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Improving the process of setting environmental requirements in urban development projects

A case study of Älvstranden Utveckling's work in three projects

Master's thesis in Design and Construction Project Management

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DEPARTMENT OF ARCHITECTURAL AND CIVIL ENGINEERING
CHALMERS UNIVERSITY OF TECHNOLOGY

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ABSTRACT

The city of Gothenburg is facing challenges in relation to urban development, as the city continues to grow. Älvstranden Utveckling, a public landowner and urban developer, has been given the commitment to coordinate the work towards a sustainable development of the city, within the areas of Älvstaden. It is important to set environmental requirements in projects, as the construction of new buildings increase the already negative environmental impact from the construction industry. The extent of these requirements affects the involved actors and the outcome of the projects.

The aim with this master thesis is to investigate and improve the process of setting environmental requirements, by examining the strengths and issues related to Älvstranden Utveckling work regarding the management and regulations. The realization of the aim was done by analysing three urban development projects, Lindholmshamnen, Masthuggskajen and Skeppsbron, through an actor network perspective. To investigate how the environmental requirements have been perceived in practice, interviewees with building developers in the different project were conducted and compared to previous research.

To conclude, the result mainly indicates a difficulty in keeping the environmental requirements suitable for all actors involved and relevant long-term. Still the results address several aspects where the process can be improved, to facilitate the work with the environmental requirements, without compromising the sustainable development. To conceptualise the findings, four categories of measures to improve the process when setting environmental requirements, in future projects, have been developed - *Resource allocation*, *The scope of the environmental requirements*, *Clear documentation*, and *Follow-up and evaluation*. However, the complex characteristics of urban development projects, with long lead times and numerous actors involved, are inevitable to neglect and will always give rise to different interpretations and perceptions. Therefore, it is important to keep the strive towards sustainable urban development on the agenda.

Keywords: Environmental requirements, urban development, sustainable building, actor network, Älvstranden Utveckling

Förbättra processen i att ställa miljökrav i stadsutvecklingsprojekt
En fallstudie om Älvstranden Utvecklings arbete i tre projekt

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SAMMANFATTNING

Göteborgs stad står inför utmaningar i förhållande till stadsutveckling, eftersom staden fortsätter att växa. Älvstranden Utveckling, en offentlig markägare och stadsutvecklare har fått uppdraget att samordna arbetet mot en hållbar utveckling av staden, inom Älvstadens delområden. Det är viktigt att ställa miljökrav i projekt, eftersom uppförandet av nya byggnader ökar den redan negativa miljöpåverkan från byggbranschen. Omfattningen av dessa krav påverkar de involverade aktörerna och resultatet av projekten.

Syftet med detta examensarbete är att undersöka och förbättra processen i att ställa miljökrav, genom att undersöka styrkor och svagheter relaterade till Älvstranden Utvecklings arbete, rörande projektledning och kravställning. För att möta syftet analyseras tre stadsutvecklingsprojekt, Lindholmshamnen, Masthuggskajen och Skeppsbron, genom ett aktörsnätverksperspektiv. Vidare, för att undersöka hur miljökraven har tagits emot i praktiken genomfördes intervjuer med byggnadsutvecklare i de olika projekten och jämfördes med tidigare forskning.

Avslutningsvis indikerar resultatet främst på en svårighet i att hålla miljökraven lämpliga för alla inblandade aktörer och långsiktigt relevanta. Resultaten tar ändå upp flera aspekter där processen kan förbättras för att underlätta arbetet med miljökraven utan att kompromissa med den hållbara utvecklingen. För att göra en konceptualisering av resultaten har fyra kategorier av åtgärder, för att förbättra processen i att ställa miljökrav för framtida projekt, utvecklats - *Resurstilldelning, Miljökravens omfattning, Tydlig dokumentation och Uppföljning och utvärdering*. De komplexa egenskaperna hos stadsutvecklingsprojekt, med långa ledtider och många involverade aktörer, är dock oundvikliga att försumma och kommer alltid att ge upphov till olika tolkningar och uppfattningar. Därför är det viktigt att hålla strävan mot en hållbar stadsutveckling på agendan.

Nyckelord: Miljökrav, stadsutveckling, hållbart byggande, aktörsnätverk, Älvstranden Utveckling

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To end our five years at Chalmers University of Technology, and to summarize all the knowledge gained, this master thesis has been carried out at the Department of Architecture and Civil Engineering at Chalmers University of Technology, Sweden during the spring of 2021. The subject of the thesis arose from the authors interest in sustainable urban development and an inquiry from Älvstranden Utveckling to investigate in their process of setting environmental requirements.

We would like to express our warmest gratitude towards Martine Buser, our supervisor at Chalmers, for all the meaningful support and wise words. We would also like to give a very special thank you to our supervisor at Älvstranden Utveckling, Åsa Lindell, for your dedication in our work, interesting discussions and feedback. The outcome of this thesis would not have been the same without the two of you, and all the inspiration you have given us.

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Maja Sjöstedt and Rebecka Strutz, Gothenburg, June 2021

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Glossary

Building developer – Byggaktör

Process leader - Processleadare

Sustainability program - Hållbarhetsprogram

Notations

BBR - Boverkets byggregler

SAM - Sustainable assessment method

SB - Sustainable building

SPL - Sustainability program Lindholmshamnen

SPM - Sustainability program Masthuggskajen

ÄU - Älvstranden Utveckling

1 Introduction

The first chapter will introduce the background to this study which forms the basis of the thesis. Further the aim, research question, delimitations and the main contributions of this study will be presented.

1.1 Background

During the following years, the city of Gothenburg will face challenges related to urban development. An increase of 120 000 citizens until 2035 is estimated, which results in a growing need of new housings, works and services (Göteborg stad, 2021b). The strategy for expansion planning of Gothenburg implies that the city shall be developed in a sustainable way, by growing within the already built environment. By densifying already existing areas previous investments and resources such as infrastructure, services and public transport could be used efficiently (Göteborg stad, 2021d). However, the construction and real estate industry is responsible for 36% of the energy consumption and 20,6% of the greenhouse gas emissions in Sweden (Boverket, 2021). Densifying cities entails construction of new buildings, which increase the already negative environmental impact from the industry. With a goal to reach zero emissions of greenhouse gases in Sweden until 2045, measures needs to be taken for the construction industry and the government suggest that further regulations need to be developed (Boverket, 2021).

