your own task while at the same time keeping all rules and regulations. There is too little space for collaboration when you are barely fulfilling your own commitments, and you never fulfill all your goals in a project."*

Another example from TK is that a person stated that: *“If you only cared about TK we would keep leading the stormwater down into gutter wells and pipes. But it is not just us and in some areas this needs to be handled on the surface. We have to follow.”*. Another interviewee, from KoV, talked about the importance of looking beyond the set structures and the need of having a prestigeless way of working. There must be some creativity, collaboration between different actors and that sometimes means working a little outside of your own scope. That is needed to create a better city. But it also means that *everybody* involved must be willing to make sacrifices. The biggest reason for contradictory tasks between the departments seem to be the lack of city space and the amount of functions that need to be squeezed in. This means that you often have to make priorities and opt out on something. The person would want to see principled policy decisions to help make these decisions instead of the individual people in every project having to decide. Other interviewees lifted common goals for the departments as a solution, since it would make it easier to make the right compromises related to the specific conditions of every project.

Another interviewee from SBK mentioned that the focus on complex issues such as ecological and social sustainability means that the division of the departments according to their specific subject areas, might not be the most optimal.

#### 4.1.5 The reorganisation of the departments

The reorganisation of the departments, that is mentioned in section 1.1.2.2, is aimed at solving some of the previously mentioned problems. Most interviewees seemed positive towards the reorganisation. They were describing how it could bring people together and counteract the mental and physical barriers that come from being separate departments with different aims and objectives, sitting in different locations. It was said that now is a good time for the reorganisation since most people are not completely satisfied with the way things are organised at the moment. The old department structure was described as obsolete and aimed at solving problems that are not as relevant anymore. Instead this new organisation could be the solution to being able to address new issues in a modern way. It could make it easier to collaborate and therefore easier to address ecological and social sustainability issues that need people with different competencies and skill sets to work together. It could lead to employees listening more to other people with different knowledge and perspectives, not least because different questions could be discussed during breaks in the corridors or around the coffee machine.

The potential to use the reorganisation to put the human perspective in the planning in a more direct way and in an earlier phase was also mentioned. This could lead to a sense of unity and of working towards a common goal, a goal that could be: *“[...] doing the best for the city and its residents, instead of doing the best for your own department”*, as one interviewee described it. One of the upsides with a shared goal is that the issue of departments holding on to their own budget might decrease since they will have a budget for the project as a whole instead. The reorganisation will probably also lead to more departments being involved earlier in the planning process than today, when SBK is doing most of the early planning themselves. This could lead to more different issues being planned for earlier in the process. Lastly it would probably be good for multifunctional and sustainable solutions, to mix different competencies under one roof.

Some potential disadvantages and risks were also presented. Some of them were linked to the big change in itself. It was mentioned that a big reorganisation will come with a lot of administrative difficulties, and fear of the change leading to a time of mess and insecurity was expressed. One person also mentioned that they were scared of losing skilled and competent colleagues who would not be able to cope with the change. Other risks were linked to the specific way in which the new departments will be divided according to the plans. While you could gain understanding and make it easier to collaborate between what is today different departments with people with various technical knowledge and skill sets, you could lose the same between people working in different stages. While it might be easier for people planning stormwater solutions to collaborate with people planning parks, it could be harder for the people planning to collaborate with the people who work with implementing or maintaining the solutions. This was expressed as something that is challenging as it is today. This could mean that you risk losing the good ideas that come up early in the planning phase along the way, before the solution is completed.

It was mentioned by one person that it would be a good idea to implement some sort of matrix organisation where you answer to one manager for your expertise area and another depending on what phase you are working in. Others were uncertain about whether a matrix organisation is a good idea, and some said that the departments already work in something that can be compared to such an organisational division. Some interviewees also mentioned that you, over time, might lose some of the specific expertise that has been built up by having departments with highly skilled individuals with a particular knowledge sitting and working close to each other. One person from PoN mentioned the risk of losing the user and service perspectives with the reorganisation, especially since PoN is already a smaller department compared to the others. The interviewees seemed predominantly positive towards the reorganisation, however.

## 4.2 Discussion department roles

It is interesting to see that the interviewees tend to think that the current organisational structure is obsolete and aimed at old problems. One could think that it could be hard to look impartially at one's own organisation and therefore draw the conclusion that, since people are not satisfied with the organisations today, the problems are clear and obvious. It does not seem too far-fetched to come to the conclusion that the departments are stuck in their own limited tasks and not able to address the problems of today in the most effective way. Social sustainability is a problem that, in its nature, is abstract and it is hard to see and quantify the effects, especially within a short timeframe, more about this in section 4.5.5. Different measures are also, probably, differently effective and suitable depending on the location. Because of this it seems hard to solve the problems isolated within each detailed development plan. Stormwater issues seem to be best addressed through something that looks like the natural water cycle, a system that does not care about borders, buildings and project frames. Therefore, it also seems best to face the challenges with a more holistic perspective of when and where it suits best, to bring the biggest gains.

In a similar way a holistic perspective is needed when it comes to social sustainability within stormwater projects. The departments seem to limit themselves to their respective tasks, simply since no department views social sustainability as their responsibility. SBK has the overall responsibility when planning the city, but the responsibility for water related issues falls on KoV. At the same time the change to more surface solutions for stormwater puts an increasing responsibility at TK, since the solutions become part of the public space and compete for room with streets and other infrastructure. The formal responsibility for recreational areas falls on PoN but since they are focused on parks and other nature areas it is not naturally obvious that stormwater solutions have a potential for such values as well. The responsibility for making sure that the stormwater solutions live up to their social potential does not seem to fall on any particular department or person, and the obsolete organisational structure could play a part in this. The issue of unclear or fragmented responsibilities does not seem to be something that is unique for Gothenburg. It was brought up by Andersson et al. (2017), Cettner (2012), and Qiao et al. (2018), described in section 2.1. It seems to be a common problem that organisational structures are obsolete and not holistic in the way that seems to be needed when you want to create sustainable solutions.

The reorganisation is still not decided and it is hard to say what the results will be. It does, however, seem to have potential to solve some of the previously mentioned problems. If a holistic perspective is what is needed, a reorganisation where actors with various skill sets are put under the same roof, might be just right. Even though the reorganisation is probably not the answer to *all* questions regarding the scope of this report, the collected information from the interviews and previous research on the topic, suggest that the new organisation is a positive change. It should counteract the problem of contradictory tasks and it should make it less likely for social issues to fall between the cracks. One unified department with the shared mission *to make the city as good as possible for its residents*, instead of several departments being locked into their own specific tasks and sometimes working against each other, seems like a positive change. The specific, technical, tasks will still have to be solved of course. But it is an interesting thought that you would work towards a common, bigger goal, and therefore be able to focus on what is most important in each case, something that would probably be helped by having a common budget for the projects.