According to Boverket (Boverket, 2016) it is the municipalities that has the holistic view of how the densification will affect the city. In the process of doing this, Boverket (2016) urge all municipalities in Sweden to set up a long-term strategy for how the city is to be expanded. A strategy facilitates the dialogue between the actors involved in the city's development. In Gothenburg, one developed strategy is called Vision Älvstaden (Göteborg stad, 2021e). Vision Älvstaden is the largest urban development project in Scandinavia, as the city centre of Gothenburg is expected to grow twice its size as it spreads across both sides of Göta Älv. Älvstaden is divided into seven sub-areas which during the years 2000-2050 will be developed in the already existing urban environment. The company that has been assigned to realize Vision Älvstaden is Älvstranden Utveckling, a public landowner and urban developer, with a core business in sustainable urban development (Älvstranden Utveckling AB, 2021c). Älvstranden Utveckling, who is the coordinator of the project, will together with the city administrations of Gothenburg, and consortiums consisting of private building developers, develop the areas of Älvstaden. To ensure a sustainable development of the areas Älvstranden Utveckling has set environmental requirements towards the actors in the projects developing the sub-areas.

The negative environmental impact from the construction industry, in combination with the increased demand for urban areas has resulted in the usage

of various tools for sustainable building (Mattiizioli et al., 2021). Sustainable building is described as the practise of creating buildings with processes that are environmentally sustainable throughout the buildings whole lifetime (Zhang et al., 2019). Sustainability assessment methods, SAMs, are considered one of the most effective tools to improve the performance of buildings (Li et al., 2017). In the Swedish construction industry Miljöbyggnad, Svanen, BREEAM-SE and LEED (Svanen 2021; Sweden Green Building Council 2021a) are commonly used SAMs for buildings.

However, it is not the methods themselves that will improve the sustainability of the built environments, what will be decisive and have an impact is the implementation of the methods (Hääkinen and Belloni, 2011) by the involved actors in urban development projects. The same problematization could be applied to the case of Älvstranden Utveckling and their effort to set environmental requirements in the sub-areas of Älvstaden. So far, the sustainability ambitions from Älvstranden Utveckling have been high, in line with the goals of Vision Älvstaden. Yet, it has shown that the efforts made, have caused challenges in the realization of ensuring the basic environmental performance at a building level in the projects, both for Älvstranden Utveckling themselves and the building developers. This since the building developers, in parallel with ÄU's environmental requirements, often relate to internal requirements, different SAMs and customer requirements.

Hence, possible measures to improve Älvstranden Utveckling's process of setting environmental requirements in urban development projects, needs to be investigated. This to facilitate the work for all involved actors and simultaneously ensure a sustainable urban development of the areas.

1.2 Aim

The aim with this thesis is to investigate how to improve the existing process of setting environmental requirements in urban development projects. To meet the aim, strengths and issues related to Älvstranden Utveckling's environmental requirements in three projects of Älvstaden will be analysed.

1.3 Research Question

How can Älvstranden Utveckling, as a public landowner and urban developer, set environmental requirements towards the building developers to facilitate sustainable development in urban development projects?

- a) What strengths and issues can be identified in the environmental requirements set by Älvstranden Utveckling and how do they relate to SAMs, industry practise and laws?

- b) How has the building developers experienced the requirements in their own projects?
- c) Based on the findings and previous research, what measures can be done to improve the implementation and follow-up of environmental requirements?

1.4 Delimitation

The study includes three of Älvstranden Utveckling's seven urban development projects. The three areas are Lindholmshamnen, Masthuggskajen and Skeppsbron, this is also the geographical location that the data of the case is collected from. In section 3.3 a motivation for the chosen cases can be found. A second limitation of the thesis is to look at environmental requirements at a building level. The conducted interview study hence focus on the building developer experiences regarding the environmental requirement.

The thesis aims to look at the process of setting environmental requirements, therefore the study will focus on how to make the process more efficient from an administrative and collaborative aspect. The recommendations of measures that can be taken to improve the process will not consider whether different alternatives are better than others from an environmental or economic performance.

1.5 Contribution to theory and practice

This study contributes with several aspects to the field of urban development, from a perspective to lift the involved actors' perceptions of sustainability efforts made. Several previous studies have addressed the contents of different SAMs and the advantages and disadvantages of using them in terms of environmental performance. Instead the authors of this thesis provide an investigation on how the choice of working with SAMs, other environmental steering documents and requirements has been reflected in practice, and how it affects large networks, and its involved actors, as an urban development project can be equated with.

This thesis was conducted in a joint process between the two authors and the workload has been equally divided.

2 Theoretical Framework

This chapter will present an overview of sustainable development in the construction industry, and the main obstacles and solutions in the work with sustainable building. The chapter will further describe the complexity in urban development projects related to the construction industry's characteristics and last, how urban development can be seen from an actor network perspective.

2.1 The built environment and sustainable development

Sustainable development has, since the Brundtland report were published in 1987, been described as meeting “the needs of the present without compromising the ability of future generations to meet their own needs.” (WCED, 1987). The report defined three fundamental dimensions of sustainability, environmental, economic, and social, and that these three dimensions together should build an economic growth that at the same time is socially and environmentally sustainable. Several studies have highlighted the fact that there are many ways to interpret and approach sustainability (Holmberg and Larsson, 2018). The three dimensions are mutually dependent and behave in non-linear ways, therefore they cannot be addressed as simple isolated entities. Further, studies show (Savaget et al., 2019) that the intent of transitioning towards more sustainable directions can not only be the purpose of single actors but need to a certain degree be a coordinated action of a collective strive. Dwaikat and Ali (2018) claims that the construction industry is, in comparison with other production and manufacturing sectors, one of the industries that needs to embrace sustainability the most, which is the main driver for sustainable building in the construction industry.

During the industrialisation in the 1930s, many swedes chose to move into the cities and urban areas since there were a lot of works there (IVA, 2017). The trend has continued, in 2014 more than half of the Swedish population lived in cities and the number is expected to increase to 66% until 2050. The cities must therefore be expanded, which could increase the already negative environmental impact from the construction industry which already is responsible for 40% of the energy consumption and 36% of the CO₂ emissions in developed countries (Mattiizioli et al., 2021).

The changes that need to take place in the urban environment to achieve sustainability can be seen as transitions. The transitions are explained as long-term, ambiguous, inherently complex, multi-actor processes (Holmberg and Larsson, 2018). Before strategies are developed to meet an issue related to sustainability, a preparational phase is demanded. In a planning phase the overarching process is designed, actors are invited, and the scope is set. Holmberg and Larsson (2018) states that to support various actor groups in the transition skilful facilitation is needed. One transition that already has taken place in the construction industry, due to the negative environmental impact, together with

the increased demand of urban areas, is a rising usage of tools for sustainable building (Mattiizioli et al., 2021).

2.1.1 Sustainable building

The concept of sustainable building, henceforth referred to as SB, is defined in many various ways, the American society of Testing and Materials define the term as a building that improves the function of local, regional and global ecosystems, during and after construction, and in the same time meets its specific building performance (Glavinich, 2008). Zhang et al. (2019) claims that SB is the practise of creating buildings with processes that are environmentally sustainable throughout the buildings whole lifetime. A broader definition of SB is explained by Rwelamila et al. (2000), as buildings that encompass environmental, social and economic standards, including technical aspects. Zou and Zhao (2014) claims that SB can be defined by either a process or outcome approach. However, the authors further opine that there is a lack of clear definitions of the concept SB which creates challenges in promotion and implementation of the concept, since it could be challenging to measuring sustainability.

The rising awareness for sustainability has forced the construction industry towards a change (Berardi, 2012). New regulations, laws and policies are constantly sharpened to drive the industry towards a more sustainable development, for example life cycle assessment tools, LCAs, or environmental product declarations, EPDs (Brockmann, 2019). One well established tool to support the development of SB is Sustainable Assessment Methods, henceforth referred to as SAMs, which have been developed throughout the world. Several studies (Berardi, 2102; Häkkinen and Belloni, 2011; Li et al., 2017; Winston, 2010) oppose that SAMs, are necessary tools to increase SB. Häkkinen and Belloni (2011) further states that, normative regulatory instruments, such as building codes, also could be a steering instrument to facilitate SB.

2.1.2 SAMs and their role in sustainable building

The ideal building performance is various described depending on the interest of different parties (Berardi, 2012; Díaz-López et al., 2019; Ding, 2008). The owner of the building could for example prefer if the building have low financial costs, while residents may focus on the air quality in the building (Ding, 2008). It is hence hard to find a SAM that fits the preferences of all involved parties. During the years, important work has been done to develop systems which are measuring and grading sustainability of a building and its surrounding (Díaz-López et al., 2019). After the energy crisis in the 1970s, when oil prices rose drastically, regulations on energy usage appeared worldwide in the construction industry and became a way to measure a buildings environmental impact (Berardi, 2012). BREEAM was the first SAM to be developed in 1990. Before that, the systems used to assess SB

only by measure single criteria's, such as energy use, air quality or indoor comfort (Ding, 2008). Instead, SAMs should contain multiple dimensions and categories of sustainability, since SB is too complex to address, using single criteria assessment (Díaz-López et al., 2019). Additional SAMs have further been developed around the world to simplify SB. The preliminary aim with the SAMs is for developers and actors to assess the environmental characteristics of a building by using common criteria's (Ding, 2008). They provide measurable values and a way of structuring sustainable information of the building and process. The SAMs further raise the awareness for SB in the industry and helps the companies to achieve different goals of sustainability.

The SAMs that are commonly used in the Swedish construction industry are Svanen, Miljöbyggnad, BREEAM, or BREEAM-SE as the Swedish version is called, and LEED (Svanen, 2021) (Sweden Green Building Council, 2021a). Both Svanen and Miljöbyggnad are Swedish SAMs, while BREEAM-SE and LEED are international developed and have further been adjusted to fit the Swedish industry. Svanen is a Nordic eco labelling system, that can be applied on several products, where the assessment method for buildings is one of their undertakings (Svanen, 2021). Miljöbyggnad is owned and developed by Swedish Green Building Council, SBGC, that together with over 90 other countries, is a part of World Green Building Council, which is the world's largest organisation to work with SB (Sweden Green Building Council, 2021c). SGBC is additionally responsible for the Swedish versions of BREEAM-SE and LEED. Statistics from SGBC (2021a) shows that Miljöbyggnad is the most commonly used SAM for both residential buildings and offices in Sweden. Furthermore, LEED and BREEAM-SE are mostly used for offices (Sweden Green Building Council, 2021a), while Svanen only can be used for residential buildings and schools (Svanen, 2021). The distribution is shown in figure 2.1.

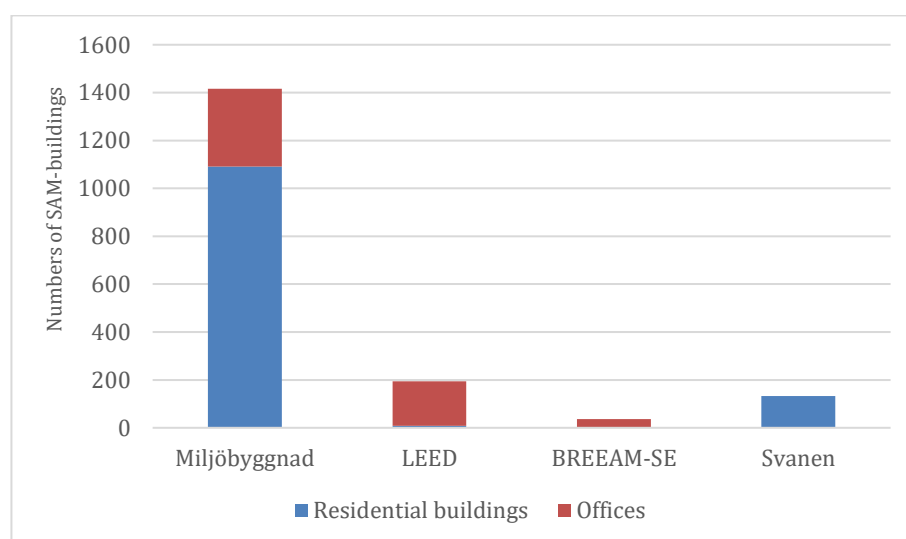


Figure 2.1: Numbers of SAM-buildings. (Svanen, 2021)
(Sweden Green Building Council 2021)

Besides the fact that there are numerous of SAMs for the Swedish builders to choose between, the SAMs contains several grading levels. Miljöbyggnad is divided into three levels, Miljöbyggnad- Brons, Silver and Guld, where the different levels vary in the strictness of the requirements to be addressed. (Sweden Green Building Council, 2020a). LEED and BREEAM-SE contains several levels of gradings as well; LEED- Certified, Silver, Gold and Platinum (U.S. Green Building Council, 2020), and BREEAM-SE- Pass, Good, Very Good, Excellent and Outstanding (Sweden Green Building Council, 2017). In these two SAMs, the builders achieve different gradings by collecting points in the different categories. In Svanen, there are no levels of gradings, but the builders can collect points that shows how much of the criterion that have been achieved (Nordisk Miljömärkning, 2016). Although, the gradings in the SAMs are differently evaluated, SGBC has done a comparison between the most commonly used SAMs in Sweden to find an equivalent level. This was done in connection to the development of the newly introduced SAM, NollCO₂. NollCO₂ is a supplementary SAM to the already existing ones, and has therefore a requirement that the buildings should be approved with another SAM as well (Sweden Green Building Council, 2020b). To secure a good level of NOLLCO₂, SGBC requires an equal minimum level corresponding to; Miljöbyggnad Silver, BREEAM-SE Very Good, LEED Gold or Svanen.