It is interesting to compare the potential gains of the reorganisation to findings in the theory chapter. Brown et al. (2015) lists principles, found in section [2.2.3](#), on how to improve the organisation to better handle sustainability issues, and they resonate well with the reorganisation. For example they describe how a *shared mission* could give a sense of purpose and create an understanding for the importance of other people's different expertises. Further they describe how you should develop *T-shaped researchers*, which means employees should have a deep knowledge within their respective fields, but also with a broad understanding of the expertises of their colleagues. This is something that, of course, is a lot easier to develop when working from the same place as the people with different skill sets. It will simplify both formal and informal communication, through case-specific meetings and small talk during breaks and in the corridors. Lastly, it is easy to believe that the reorganisation will make it easier to *nurture constructive dialogue*, as Brown et al. states it, by reducing the distances between people from different disciplines.

Another alternative that has been discussed in the interviews was matrix organisations, which has some similarities with the idea of *T-shaped researchers*, in that the employees need to focus on more than their specific work tasks to simplify collaboration with people from different disciplines. Instead of every department having specialized people in every field and one manager that they report to, matrix organisations mean that there are division managers with different responsibilities. In the case of Gothenburg's technical departments after the reorganisation, the employees could answer to one manager who is responsible for the technical expertise area, what today is the different departments, and one that is responsible for the specific stage in which the employee is working. This would therefore potentially help solve the risk of problematic stage handovers, described in section [4.1.5](#). This is more widespread in the private sector but could probably be used in the municipal departments as well.

The interviewees had very different opinions regarding matrix organisations, some were very positive but many also expressed scepticism when it was brought up. With the reorganisation where people with different backgrounds and knowledge will work closer together this way of working might have even more potential than before. Since collaboration between departments has been shown to be an issue within city building, a matrix organisation could potentially improve communication and spread the sense of common goals throughout the municipality. However, there are also risks and difficulties. For example, it will take time to establish this new way of working and even though the reorganisation might seem as the perfect timing it could be too much change at the same time. Another risk is that decision making might become even slower since there are more people involved in every decision, which is already a problem in urban planning and building. Another risk with both the reorganisation as it looks today and the idea of matrix organisations is that the gains of broader understanding will come at the price of specialization.

As stated earlier, the increased focus on stormwater solutions above ground has increased the participation of TK in the projects, and they are not yet used to working with water issues. At the same time KoV has the fundamental task to work with water, but they have traditionally done so by using underground pipes. The two departments probably have things to learn from each other and reducing the distance could therefore play an important role. This is provided that KoV will be part of the reorganisation, something that does not seem to be clear due to them being funded through fees instead of from taxes. But since the reorganisation is not yet decided, this report focuses on the potential gains of a reorganisation with all the departments involved.

Brown et al. (2015) describe, see section [2.2.3](#), how good long-term relationships between researchers, politics and industry can nurture interdisciplinary collaboration and spread knowledge to help make sure that sustainable solutions are being built. With improved knowledge sharing the issues of difficulty to identify social aspects and lack of awareness of blue-green solutions could decrease according to Qiao et al. (2018). Cettner (2012) says that there is generally a low interest in knowledge sharing. However, at the workshops organised by RISE many attendees were sharing their experiences, asking questions, and were involved in the discussions. It seemed like there was a true interest in sharing knowledge. These people, on the other hand, might not be representative since they voluntarily took part in the workshops and therefore seem to be more interested than others who did not take part.

RISE's potential role was discussed during some of the interviews, presented in section [4.1.2](#). Since RISE is an outside actor without any formal responsibilities when it comes to stormwater issues, it could be a risk relying too heavily on them playing an important role, but they do have the potential to make difference by bringing different departments and other actors together and to highlight various issues that they find important. This was done in the Angered workshop, previously described in section [4.1.2](#). The workshops seemed to be a great place for knowledge sharing. People were not afraid to air their opinions and seemed to listen to each other. It was, however, clear that some individuals were more keen to talk than others and it is easy to believe that such individuals make themselves heard and are able to get things done in normal stormwater projects as well. The role of driven individuals in stormwater projects are discussed further in section [4.3.2](#).

## 4.3 Collaboration

Collaboration in itself is more complex compared to working alone, and interdisciplinary collaboration with many people from different departments involved makes it even more complex. In this part the issues that come with collaboration are presented as well as the role of driven individuals and how improved organizational structures can help improve collaboration.

### 4.3.1 Difficulties with collaboration

One interviewee stated that it is simply troublesome to cooperate with other actors compared to working within your own department. Open solutions demand more collaboration between the departments compared to traditional stormwater management where KoV can do more of the work themselves with less need to consider other departments. Another person mentioned that it was easier at a former workplace in a smaller municipality since there were less people involved and therefore easier to discuss different issues with the correct person straightaway. As the situation in Gothenburg is today, the overall goals which can be difficult to grasp, such as social sustainability, often have to step back to make room for more urgent goals that are prioritized higher.

Many of the former difficulties with collaboration, however, seem to have disappeared or at least improved with time. According to a few interviewees there were more issues related to cultural differences and outdated working methods a few years ago compared to how it looks today. The people working in the various departments now have a broader perspective which makes collaboration and communication a lot easier.

One of the remaining problems is the lack of spontaneous meetings between the different departments. They have their offices on different floors and in different buildings, and therefore the only contact they have is in more formal settings. One interviewee from KoV said: *“I, and other people with me, think that it is a challenge that there are no spontaneous meetings with other departments. A lot could have been solved easily if we could see each other by the coffee machine. It is easier to relate to a colleague at another department than to just a project at that department.”* This has come up in a number of interviews and is something that could potentially improve with the reorganisation.

### 4.3.2 The role of individuals

Several interviewees discussed the importance of motivated individuals when it comes to driving change and implementing innovative solutions in stormwater projects. Most people agree that driven individuals are important for making socially sustainable solutions happen, but some mention that a really good idea, that is hard to say no to, could work as well. It was also mentioned that the dependence on individuals is something that characterizes all of the community building sector, someone who has a lot of passion or knowledge is able to make a big difference. Different people have different knowledge and are passionate about different issues. If someone is more passionate about a specific issue, or just more outspoken, that issue tends to end up higher on the agenda. Different organisations, and also individuals within the same organisation, might disagree on the importance of social sustainability and whether it is an important part of their fundamental task or not. This issue could be linked to policy documents being vaguely worded.