Depending on the context and the actors, the uptake and influence of SAMs as a tool varies. Instead of just functioning as tools, which in a strict sense should aid sustainable design and assessment, Schweber (2013) and Spinks (2015) claims that the role of the SAMs can also be to symbolize environmental prestige, justify assured design decisions and create a platform for discussion of broader environmental values. Thus SAMs could be considered as a part of a broader socio-technical network (Goulden et al., 2015), combining artefacts, discourses and individuals.

2.1.3 Obstacles and Solutions for sustainable building

In the strive towards sustainable transitions, the drivers influencing urban decisions, can many times become an obstacle to deliver the stated goal (Webb et al., 2018). For example, even though shared visions and goals for sustainable urban development exist, issues regarding unclear translation of goals to specific project implementation are often identified, as well as the complexity in trying to evaluate cross-scale, as needed in urban development projects. Enablers for sustainable building, SB, can, to a certain extent, be promoted with the help of regulations, at the same time the wrong type- or the lack of steering may hinder SB (Häkkinen and Belloni, 2011). Further housing policy and practice can either make a significant contribution or detract from the sustainable development of urban areas (Winston, 2010; Zou and Zhao, 2014) and. For a sector as construction, with contradictions and a known lagging development, the

possibility to assess products and processes is particularly important. Häkkinen and Belloni (2011) also lifts the fragmentized nature of the construction sector and the high number of actors involved as a reason to have regulations as a steering mechanism, which can be an effective way to achieve results. Yet the activity of societal agreement, as normative regulations require, is enhanced as a time-consuming process. It also appears that the adoption of sustainable innovations may be hindered by too rigid normative steering mechanisms (Häkkinen and Belloni, 2011). When developers and actors must adapt to a variety of standards and guidelines it could make market adaption more difficult and costly (Goulden et al., 2015).

According to Häkkinen and Belloni (2011) efforts have been made by researchers and the industry to develop management methods of SB. If there are methods helping to set targets for SB, assess the result and show the achievements for clients, it is believed that SB can be promoted. Devuyst (2000) describes sustainability assessment as the process of identifying, predicting and evaluating the potential impacts of initiatives and alternatives. However, Häkkinen and Belloni (2011), argues that the methods themselves will not improve the sustainability of built environment, it is the implementation of methods that will impact and be decisive. Complications in communication between different actors, as well as coordination and management-related issues could hinder SB to be enacted within organizations. Stenberg (2006) therefore argues that the environmental key actor, which for this thesis could equal Älvstranden Utveckling, needs to be empowered with decision-making mandates.

As mentioned, the Swedish government (Boverket, 2021) urges the construction industry to develop further regulations and measures in order to obtain sustainable development. This transition, where obstacles and solutions for sustainable development are faced, can be seen in other parts of the world as well. A study of 15 municipalities in Israel shows that there are a lack of resources and expertise in the municipalities to develop their own sustainable requirements (Goulden et al., 2015). If the municipalities instead used third-party standards in development projects, they do not have to deal with the cost and recourses to develop and update the standards. Nevertheless, some of the municipalities in the study preferred to use their own standards since they thought it was harder to get mayoral- and municipal approval for third-party standards than for their own. Further, a survey with 31 industry experts, listed under the BCA's Certified Green GMM and GMP Scheme in Singapore (Hwang and Tan, 2010), shows that two frequent obstacle encountered during the process was *Green building practices are costly to implement* and *Lack of communication and interest among team members*. A less frequent, by still noteworthy obstacle encountered was *Complex codes and regulations on green building and sustainable construction*. Another case study of 6 Star Green office buildings in Perth regarding the implementation of sustainable innovations (Love et al., 2012) concluded that something that acted as a catalyst for the implementation of sustainable innovation was the clients desire and

commitment to achieve world leadership in environmental design and construction.

2.2 Urban development

The process of urban development mainly includes the creation of urban environments and structures, but also the creation of changes in processes of economic, social, organisational, cultural, governmental, and physical nature (Ernst et al., 2016). When developing urban areas, the aim is to realize comprehensive investment and transformation, renew urban functions and reuse urban spaces (Zhang et al., 2021). The built environment is according to Handy et al. (2002) a system involving urban design, land use and transportation, and includes the patterns of human activity in the physical surrounding. Urban development includes multiple complex relationships and subjects which requires well-structured management and coordination (Holmberg and Larsson, 2018; Zhang et al., 2021). The actor which is responsible for the management in urban development projects plays an essential role in the process, given that it is their mission to coordinate the work and provide a good social environment for the involved actors (Atkinson, 1999). Feretti (2016) argues about the importance to involve multiple parties, such as the contractors and real estate developers but also citizens and political organisations, in the decision making in urban development project. This to engage several people, collect different opinions and at the same time promote future involvement in decision making. Kungliga Ingenjörsvetenskapsakademin, IVA, (2017) further claims that including new smaller actors, rather than just the well-established building developers, in urban development could give new competences and ideas that have not been considered in the work before. When developing new ideas in a transition process, as in sustainable urban development, the inclusion of different actors, both internal and external, creates a need of not only supporting organisational structures, but also a greater need of leadership support (Gluch et al., 2019). Zhang et al. (2021) further states that processes with multiple parties involved needs an established framework to guide the cooperation process.

2.2.1 Initiatives in the Swedish construction industry

In the Swedish construction industry, there are national building requirements that needs to be followed for every building projects, BBR, Boverkets byggregler (Boverket, 2018). Further initiatives have been developed to guide actors in their work with sustainability requirements (Thrysin, 2021). Except the requirements in BBR, some of these initiatives are *Klimatkrav till rimlig kostnad*, *Klimatberäkning och klimatkrav vid renovering och ombyggnation* and other roadmaps, called färdplaner in Swedish, for sustainable development. Both BBR and the requirements in the SAMs are continuously tightened and updated to steer

the construction industry in the right direction. For example, the government of Sweden plans to introduce a climate declaration requirement for construction of new buildings from 1st January 2022 (Boverket, 2020). The introduction of this requirement is a step in the government's steering towards a decreased climate impact from the construction of buildings.

2.2.2 The complexity in urban development projects related to the construction industry's characteristics

The urbanisation in today's society have resulted in several urban development projects all over the world (Luo et al., 2017). These projects consist of complex characteristics that often leads to cost overruns and schedule delays, that also characterise the construction industry as a whole, which is defined as complex and conservative (Dubois and Gadde, 2002; Jin et al., 2017; Lou et al., 2017). The physical substance of a building could, as a metaphor, be described as a pile of material which have been gathered from different sources, undergone different processes at different places, involving many types of services from many people organised in different organisations and units (Dubois and Gadde, 2002). Gidado (1996) early stated that the complexity of the construction industry is a result of several circumstances: the environment where construction takes place, resources employed, the required level of specific knowledge, and the interactions of numerous different parts in the workflow. Further Lou et al. (2017) describes that the interactions in the workflow is done in many various, often unpredictable, ways. Every project in the construction industry is unique. In accordance Dubois and Gadde (2002) opine that with these circumstances, it is better to adjust the process based on each project, unlike in other industries where it is easier to find standardized solutions. However, studies show that innovations for standardized solutions in the construction industry are frequently developed (Aapaoja and Haapasalo, 2014). One attempt to imitate other industries is prefabrication, when all or some part of an object is produced in another place than the final position of the building. One of the greatest benefits with prefabrication is to move the mindset of the industry from a unique project focus towards a standardised process focus. Xue and Zhang (2018) further states that standardised processes in the construction industry is connected to economic growth and that construction standards must be used to create a long-term economic growth in the industry.

Every construction project involves numerous of stakeholders which can be divided into two overarching categories, internal and external stakeholder (Jin et al., 2017). The internal stakeholder could be the owner of the project, also referred to as the developer, which have the overall responsibility for the projects. Another internal stakeholder is the contractors which also plays an essential part in the realization of the project. The external stakeholders could be the government, potential users, or environmental organisations. In every new project, these various stakeholders create temporary networks, within their

organisations, which can be seen as more permanent networks (Dubois and Gadde, 2002). To create a well-functioning environment within the temporary network, it is important that the stakeholders have knowledge about each other, to promote their common interest (Jin et al., 2017). Zhang et al., (2017) further states that insufficient knowledge management is the main issue for construction projects. Another significant part of a well-functioning network is trust. Kadefors (2002) discuss trust in construction relationship and argues that networks where trust is present facilitates spontaneous interactions with each other, where no thoughts of possible hidden motives exists, that could hold the exchanging parties back.

The complex characteristics of construction industry makes it difficult to embrace innovations (Ozorhon and Oral, 2017). An innovation process is, according to Garud et al. (2016), influenced by different factors like the frequent back and forth activities, the key role of the manager, the shifting criteria over time, and the different contradictory stakeholders' interests. These factors can be found in what is known as the 'black box' of the innovation process. In science, 'black box' is a system that could be seen in terms of inputs and outputs, and without knowledge about its internal workings – inside the 'black box'. Garud et al. (2016) further states that the 'black box' is full of ups and downs due to the previously mentioned factors, in particular the transformations performed by different actor in the course of their interactions. Therefore, to manage the innovation process Graud et al. (2016) claims that recombination, ongoing efforts to deal with new entanglements between social and material element, and the capacity to go back and forth in time to deal with continuity and changes, are useful ways to do it.

2.3 Urban development projects from an Actor Network Theory perspective

As mentioned in the previous paragraphs the construction industry is often built upon large networks of stakeholders, with individual interest and participation in projects. No less, urban development projects involve several actors and often municipalities. The interference of different stakeholders, in combination with the establishment and existence of laws, regulations, requirements and building codes regarding environmental sustainability, hence, result in a large amount of steering directions to relate to. In urban development projects, this also leaves the SAMs open for different interpretation, as they represent multiple perspective, depending on who is giving and receiving the information (Bowker and Star, 2000). To understand the relationship between such networks, composed of several actors, an actor-network theory approach can be used (Latour, 2005). The theory, henceforth referred to as ANT, is an alternative social theory, developed by Callon (1984), Latour (1987, 2005), Law (1987). ANT particularly examines how networks are developed and maintained together with the interacting role of

diverse actors, both non-human and human (O'Connell et al., 2014), which act, or make a difference inside the network. The non-human actors could be artefacts, technology or natural objects (Aka 2019; Goulden et al., 2015), this could for examples be SAMs or environmental requirements. According to O'Connell et al. (2014) the non-human actors needs a spokesman, a human, to speak on their behalf. Hence, concerns regarding the spokesman's ability to interpret the interests of the non-humans are introduced.

The actors in the network together develop dynamic chains of influence, impacting on established knowledge, power and legitimacy (Goulden et al., 2015). The theory allows to see knowledge as strongly dependent upon networks of actors who join forces, translating their interests into a common goal.

A concept often referred to when applying ANT is the four-step process, which was developed by Callon (1984) to explain the development of an actor-network, and the allies in it. The four steps, also known as the 'four moments of the translation' are problematization, interessement, enrolment and mobilization (Aka, 2019). The four moments of translation can be intertwined and used back and forth in different sorts of decisions. Hence, the moments necessarily do not need to occur one after the other. If looking at this through lenses of urban development projects, the *problematization* moment is when members of an organisation are meeting, and they need to find out what they need to do together in order to improve or facilitate a certain process, for example within the projection or production of a new area. The members, the primary actors, must define what it is that need to be addressed to resolve an obstacle or a problem in the process (Aka, 2019). Also associated stakeholders, other actors, need to be identified, which potentially, together with the primary actors, will become a new network. Second, the *interessement* moment is when the primary actors need to make the other actors of the new network to see the validity of what they have proposed. The other actors need to understand the roles they may play in the network (Aka, 2019). This can be challenging if the actors have brought different ambitions and goals from their companies, or if several steering documents or SAMs, the non-human actors, are to be used. Third, the *enrolment* moment is when the primary actors need to find strategies and arguments how and why the network together should do what have been proposed. Finally, the *mobilization* is when the different interests within the network needs to be monitored to remain stable. Different methods could be used to support the network, and new external actors might need to be recruited. Yet, due to the changes in processes and projects the network could be stabilized, but never totally stabilized.

A study by Goulden et. al, (2015), applying ANT, exploring different actors work to establish a green building standard as the tool for adoption in Israelian municipalities, explains the green building standard as a non-human actor in the network. The development of the standard, the documentation itself, was built on negotiations and different perspectives from the actors in the standardization process, and defined rules and actions to be taken as a result. Once established,

the standard influences decisions, taken in multiple ways, and the study by Goulden et al. (2015) show that the attributes of the standard itself helped to support and uphold the strength of the network of municipalities.

For this thesis, if considering sustainable urban development as a concept built on an actor-network, SAMs, environmental requirements and detailed development plans can example equal the 'non-human actors'. Various stakeholders are thus the 'human actors' with the role to translate and implement the requirements. Depending on how well these non-human actors enrol with the human actors in projects, ANT can provide an understanding regarding the importance of the interplay between these actors as well as clear documentation.