It was mentioned earlier that individuals can play a huge role, not only in implementing, but also in stopping the implementation of new and innovative solutions, not least because of a hierarchical structure where managers have a lot of power. Both the individuals who work to implement change and those who work counterproductive to it, are easy to spot in the organisation, according to the interviews. The question of how to give the right people the tools and freedom they need to change the way they work, was raised in the interviews. And even though it did not seem to be an easily answered question, several individuals pointed towards the importance of permissive organisational structure and culture. It was also said that if an organisation lacks interested and driven individuals that can drive change, a need for rules and regulations emerges instead.

### 4.3.3 Organizational structures

It was mentioned by several interviewees that the importance of driven individuals is biggest in the beginning. When the technique or change you want to implement is new and seen as innovative, early adopters are very important. As the change is then implemented and normalized, the importance of individuals decreases. Instead a dependence on a good organizational structure, that encourages the usage of the new technique, increases. A limit was mentioned, where the need for a good structure gets more important than the contribution from specific individuals. The opinion as to whether this limit is reached or not, when it comes to multifunctional blue-green stormwater solutions, varied heavily between the interviewees. 2021 For example, one interviewee stated that: *“They [driven individuals] are important. But we have reached a limit where they are not crucial anymore, like they were in the beginning. Now all people are aware of what has to be done.”*, while another said: *“They [driven individuals] are vital. The people who are driven and solution-oriented make sure that things are happening [...] It is absolutely crucial with driven individuals in the departments.”*

A potential backside with having driven individuals who drive change, that was mentioned, is that a solution might be implemented at a place where it does not fit in. If one individual is passionate about a specific subject or technology it might be used where it is not needed the most and where it does not make the biggest impact. It is therefore important to have an overview of the whole city district or even the whole city and to look at every site's specific needs.

Several interviewees mentioned that they wished to see a greater understanding for the importance of social sustainability when planning stormwater solutions within their organisation. This can be done by standardizing the way of working with these issues, by raising awareness of the gains, by valuing innovation or by presenting successful projects. Other people mentioned that the knowledge on the subject is big but that the employees are too busy with their regular tasks to put in the extra work that is needed to cooperate and implement new and innovative solutions. Some said that guiding and ruling documents are contradictory and that the city needs to decide what it actually wants. The fact that new solutions scare people was also mentioned as a problem bigger than the lack of knowledge and motivation. Both employees, managers and politicians need to be willing to take some risks when it comes to innovative solutions from a top down, bottom up perspective. It is very hard for the employees to drive change when managers want to keep things as usual but it is also very hard for managers to implement innovative solutions when they encounter resistance from their employees.

#### 4.3.4 Other municipalities

Being the second biggest city in Sweden, Gothenburg also has one of the biggest municipal organisations. As mentioned, some of the interviewees had experience from other, smaller municipalities and shared some thoughts on the differences between these municipalities and Gothenburg. They described differences between municipalities and their strengths and weaknesses, such as how progressive they are compared to each other. The interviewees believed that Gothenburg is focusing more on social sustainability than other municipalities, even though they only have experience from a small number of places. Another thing that Gothenburg does differently is that they are doing more inhouse planning compared to other municipalities. They have decided to do all stormwater and heavy rainfall investigations themselves and this distinguishes them from other cities and gives more control over the planning. For example, the interviewees mentioned that municipalities that outsource more jobs to consultants have a bigger need for checkups to make sure that everything is done well. Consultants might also be working more all over the country and therefore have less local knowledge. The interviewees discussed a will from different municipalities to learn from each other and from successful projects but they also said that it is rare that such meetings ever happen.

Some differences are directly connected to the size of the municipality, and to summarize what was brought up during the interviews, one could say that smaller ones are better at collaborating and creating multifunctional solutions since people with different skill sets might be located at the same place, share common areas and therefore know each other better and thus having easier to collaborate. The smaller municipalities, however, seem to lack some of the knowledge that bigger ones have. They might therefore have difficulties living up to some of the rules and regulations since it is expensive to have people being responsible for every part that needs to be fulfilled.

## 4.4 Discussion collaboration

Interdisciplinary collaboration has its pros and cons. When it comes to stormwater management it is a necessity to collaborate between disciplines simply because of how the organization is structured with different departments responsible for different parts. That is often viewed as an issue and as something that makes the projects more complex and difficult. The issue has a lot to do with the different *fundamental tasks* described in section [4.1.1](#). Since the municipal departments often lack a holistic view and instead focus on their own goals, the other departments are sometimes viewed as competitors instead of colleagues as discussed deeper in section [4.1.4](#).

These issues aside, it does not necessarily take that much to improve the situation. As mentioned in section [2.2.2](#), a number of reports on the topic of communication and collaboration in interdisciplinary stormwater projects, Qiao et al. (2018), Shifflet et al. (2019), and Andersson et al. (2017), states that driven individuals have a huge role in making blue-green stormwater solutions happen. Something that has come up in a number of interviews for this report as well. During the workshops (section [3.1](#)) one could also see how a few individuals were allowed to steer the discussion to revolve around their topic of interest. Obviously, these workshops are a forum for exactly that type of questions and discussions. In a more formal setting the same person will probably encounter more resistance. But since different people within the organisation will not share the same opinion on the importance of building multifunctional blue-green stormwater solutions it might become an issue if a handful of people get to decide what to put first on the agenda. Nevertheless, as the situation has been in recent years, driven individuals have had a very important role in driving innovation and making sure that more multifunctional solutions have been built. And there has been a need for people forcing through discussions that might never have happened had they not been there.

In the long run, however, there needs to be a change so that the organizations take responsibility for social sustainability instead of relying on individuals driving innovation. According to some people, that line has already been crossed and there is no longer a need for driven individuals to show the way since the policy documents encourage this type of stormwater management. Others seemed to think that these individuals are as important as ever. This difference in opinion is probably easiest described by people having different perceptions of what social sustainability actually means. Depending on one's background in urban planning and opinion on the importance of blue-green solutions it is fair to argue that a lot has improved and the organisation can now continue the work without a few individuals driving the work. But the opposite argument is just as valid, that the policy documents and regulations have improved in the sense of encouraging multifunctional stormwater solutions, but that there is still a long way to go. And if an improvement is going to happen, there is a big possibility that a few individuals will lead that change. Something that is supported both by the interviews performed within this project and previous research on the topic, see section [2.2.2](#).

It was mentioned in a number of interviews that the reorganisation could potentially improve collaboration for a number of reasons, for example more informal meetings around the offices. By simply knowing people from other departments with other goals and agendas, it could be easier to relate since it becomes a personal connection instead of just a contact from another department. In smaller municipalities, where people with different expertise are forced to cooperate more compared to how it looks in Gothenburg, it also seems like issues of competing goals and lack of

understanding are less common. More informal meetings, which comes naturally in smaller municipalities, could increase the understanding of other departments, something that might improve in Gothenburg after the reorganisation, described in section [1.1.2.2](#). However, only a few examples from other municipalities were brought up in the interviews and most of the previous research is based on bigger cities so no broader conclusions could be drawn in this report.