3 Methodology

The following chapter will present the chosen methodology of the thesis. To meet the aim and the research question a case study of Älvstranden Utveckling's, henceforth referred to as ÄU, work with environmental requirements has been the main method addressed in this thesis. As the focus of the study is to understand the perception of different actors in relation to efforts made towards environmental sustainability in the construction industry, a qualitative research approach has been used. The different steps of the study will be further explained in the chapter together with a reflection of the chosen methodology.

3.1 Research approach

By choosing to see the interaction of building actors response to environmental requirements set by a public landowner, through an actor network theory lens, the authors of this thesis can obtain an understanding of the lived experiences of the actors in order to come up with suggestions of improvements of the existing process. In that context, the research approach of this thesis is qualitative, since it contributes to an understanding of the human conditions of a perceived situation (Bengtsson, 2016), rather than focusing on values of quantities and variables (Bell and Bryman 2015).

Further, an abductive reasoning approach has been used for this thesis as handling the interrelatedness of various elements is the main difficulty of case study research (Dubois & Gadde, 2002). Thus, going 'back and forth' between one type of research activity to another, as moving from the case back to the initial theory and proposed themes in several cycles was necessary to expand the understanding of the empirical phenomenal, matching the reality with theory. This process can entail yield of additional aspects and refinements of the study. Hence a redirection of the theoretical framework is required. This process is referred to as 'systematic combining' (Dubois & Gadde, 2002), see figure 3.1.

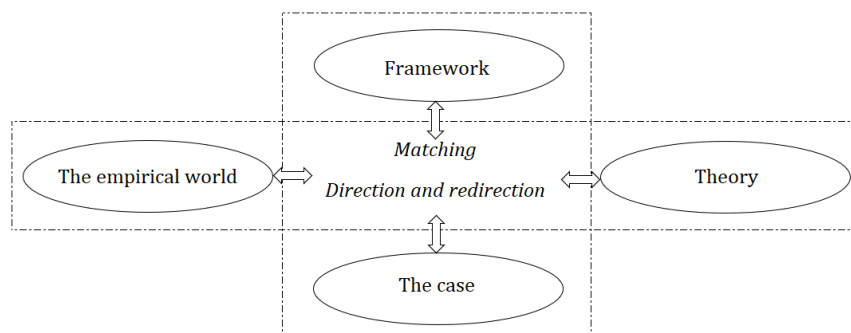


Figure 3.1: *The process of Systematic combining (Dubois and Gadde, 2002)*

The origin of this thesis came from the authors interest in in sustainable urban development and human relations in projects. It is well known that there are several ways to interpret sustainability, and the fact that people perceive things differently, as part of the human nature, justifies the choice of a case study with a qualitative research approach including several cycles of recombining reality, theory and the empirical findings.

3.2 Literature review

In the initial phase of the study a first review of existing literature was conducted to gain knowledge and information about the subject, to identify what theories and concepts that could be relevant for the research area. This was done prior to the interviews to build a foundation of knowledge and expand the perspectives of the challenges regarding too comprehensive environmental requirements. However, the literature review had several cycles during the course of the study, since new observations were encountered along the way, opening up for new angles of approaches to investigate and include in the study.

Several keywords have been used in the search for relevant literature in databases as Chalmers Library and Google Scholar. These keywords *include urban urban development, sustainable building, sustainable building process, sustainable assessment methods, actor-network theory*. Additionally, some literature was provided by supervisors at Chalmers and ÄU, likewise for the information about the cases.

3.3 Case Study

For this thesis, to understand and analyse the management around the setting of environmental requirements in urban development projects, a case study of the work carried out of ÄU was conducted. The choice of a case study was considered most appropriate since the findings deriving from the case can be compared and contrasted to previous research (Bell and Bryman, 2015). To allow the researchers to consider what is common and what is unique in the work of ÄU, with a focus on how environmental requirements has been set and implemented, different projects that ÄU manage were investigated. Three projects from two sub-areas of Älvstaden in Gothenburg, were investigated in the case study, presented in table 3.1.

PROJECT	AREA OF ÄLVSTADEN
Lindholmshamnen	Lindholmen
Masthuggskajen	Södra Älvstranden
Skeppsbron	Södra Älvstranden

Table 3.1: *The projects investigated in the study*

Since the projects, to be studied in the case, already were identified when starting the work with the thesis, due to the inquiry from ÄU, the casework is of an intrinsic design (Stake, 2000). Case studies of intrinsic designs develop what is perceived to be the case own issues, contexts, and interpretation by understanding what is important regarding the case within its own world. However, the three cases were of great interest for the thesis since each projects was in different stages of the building process; Lindholmshamnen was in the final stage, Masthuggskajen was in the ongoing stage and Skeppsbron was in the starting stage. This allowed the authors to compare similarities and differences between the cases, looking for experiences to seize in future projects.

3.3.1 Interviews

Since the choice of research approach for this study is qualitative, semi structured interviews were conducted as the primary data collection in the study. This to enable an exploration of the lived experiences of the actors affected by the environmental requirements. The semi structured interview process is flexible which allows the interviewees to formulate their own perspectives on the initial research ideas, giving an insight to what the interviewee sees as relevant and important (Bell and Bryman 2015).

Before the start of the interview process, dialogues where initially held with three employees at ÄU, to better grasp the issues connected to the environmental requirements. The employees where involved in the development of the three sub-areas studied, working as process leaders with focus on environmental and social sustainability. Together with the process leaders at ÄU the participants of the interview study were identified and selected.

In the study, 9 interviews were held with 10 respondents from the different building actors of the consortiums in the investigated projects in Lindholmshamnen and Södra Älvstranden. Since it is the building actors which are directly affected and should implement the requirements set by ÄU, it was of great interest to interview them. Although ÄU, in their role as a coordinator, has knowledge about which building actors who are a part of the consortiums, the interviewees will be presented anonymous in the thesis, to assure honest and transparent answers. The respondents have instead been given a reference name in the report, consistent with their role in the companies, see table 3.2. The selected interviewees had different roles, this to broaden the perspectives of the sought answers and experiences.