## 4.5 Difficulties with urban planning for social sustainability

In this section some of the major issues involved in designing a city with social sustainability in mind are brought up. Urban planning is a complex issue with a lot of difficulties. Some of them stem from the nature of city planning and building, which for many reasons has been and still is a slow process.

### 4.5.1 Bureaucracy in urban planning

City planning and building does, and should, take time, according to many of the interviewees. Since the city is already established, every new project needs to fit in with the existing infrastructure. One of the main goals that Gothenburg has for its continual growth is to densify the city, which makes it difficult to find space for everything. This means that a holistic view is important since you need to find the right place and design for the solutions, so that they can bring the greatest possible benefit. Therefore you have to look at the bigger picture instead of just looking at one smaller area at a time.

Within this context there is a natural resistance to change, which might prevent new and innovative ways of working, sometimes because of bad experiences from less successful projects. Since the consequences would remain for a long time the city cannot afford to risk too much. Therefore many of the interviewees believe that there is a value in having a slow process, that decreases the risks of error, for city building. On the other hand, one of the persons who talked about these risks also stated that the cities of today are not built in a sustainable way. Therefore, there is also a need to work quickly when trying to reverse the non-sustainable effects from earlier choices. The person lifted the example of cars and how many cities have been designed with the idea that cars should be the main means of transportation, and that is no longer considered sustainable. Therefore many cities, including Gothenburg, are redesigning to favor other means of transport.

One interviewee described how we decided decades ago not to have road ditches in the cities and use gutter wells and pipes instead, now we are starting to think that green trenches could be a better solution in some cases. Another interviewee agreed with the above but also stated: *“In Gothenburg, and many cities, you are not used to testing things, but before building [innovative solutions] you need to try different methods temporarily before you build something permanent. This also gives the residents a chance to provide feedback. Then you can make the permanent solution even better.”* Another reason to let city building take time is that laws and regulations need to keep up. This came up in a number of interviews. Anchoring decisions takes time, if it is done too quickly there will be contradictory decisions instead, which could cause even bigger difficulties.

Even though most of the interviewees acknowledged the need for a safe, and therefore slow, process a few felt that there are now too many laws and regulations. The interviewee from TK, which is often mentioned as one of the departments with the most regulations to follow, stated that it is too bureaucratic, that it is already impossible to follow everything and has been that way for a while. There are always a lot of compromises and everyone has to collaborate to create a good enough solution for everyone involved.

#### 4.5.2 Concern for what is new

Another issue is that focusing on social sustainability within stormwater projects is quite new. A person from TK said: *“Until 2015 it was easy, we could work with sloped streets, storm drains and piped systems, and then KoV were responsible for all the underground pipes. But then Gothenburg decided that we should take care of the water above ground and, if possible, avoid piped solutions.”* The interviewee then described the reasons for this to be, on one hand that the *Environmental Code* says so, but also that it eventually becomes too expensive to increase the size of the pipes due to increased volumes of water, and that limit has now been passed in the central parts of town. By using solutions on the surface it is possible to delay the water and that way the current pipes will be enough.

Six years is a very short timeframe in city building where things usually take time, and change in itself also takes time. One person mentioned that there is often some resistance to change just for the sake of it. But there is also a risk in trying new and innovative ways. One interviewee described scepticism towards new things as one of the biggest reasons for innovative solutions not being built. People are afraid to make mistakes that will draw attention, and therefore many people tend to go with traditional, proven methods. A few interviewees from KoV also mentioned that they are not yet used to working above ground which is very different compared to how they worked before.

One interviewee felt a lot of frustration a few years ago since nothing seemed to happen with these issues. But over time people have gotten used to thinking more about the social aspects of city building and clear progress has been made. Even though there is still a lot of work to do, there are now at least discussions about social values in all detailed development plans.

#### 4.5.3 Lack of space

As stated earlier, social sustainability is just one of the many areas that need attention when it comes to city building. There are many other things competing for the city area and the municipality's money. According to the interviews, lack of space is the biggest issue. Since open stormwater usually takes a lot more space compared to grey solutions it can be difficult to argue for building this instead of for example housing or parking lots. Housing is often quite profitable for the city, and a social goal in itself, and since it is difficult to measure the benefits of social aspects these solutions often have to step back. An interviewee from KoV questioned if they are the ones who should argue for these kinds of stormwater solutions since they are not used to work above ground. The person argued that KoV should point at suitable areas but not drive the issue. Another interviewee who also saw space as the biggest competing aspect said that interest in exploitation is what creates the detailed development plans which is why the city wants to maximise the exploitation areas. But the same person stated that this is not necessarily a bad thing when it comes to social sustainability since there are many private actors who build with a sustainable city in mind. On the other hand the argument that private actors often want to build as big as possible also came up in another interview. This would mean less space available outside the building, but the same person ended by saying that the issue of space usually works itself out in one way or another.

#### 4.5.4 Costs

When it comes to collaboration between the departments, a constant conflict is who will take the different costs. This becomes an even bigger issue when building open solutions since more people and departments need to be involved. First comes the initial cost. With tight budgets some of the actors are afraid of committing a lot of money to innovative, untested solutions. Then comes the service and maintenance costs which an interviewee from KoV described as an even bigger issue, especially with blue-green solutions: *“We are used to underground pipe systems that we know how to maintain, storm drains in the streets we know all about. New solutions are unknown and we can not really tell what it is going to cost and people are worried about increased costs. If you want grass somewhere, some form of ditch, you will have to go around and pick up trash. Green solutions require more manual labour.”* How expensive is it going to be and who is responsible for taking care of the area? One person described that a solution that is easy to maintain and that looks alright to the landscape architect is often chosen, without much consideration to the social benefits being taken, resulting in dull and boring areas.

Another interviewee, from KoV, argued that lack of money is not the issue at all. The issue is rather that money is put in the wrong place and that the departments never want to take a cost that is a little bit outside of their fundamental task. The planned reorganisation, mentioned in section [1.1.2.2](#), would bring a common budget and could possibly help counteract this problem. One interviewee from TK mentioned the same thing, that you have to solve your own task before you can consider other values. When it comes to social aspects, the space and time issues usually solve themselves eventually, instead it falls on the cost. This one interviewee said that everyone wants the same thing but it becomes too expensive.

#### 4.5.5 Quantifying social gains

Within the municipality there are a lot of different costs and benefits to consider. In the same way as social sustainability in itself is difficult to grasp, it is also very hard to quantify the benefits. For example it is hard to compare a blue-green solution to a traditional pipe-based one since the former will provide other values in addition to only managing stormwater. Even though there are obvious upsides in many cases, these are difficult to measure, or as one interviewee from KoV said: *“We can estimate the costs, for example operation and maintenance costs, for pipe-based solutions. But we have no way to show numbers for some of the gains of the blue-green solutions, which leads to them not being included in the decision-making process in a natural way.”* To make an accurate analysis, a deeper understanding of social issues is needed, and also a longer time perspective to be able to see the results.