Table 3.2: *List of interviewees with building developers and contacts at ÄU*

REFERENCE IN REPORT	AREA	COMPANY	ROLE
Project manager L1	Lindholmen	Large construction company A	Project manager
Project manager L2	Lindholmen	Housing development company A	Project manager
Project developer L1	Lindholmen	Large construction company B	Project developer
Real estate developer SÄ1	Södra Älvstranden	Large construction company C	Real estate developer
Real estate developer SÄ2	Södra Älvstranden	Real estate development company A	Real estate developer
Real estate developer SÄ3	Södra Älvstranden	Real estate development company B	Real estate developer
Head of department SÄ1	Södra Älvstranden	Large real estate company A	Head of department
Head of project SÄ1	Södra Älvstranden	Large real estate company A	Head of Project
Business developer SÄ1	Södra Älvstranden	Real estate development company C	Business developer
Sustainable specialist 1	Lindholmen/Södra Älvstranden	Housing development company B	Sustainability specialist
Process leader L1	Lindholmen	Älvstranden utveckling	Process leader sustainability
Process leader SÄ1	Södra Älvstranden	Älvstranden utveckling	Process leader sustainability
Process leader SÄ2	Södra Älvstranden	Älvstranden utveckling	Process leader sustainability

The interviews were held online via Teams, approximately 45-60 min each. The questions asked had been prepared as an interview guide in forehand, see appendix A, and was adapted to the specific project and sub-area of Älvstaden which each interviewee participated in. The interviews were recorded and transcribed afterwards to ensure correct citation. When the transcription was complete the recordings were deleted, which the authors and all interviewees had agreed on.

During the interview study, a criticism towards the collaboration between ÄU, in their coordinating role, and the city's administrations of Gothenburg arose. To get a nuances picture of the situation, and to give the city's administrations an opportunity to respond to the criticism, the authors of the thesis tried to contact them. Unfortunately, the city's administration has not responded the request and thus not commented on the situation.

3.3.2 Gap-analysis

For the case study, to gather an overview of ÄUs set environmental requirements and how they relate to external building requirements and steering documents, a gap-analysis were conducted in parallel with the execution of the study. This to illustrate where the different requirements overlap and where they not, hence where there are gaps. The aim with the gap-analysis has partly been for the authors to get acquainted with the requirements, but mainly to investigate if ÄU should use already existing steering documents in their regulation, and if so, what would then be covered by the already existing documents, and what will ÄU still be required to add in their own requirements to not lack any aspects. The steering documents compared in the gap-analysis are, the sustainability programs for Lindholmshamnen and Masthuggskajen, the environmental requirements in the land allocation for Skeppsbron, Boverkets byggregler, and the SAMs Svanen, Miljöbyggnad, BREAM-SE and LEED, since these are the most commonly used SAMs at a building level in Sweden.

The decision of which requirement categories the gap-analysis should compare, were done through a mapping of all the different steering documents and which categories they handled. After that, a weighting of the most common requirements was done, and those requirements were then mapped and illustrated in a table. The result of the gap analysis will be presented in section 4.5.

3.3.3 Reference group

Further, a reference group was established by the supervisor at ÄU to broaden the view of the set requirements in the projects and to evaluate, elaborate and discuss the observations of the case study along the way of, both from the interviews with the consortium and the gap-analyse. The background to the reference group was for ÄU to gain knowledge of the work to be continued after the end of the thesis, still it contributed with feedback and more knowledge about the case for the authors of the thesis. Four reference group meetings were held during the course of the study. The reference group consisted of 5 employees at ÄU Utveckling, in one way or another involved in the projects where the result of the study will be applied. The group consisted of one sustainability manager, one business developer in real estate development and three process leaders in sustainability.

3.4 Data Analysis

To process and create meaning from the collected data in the interviewees, a content analysis technique was used (Krippendorff, 2018), which makes it possible to draw interpretations of the result.

When the interviews were conducted, the process of analysis began. Together, in agreement, the authors developed a set of themes, which had emerged inductively from the interviews, starting off with the interviews considered most “rich” at that time, to cover most content. These themes were later used to code each transcript while comparisons to the literature were made in parallel to enable recoding and consolidation of the chosen themes. The created codes may change as the study progresses, and interpretations of meanings that seemed clear in the beginning may during the process be obscured (Bengtsson, 2016). Therefore, the process of coding in this study was performed repeatedly, looking back at the interview material to increase the reliability of the result. This process resulted in additional interesting subjects to further explore in the literature review.

3.5 Ethical considerations

As stated by Stake (2000) qualitative researchers could be seen as guests in the private spaces of the world, since qualitative case studies often deal with matters of public interest and have an interest in personal views and circumstances of the involved actors. In urban development projects, as the case study of this thesis is

built on, many actors with different opinions and perceptions are involved. Statements from the interviewees could thus be of an ethical concern. The authors have therefore chosen to keep the interviewees anonymous, partly to ensure the integrity of the individuals, and partly not to create discord in the future collaboration between the building developers and ÄU. Further the interviews, where given the opportunity to review the result of the interviews and assure correct quotations and interpretation of the result.

3.6 Reflections about chosen methodology

As presented in the beginning of this chapter, section 3.1, a qualitative research approach has been applied to come across the opinions from the involved actors to see how their perceptions of the environmental requirements has been developing. In line with the choice of a qualitative approach, semi structured interviews were conducted to further let the building developers shape their statements. Due to the circumstances of the Covid-19 pandemic the interviews were held online via Teams in accordance with the current restrictions. Although no technical trouble were encountered during the online interviews, real interviews had been desired, since face-to-face interactions, according to Bell and Bryman (2015), is the fullest condition of participating in the mind of another human being. Hypothetically it could have brought a deeper interplay between the researchers and respondents giving rise to further discussions and amplifications.

As the work with the projects of Älvstaden consists of different forums and meeting, where the consortium meets and discuss what has been done and how to proceed, see section 4.3, something that was discussed during the execution of the thesis was to participate at one of these gatherings to perform further observations. Due to the time frame no such meetings were held in a suitable time. Participation at a quality forum could have resulted in more gathering of active data, which in contrast to passive data, is associated to discovery instead of data that appears through search (Dubois and Gadde 2002). Through this kind of observation, data that never would have been found through search could have appeared, bringing new dimensions and insights to the subject.

The collaboration between the authors of this thesis and the employees at ÄU involved in the case study, has been good and resulted in fruitful discussions and support. ÄU themselves has been responsive and self-critical to much of the identified issues in the study. Still, this could influence the researchers bias for the investigated organization (Bengtsson, 2016). It has therefore been important that the authors of this thesis have considered their own experiences of the phenomenon emerged in the case studied, to maintain a quality of the research process to reach trustworthy and reliable results.

4 Case Study

Before the description of the three investigated projects are presented, this chapter will also describe the background of Älvstranden Utvecklings existence, the mission to realize Vision Älvstranden. Additionally, to understand how the urban development process is coordinated and implemented in the different projects, the consortium model in the City of Gothenburg will be explained. Finally, the compilation of the gap-analysis is briefly presented to be further discussed in the concluding chapters.