Since space and resources are limited, these solutions are always set against something else, such as housing or the environment, and the social aspects must be compared with these values as well. One way of doing this is by using MCDA, which has been done by RISE in a project in Angered, described in section [4.1.2](#). The idea of MCDA is to look at different criterias, in this case for social, ecological, and economical aspects, to compare three different proposals for a stormwater solution in Angered. A few of the interviewees have been involved in this project and most of them are positive about the idea of comparing different values by using MCDA. One interviewee said that the project opened their eyes to how you can remain objective while comparing values of different solutions, something that is usually hard and complex.

One interviewee also questioned the need for quantifying the gains. Since it is so difficult to measure the value of social sustainability in the city, but there is still an obvious and big value, the person suggested that measuring might not be needed at all. The person stated that *“I think it is a waste of time. If we spent the resources that we put into measuring social values on increasing social sustainability instead, we would probably be at the finish line”*. Then the interviewee continued by saying that everything cannot be measured and thinking that the city needs numbers on everything could potentially stop growth and innovative ideas since you will never know for sure until you have tried something in reality. Sometimes simple logic should be enough. Even if it is difficult to find accurate data saying how a greener, more inviting city makes people go out more and improve their health in the long run, which saves money, this is not a far-fetched way of thinking. Another interviewee thought that you, as a city, need to be brave and invest in things that are not giving any immediate and easily quantifiable results. The person made an example of youth recreation centers that can help young people stay out of trouble, spend more time in school and potentially contribute more to society in the long run. This longtime thinking is something that has to come as a goal from politicians since the system right now demands that the departments can show value for money straight away.

#### 4.5.6 Politics

As mentioned in section [4.5.1](#), there are a lot of laws and regulations around the stormwater issues and city building in general. A number of the interviewees see that as a problem in some cases. On the other hand, the rules regarding incorporation of social aspects within stormwater projects do not provide clear guidelines for how to act, due to them being too vaguely formulated. A few of the interviewees suggest laws and regulations forcing the projects to consider how to improve social sustainability in every detailed development plan. But they also stated that it is not the only, and maybe not the best, way to go. There are already a great number of regulations to follow, among them even guidelines promoting innovative ways of thinking. The issue is that it is not done anyway. There were different opinions amongst the interviewees regarding the role of the politicians in this issue. One person from PoN said: *“I do not think that we can reach social sustainability through better collaboration if the big political decisions do not steer us in the right direction. [...] We need clear goals to guide us that everyone can agree on and bring up difficult issues in an early phase.”* A number of interviewees brought up that the greatest difference will not be made on the political level either way, but rather at the managerial level within the administrations. One interviewee stated that there is no need for more legislative mandate from the political side, but rather more willingness and courage from the managers to try new innovative ways of stormwater management. The same person also talked about how multifunctional, sustainable stormwater solutions are in line with what the politicians want. So that even if there is, and continues to be, a lack of formal decisions and goals stating exactly what should be done for social sustainability, the departments could do a lot more.

## 4.6 Discussion difficulties with urban planning for social sustainability

As stated in the interviews, building and developing a city is difficult and especially so when the city is already quite big. There are a lot of reasons for this, as mentioned earlier, but what is important to remember is that there is also a need to make the city more sustainable, both socially and ecologically. If all decisions are allowed to take enough time for people to investigate all the options, compare different solutions and so on, we are in the meantime adding to the climate crisis and the social issues. By instead acting a little bit faster in some areas, maybe there will be a need to rebuild sooner than planned but the short-term effects could still help building towards a more sustainable city. A few interviewees have talked about this and the importance of having courage to try new things and set an example.

However, even if some people have this courage there is usually a *Resistance to Change*, which is one of the seven points that Andersson et al. (2017) lists as obstacles to sustainable stormwater solutions, described in section 2.1. This has also come up in the interviews, both regarding innovative solutions and new ways of working. People often want to keep what is working and not change unless they have to, which has also been a strength in the case of city building where there is value in having a slow, steady and safe process with low risks involved. But now this stands in the way of innovative solutions which might be needed to solve sustainability issues. One way of dealing with this could be to become better at trying new solutions on a smaller scale or during a limited time, and thereby not risking as much, as mentioned in one interview.

As described in section 4.5.3 lack of space is a big issue, something that is also supported by Qiao et al. (2018). A number of the interviewees argue that this is the biggest problem in urban planning. Space is limited in a city and even if one can find a spot suitable for an open blue-green stormwater solution this has to be compared to what else could be done with the area. As mentioned before, housing is a big competing factor and one interviewee argues that housing is also a social value. A related issue is the one of parking lots. If houses are built but there is nowhere to park, the apartments will not be attractive to potential buyers. So in some way one can say that in many cases social sustainability competes with itself for both space and money. The densification of Gothenburg, which is also part of the social goals of more housing, improved communications and a livelier city in general, stands in direct conflict to more open, green areas in the city. So the question is which is more important and acute, and maybe also how to combine the two goals of densification and more green areas. Again, it is about seeing the bigger picture to decide what is best for the city in the long run. Since no one really has the social aspects discussed in this report as their main priority, it is not surprising that it often falls between the cracks.

Gothenburg is a big city with many residents and with that comes the responsibility not to spend money on projects that do not help the city. Depending on who you ask, traditional solutions have worked well in the past and are the safer option when building new stormwater solutions. So if these two groups: the innovative who want to try new things, and the more conservative who are less willing to take risks are to meet and agree there probably needs to be a way to measure the benefits of blue-green stormwater solutions.

That is where the next issue comes in. How do we calculate the costs and benefits of building more socially sustainable stormwater solutions? One reason why it is very difficult to quantify the

benefits of for example building a blue-green stormwater solution, which makes people go out more, is that even if it succeeds in making people more active, some of the benefits may still not show in a measurable way for decades. And even then it will be impossible to pinpoint the results to the specific efforts made. As mentioned before, one person said that maybe we do not have to know all the numbers to understand that there is a lot to gain by incorporating more of the social aspects. Even if the stormwater solution would become more expensive compared to a traditional pipe-based solution, the value of an inviting area encouraging movement should more than compensate for the difference. However, even if this sounds reasonable for an initiated person it is difficult to argue without any clear figures to back your claims. As described in section [2.1](#), both Andersson et al. (2017) and Qiao et al. (2018) point out insecurities around the cost of sustainable stormwater solutions as one of the main issues within this topic. If we do not know either the cost nor the economical benefits it is difficult to argue that it is profitable.

As described in section [4.5.5](#) one interviewee questioned the need to quantify the gains of socially sustainable stormwater solutions with the argument that the upside is obvious, even if it is very difficult to measure the benefits accurately it would be better to use the resources put into measuring social gains to increase them. It is reasonable to believe that the truth lies somewhere in between. There might be no need to know *exactly* how much there is to gain from building more with social sustainability in mind. Since many of the potential positive effects are very long-term it gets too difficult. For example, if a multifunctional stormwater solution used as a basketball court when it is dry outside makes kids spend more time outside, and increases the amount of physical activity, the effect of this will not be seen for many years. And even then it will be difficult, not to say impossible, to relate to the specific project. One possible solution might be to make qualified guesses on what the gains might be and then use tools for comparison to decide which of the suggested solutions is best fitted in the specific case.

One example of such a tool is TBL-MCDA, described in section [2.2.3](#), which has a lot of similarities with the MCDA used by RISE in the workshops, section [4.1.2](#). The idea is, in this case, to compare solutions from social, ecological and economical perspectives and say how important the different values are in comparison to each other in a specific area. This type of workshop has a lot of benefits such as an open discussion climate and not least that it is a forum where multifunctional solutions with social sustainability in focus are discussed. Normally, as mentioned earlier, social sustainability is something that might be discussed if there is time or space for it, so by simply bringing people together to discuss this is a big step forward. As also described in section [2.2.3](#) Fryd et al. (2012) have another planning framework to help finding suitable locations for blue-green multifunctional stormwater solutions. This is also similar to what RISE is doing in Gothenburg. The idea here is also to bring people from different disciplines and departments together to find a holistic solution. Considering the opinions of the interviewees and the similarities to the research results, RISE's method seems to have potential when it comes to improving collaboration and simplifying the comparison of different solutions.

It was mentioned in a few interviews that standardized multifunctional stormwater solutions might make it easier to build solutions that solve its technical purpose as well as bringing social gains. This would take less planning and therefore be faster and cheaper to incorporate. It could potentially solve some of the cost and performance insecurities as well. At the same time, the switch to above ground solutions has made it more important to take local conditions, such as topography, into consideration when planning. As described in section [2.2.1](#), Holman-Dodds (2007)

argues that *one-size-fits-all* solutions are less relevant now since they have to be adapted to the local soils, ecotypes, typography and meteorology. Maybe there is some middle ground with development of type solutions that can then be tweaked to the local conditions and therefore save time while also being site specific. The technical aspects of such solutions are outside the scope of this report but the conclusion that an improved collaboration between disciplines would simplify the development of such solutions does not seem too far-fetched.

Something that came up in several interviews, and also during the Angered workshops described in section [4.1.2](#), was the possibility to save or earn money by investing in socially sustainable city development projects. The theory was that a really good solution that has something extra could increase the value of the neighbourhood, get people to invest, and attract tourists by becoming a landmark. The Eiffel Tower is one of the most obvious examples of such an investment, that seemed expensive when first planned, but that has probably paid itself off many times through the years. It will of course not be relevant to do in every stormwater project, the gains will show after quite a long time and even then will they be hard to pinpoint to a specific investment, as described in section [4.5.5](#). But the idea is interesting. By having this mindset and considering these potential gains, not only when constructing big infrastructure projects and buildings, but also in smaller projects, could possibly bring benefits to the local area and the city as a whole. It could, however, be questioned whether it is naive to believe that small projects of this type could actually make a real difference, or if the money is better spent elsewhere. But with a holistic perspective, and a careful consideration of time and place, it could potentially be a good idea to have this mindset, and thereby make the city better, one small project at a time.

As stated in section [2.1](#), both Andersson et al. (2017) and Qiao et al. (2018) lists *lack of legislative mandate* as an obstacle for implementation of more sustainable stormwater solutions. This position was partly confirmed in the interviews, but since the field is quite bureaucratic the interviewees did not seem to think that more rules and regulations are what is needed. As described in section [4.5.6](#) one interviewee talked about how sustainable, multifunctional solutions are in line with what the politicians want and therefore it is up to the departments and their managers to get things done. However, this would take some courage and more willingness to try new things even if they are not *forced* to do it. It was also mentioned, though, that there is a lack of clear objectives for when and how to incorporate measures to increase social sustainability in the stormwater projects since the rules are not concrete enough and since there are too many other things to consider. As mentioned in section [2.2.3](#), the TBL-MCDA framework suggests incorporating social values right from the start and this is supported by the interviews, further described in section [4.7.2](#). As the situation is today it is in many cases up to the departments who can always find some reason not to include the social aspects or simply that it is not within their task to work with social sustainability. Therefore concrete rules that state how and when to consider measures that aim to increase social value would probably be a good idea since it can help counteract uncertainty and make it easier for people working in the municipal departments.

## 4.7 Stormwater management

This section compares blue-green and grey stormwater solutions and describes the interviewees' opinions on when to bring in the social aspects for the projects to succeed in creating a holistic solution. Then it moves on to describe why water management has to be viewed from a holistic standpoint and with the residents' well-being as the top priority.

### 4.7.1 Blue-green versus gray stormwater solutions

During the interviews, old and established solutions were compared to innovative, blue-green, multifunctional solutions with potential to increase social sustainability. A lot of pros and cons were discussed regarding both. Blue-green solutions were said to be better in the long run when ecological and social aspects are considered, compared to traditional pipe-based solutions that might be cheaper when implemented. The ecological aspects have to do with the possibility to treat the water on site through infiltration, but also that the visible water and vegetation can be a habitat for wildlife and therefore good for biological diversity. The water can be seen as a resource, either for vegetation or as a decorative element for people. The social aspects consist of provision of public spaces and green areas for the residents of the city, an important part of the work with social sustainability. But the multifunctional areas could also include other things, such as playgrounds, cafes, meeting places and sports facilities. Flood control zones are rarely flooded and could be used for other activities during dry periods, if planned and executed right. Well thought out and appealing solutions could also help raise the status of a neighbourhood and give the residents a feeling of being seen and prioritized, and therefore possibly help counteract segregation, according to one interviewee. Open solutions are also better at handling heavy rainfall than pipe-based ones, since the water level is free to raise. Heavy rainfall could also lead to decreased treatment efficiency of sewage water in the treatment plant due to the city of Gothenburg having a combined sewage system in some parts of the city (see section [1.1.1](#)).

Pipe-based solutions are still being built, however, and have some advantages beyond what has already been mentioned. Since they are located underground, they will free up surface space that can be used for other purposes and since Gothenburg is a growing city that wants to densify, space is valuable. Gray solutions will also need less collaboration and compromise between different private and municipal actors. This is because the location underground means they do not have to compete with other interests such as roads, schools, parks and houses. Stormwater solutions above ground demands that you consider and work carefully with all height differences since water will always flow to the lowest point. This can cause problems since different departments are responsible for the heights of different elements in the built environment. For example, you need lowered green areas when using them to retain or filter water and since they are often higher than roads today this demands new ways of thinking and working, something that is viewed as demanding. Innovative solutions could also be more demanding simply since it is quite new, see section [4.5.2](#). Employees at the departments might feel more comfortable with established solutions because they know how to build and operate them and it is therefore less likely that unexpected costs will come up. Maintenance costs is something that came up throughout most interviews as a reason to why more established solutions are often built, and the interviewees described an uncertainty regarding both the costs themselves and regarding the division of responsibilities.

### 4.7.2 When to include social aspects

Several interviewees mentioned the importance of acknowledging social sustainability in an early stage for it to be built. Stormwater issues in itself are described as something that is considered in a late stage when planning for a new city area. And then social sustainability is something that is thought of if there is time and resources over at the end, resulting in nothing more than a few flowers and benches being built. Instead most of the interviewees ask for both stormwater issues and potential social gains to be considered in an early planning phase and therefore be part of a holistic plan for the area. In order to succeed in the long run, one interviewee pointed out that as soon as it is decided that a stormwater solution is being built one must also include demands of considering social aspects in the projects. If not, those values will be left out since you simply do not analyze type solutions from a social perspective.

A parable is made by one interviewee, to the environmental issue: *“It [the way people are handling social issues today] is similar to how people were working with environmental issues 20 years ago. They tried to add a little bit of it at the end of the projects, but now it permeates all work and it is obvious that it should always be included. It has to be the same way with social issues. We need to build a city where people are healthy and enjoy spending time, and that needs to come naturally for all people working on these projects. You can not consider only the motorists, but all people all the time. It is hard with aspects that are just squeezed in at the end.”* The stormwater issue is technical and has a lot of demands and regulations that have to be considered and therefore social issues need to be clearly stated in the overall aims of the project to not be forgotten or deprioritized. For example, technical demands, road safety and specified measurements for both piping and roads are always considered, it should be the same with social aspects. One interviewee mentioned that the municipality has a lot of aims and demands regarding social sustainability but that they need to be concretized for people to know what kind of solutions are actually expected to be built.

### 4.7.3 The nature of water

Another aspect that came up in several interviews was the nature of water and how it does not match the way stormwater issues are handled today. You can not control where the rain falls, and when it hits the ground it will follow the topography of the ground no matter where the boundaries of plots, detailed plans and municipalities are located. The best solution might not be located within the detailed plan, but several blocks over or upstream of the recipient. Several interviewees said that the departments are not good enough at thinking holistically about the issue, but legislative reasons were mentioned as well. One person even thought that, while doing and following comprehensive and detailed plans, the city forgets to look at what happens between the houses, and instead requested a perspective where the planning and building starts with the residents of the city, and their wellbeing.

#### 4.7.4 People first

Several interviewees brought up the importance of having the human in mind when building a city and expressed that they do not think Gothenburg does so to a sufficient extent. For example one interviewee said: *“The departments have their fundamental tasks, but none of them are working with social values. No department has the task of highlighting the human needs.”* Another interviewee, from KoV, said: *“KoV has to change its mindset from water pipes and instead think that they are working with city development. Yes, we need to construct pipes or open stormwater solutions, and take care of heavy rain. But we have to understand the context. Cities need to take care of the water, but we should not miss the opportunity to work with, for example, social sustainability. [...] What you can do is to describe a scenario about what you want to accomplish, that is clear and concrete. This is what our vision for a future Gothenburg looks like. Then you can change your perspective and look at what needs to be done to realise this.”*

Water management is only one of many aspects, there is also transportation, the electrical grid, housing, schools, culture and a lot more to consider. With all of these different interests and their different regulations sometimes the humans who actually live in the city are forgotten. The city needs to be a place where people want to live their lives. One interviewee lifted this issue and pointed out some of the many gray and dull areas around Gothenburg. But the same person also stated that just some trees, grass, bushes etc. would make a big difference for a relatively small amount of money.

One interviewee mentioned that people with physical hindrances, children, elderly people and other minorities are often acknowledged when our cities are designed. That is of course a good thing, but too much focus on making adaptations to ensure accessibility for everyone might draw focus away from the vast majority. We must not forget those who do not need extra consideration. Instead the person pointed out that we should focus on all people, their place in society and their wellbeing right from the start when we are planning.

Several interviewees brought up how a better understanding of social sustainability can help improve people's feeling of security when they move around the city at night. It is a problem that people are scared of taking a walk in the dark but a lot can be done by city planners with a good understanding of the issue. For example by ensuring proper lighting in new multifunctional parks, that is a crucial aspect if the goal is to encourage more movement and outdoor activities.

## 4.8 Discussion stormwater management

As discussed earlier there are obvious up- and downsides with both blue-green and grey stormwater solutions, each having its place. In some areas it is necessary to use the traditional pipe-based solutions and in others it is obvious that some kind of blue-green solution is more suitable. But what has been surprising, and not really answered, throughout this project is why solutions such as permeable parking lots, submerged plant beds and similar are not more commonly used. It has come up that the pipes used for stormwater are on the verge of being too small in some areas. Therefore it is not only about the social aspects of a greener city but also a technical need to handle stormwater on the surface. If this can be done at the same time as making the city greener and more inviting it could be a win-win for everyone involved. The social aspects are often considered in the latter stages of a project if there is time and money left. This makes it difficult to combine the aspects so that the same solution can solve technical issues while also adding to the social aspects. For example, it is still fairly uncommon to build submerged plant beds even though there are a lot of flowers and trees in the city but they are raised above street level instead. With better communication between the different actors in an early stage these two could be combined so that, for example, a plant bed can replace a gutter well in at least some cases.

This leads to the next issue which is that stormwater is usually considered late in the projects when a lot of the area is already planned. If social sustainability and stormwater are going to be worked with at the same time, the problem gets even bigger. Even if there are great ideas on how to design stormwater solutions that also increase social values it will be difficult to have it built if it is not part of the project from the start. As mentioned on a number of occasions, a more holistic view is needed. Stormwater, social sustainability *and* all the other parts of the projects must be viewed as one project where all these needs have their respective place. There is no need to separately work with the technical side and then bring in the social aspects, a holistic view would reveal opportunities which could benefit both sides. Other writers on this topic also talk about the importance of including the sustainability aspects early in the projects and having a holistic view of the whole process as described in section 2.2.1. Arnö & Pellegrini (2017) say that one must “*see all the different actors and their interests*”, and that locking in on one detailed development plan without having the whole picture simply will not do it. When Cole talks about the TBL-approach a big part of that is to bring in the sustainability issue in the beginning of a stormwater project so that it is there from the start.

As found in the interviews, stormwater is viewed as a technical problem rather than an opportunity to make the city better for its inhabitants. This is probably partly related to the departments primarily trying to solve their respective fundamental tasks, which are of a predominantly technical nature, as described in section 4.1.1. It is interesting, however, to compare these findings to the ones in the theory chapter. Several sources discuss this issue and it seems that it is a common problem in other places as well, see section 2.1. Cettner (2012) says that stormwater should be viewed as an opportunity for sustainable development instead of a technical issue and Lundy & Wade (2011) say that it is important to see water in the city as multifunctional components that can bring a lot of value. Smith (2009) instead describes how engineers and landscape architects are working separately with water, one is trying to get rid of it while the other is adding it for aesthetic purposes. They all make the same point, to stop looking for problems and instead see the potential in using the water as a resource. Maybe that little change in mindset could make a huge difference.

The interviewees seemed to think that a few individuals were responsible for a large amount of the innovative and sustainable solutions that are being built. These individuals do probably not focus on stormwater solely as a technical issue that needs to be solved.

One interesting thing that was brought up during the interviews was the similarity between the social sustainability issue and the focus on climate related problems, or ecological sustainability, that has gradually become a more obvious part of all building projects during the last decades. The interviewees argued that the social aspects could make the same journey within city planning. It is not a perfect analogy, firstly since climate change could potentially destroy the world if not handled well and secondly since one could argue that building urban areas, with shortened transports and shared resources, was a social sustainability measure from the beginning, long before the term was invented. When it comes to the obvious focus in all projects, however, social sustainability does seem to deserve more, and that makes the parable interesting. Ecological sustainability has probably become such a natural part of city development because of a number of reasons, such as widespread information, demand and laws and regulations, and maybe some lessons can be learned from it.

As stated throughout this report, and as Fryd et al. (2012) say, see section [2.2.3](#), there is a need for a holistic perspective when working with these issues. For example, there could be problems with flooding near a river bank where the instinct is to solve it where the problem reveals itself, when in reality, a cheaper and more effective way of dealing with the problems would be decreasing the run-off from an area upstream. Furthermore it is usually said that the three parts of sustainability: social, ecological, and economical are mutually exclusive and if one is not fulfilled the others will not be either, at least not in the long run. For example, a city could be economically and ecologically sound but not live up to the social standards which will affect the residents and that way affect the economy which in turn eliminates the possibility to care for the ecological issues, or the other way around. To reach the visions of Struck (2012), described in section [2.2.1](#), there is therefore a need to rethink the way stormwater issues are handled. Social, ecological, and economical sustainability aspects need to all be considered from the beginning in the projects. The *Rain Gothenburg* project aims to use the rain as a resource to create experiences for the residents and create *the world's best city when it rains*, as described in section [1.1.2.1](#). This can only be done through working with a holistic view of society, by starting from the human being when planning and by taking the right measures at the right time, to give the greatest possible benefits.

## 5 Conclusion and recommendations

This report shows that there is a potential to increase the well-being of the residents by focusing on social sustainability when constructing blue-green, multifunctional stormwater solutions. For this to happen, social sustainability needs to be a clear and prioritized goal for people working with implementing such solutions. Urban planning is bureaucratic, and because goals and visions are vaguely formulated and sometimes contradictory it becomes difficult for the departments to consider social sustainability. Furthermore, the gains are hard to quantify which makes it difficult to justify the cost.

Some of the people working in the technical departments in Gothenburg feel a need for change in the way they are working and the planned reorganisation seems to be an opportunity to solve cooperation issues that stand in the way of reaching the city's social potential. It could bring better understanding for the roles and the challenges of the other departments and make the way of working more similar to smaller municipalities where collaborating is easier.

By placing different disciplines under the same roof, the reorganisation could potentially make it easier to handle stormwater related problems in a more holistic way. The holistic view is something that was found desirable according to many, since it would make it easier to implement the right solution at the right time and place, which could help better handle the problems of limited city space and resources. Because of the nature of water, some problems are best solved in another place than where they first arise. Stormwater issues are not necessarily best solved within the respective detailed development plan and needs to be looked at from a holistic perspective. And if this holistic planning starts from the human being, the city can get better from a social standpoint with every project.

The conclusions from this report forms the basis of some recommendations for people who have the ability to change the way stormwater issues are handled. Firstly, stormwater management should be considered earlier in the planning processes to make sure it fits in the specific area. The same applies for social issues within the stormwater projects. For increased social sustainability in cities, this report recommends more planning of the built environment to be based on the residents best interests, even when there is a technical issue that needs to be solved. To be able to consider solutions that increase social sustainability, methods that enable comparison between social and technical gains, for example MCDA, are recommended to be further used and investigated. Even though the reorganisation of the technical departments in Gothenburg seem to have potential to facilitate collaboration, the consequences of said reorganisation are recommended to be carefully evaluated. Lastly, rules and regulations regarding inclusion of social aspects in planning processes for stormwater projects are recommended to be looked over and clarified, not least to help create a holistic approach to city building.

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# Appendix

## 1 Intervjuguide

Är det okej att vi spelar in?

Presentera projektet:

Vad är dina spontana tankar efter att ha hört vår frågeställning?

Vad exakt är din roll på *din förvaltning*?

Vad har du jobbat med tidigare?

Har du några andra erfarenheter av dagvattenprojekt?

Vad är *din förvaltnings* uppdrag generellt och i dagvattenprojekt specifikt?

Hur skulle *din förvaltning* kunna bidra till att öka den sociala nyttan i de här projekten?

Känner du till och vad tycker du isåfall om den planerade omorganiseringen av förvaltningarna i staden?

Finns det ett standardförfarande när det gäller planeringsfasen för dagvattenprojekt och skulle du kunna beskriva den?

Hur mycket fokuserar man på social hållbarhet i de här processerna?

Vad finns det för aspekter som konkurrerar med den sociala när man planerar?

Är olika individer ungefär lika intresserade av att skapa lösningar som höjer den sociala hållbarheten? Olika förvaltningar?

Vad tror du är de huvudsakliga anledningarna till att man inte alltid gör innovativa systemlösningar som kan hjälpa till att höja den sociala hållbarheten?

När i processen skulle man ha möjlighet att tänka mer på sociala aspekter?

Vad tror du är huvudanledningarna till att kommunikationen mellan olika förvaltningar inom dagvattenprojekt inte alltid fungerar perfekt?

Vad tror du är viktigast för att förbättra den sociala hållbarheten i staden när det kommer till den byggda miljön?

Andra intervjupersoner som verkar i projekten eller på andra sätt vore bra för oss att prata med?