4.1 Vision Älvstaden

Älvstaden is the biggest urban development project in Scandinavia, where the city centre of Gothenburg is expected to grow twice its size as it spreads across both sides of the Göta Älv. Älvstaden is an area which includes Backaplan, Centralenområdet, Frihamnen, Gullbergsvass, Lindholmen, Ringön and Södra Älvstranden, as shown in . Södra Älvstranden consists of the areas Skeppsbron and Masthuggskajen.



Figure 4.1: *The areas of Älvstaden*

The City of Gothenburg has a goal to create a green, inclusive and dynamic city, which is open to the world by strengthen the regional core and link the city together, both to its areas and to the river (Göteborg Stad, 2012). The vision was adopted by the City Council of Gothenburg on October 11, 2012. Before that, an extensive dialogue-and idea work was carried out and laid the foundation for the final vision. This process involved citizens of Gothenburg, business, academia and representatives of municipal administrations and private companies. During a two years period a variety of citizen dialogues, expert workshops, international

knowledge exchanges, investigations and studies where conducted. The citizen dialogue was held in different forms with 2800 people from all over the city, offering them an opportunity to influence the outcome. Every year the work regarding Vision Älvstaden is updated in the Färdplan Älvstaden adopted by the City Council of Gothenburg (Älvstranden Utveckling AB, 2021b). Common to all projects in Vision Älvstaden, ongoing and upcoming, is the need of create a common goal to deal with the large context of questions that a urban development project of this scale entails. The questions answered need to cover the perspective of the entire city and region. The vision should set the direction for all projects within Älvstaden.

4.1.1 Älvstranden Utveckling AB

The mission of realizing Vision Älvstaden has been assigned to the public company Älvstranden Utveckling AB (Älvstranden Utveckling AB, 2021c). The company is a public landowner and is owned by the City of Gothenburg with a core business in sustainable urban development in collaboration with the business community. They develop building rights for exploitation through land development/land acquisition/land allotment. Except their large areas of developable industrial land ÄU is also the owner of properties close to the city on both sides of the Göta Älv river. The goal of the company is to promote the long term urban development in the central parts of Gothenburg in parallel with realizing Vision Älvstaden and to create financial room for maneuver. The role of ÄU is to manage, develop and trade properties within the sub-areas of Älvstaden based on social, economic and ecological sustainability (Higab, 2020). ÄU shall, in the work with the vision, contribute to a holistic view and together with the City of Gothenburg's planning committees, companies and external stakeholders have an effective cooperation and good collaboration. The mission of ÄU will end when the work with the vision is fulfilled, and they will no longer manage any properties.

4.1.2 The consortium model of the City of Gothenburg

One way to collaborate in an urban development project is to work in a consortium. This is a part of the City of Gothenburg's model for urban development (Älvstranden Utveckling AB, 2021a). A consortium consists of several actors collaborating to create the best possible development and an entirety. Four phases are included in the model:

1. A land area shall be exploited- land allocation takes place
2. Everyone strives for the area's best- a consortium is formed
3. Distribution of building lots- the detailed development plan work begins
4. Cooperation under construction- consortium discontinued

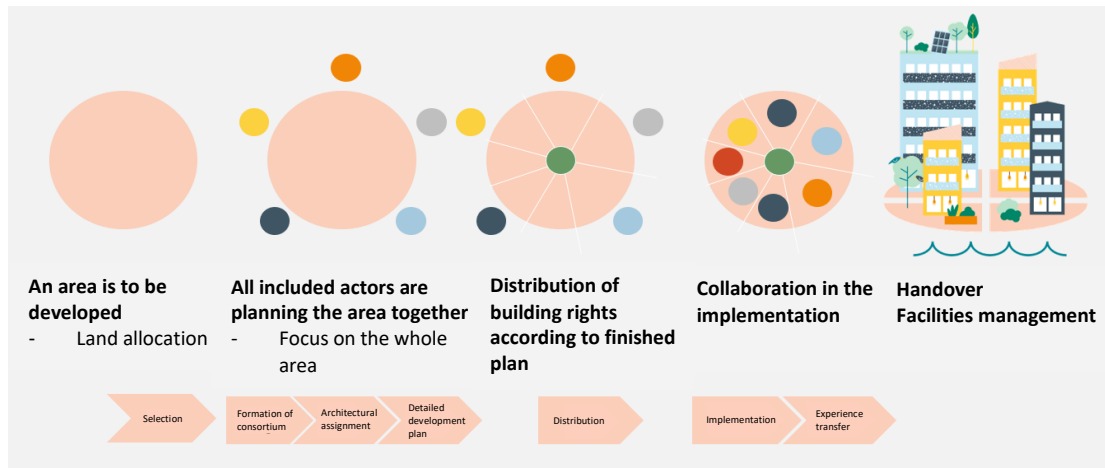


Figure 4.2: *The consortium model of Gothenburg (Älvstranden Utveckling AB, 2021a)*

When the land allocation is done a joint consortium is created consisting of the actors which have been assigned land (Älvstranden Utveckling AB, 2021a). The aim is to make the area as sustainable and attractive as possible by making the parties contribute with experience and knowledge. Before the building rights are distributed, the development of the area takes place in collaboration and based on the vision. In some cases, the building rights are distributed from start, but in general the plots are later, to maintain focus on the areas best. The responsibility of the implementation and quality of the project is divided between the actors, and that is the foundation of the model.

Process leader SÄ2 at ÄU (personal communication, 19 May, 2021) explains that there have been different procedures in the sub-areas to be studied in this thesis. In Lindholmshamnen and Skeppsbron land allocation competitions were held with building developers to decide which should participate in the projects. In Masthuggskajen, the City of Gothenburg did not own all of the land from before, therefore a consortium was created partly with building developers who already had existing building agreements.

4.2 Lindholmshamnen

Lindholmshamnen, at Lindholmen, was the first area in Vision Älvstaden to be developed. The area had a characteristic shipyard and industrial environment and the ambition has been to create a coherent district where new 650 residential units, a kinder garden and restaurants will connect with the old industrial premises (Älvstaden, 2021a). To add residential units in Lindholmshamnen will create a mixed used city in the former business-intensive area.



Figure 4.3: Map of Lindholmshamnen (Älvstaden, 2018)

Lindholmshamnen is developed by ÄU in collaboration with the city administrations of Gothenburg and a consortium consisting four well established building developers in Gothenburg, further presented in table 3.2. The consortium has together with ÄU had meetings once a month to discuss the development of Lindholmshamnen. Together they shall create the new area which is described as Lindholmens' green lungs, with parks, urban crops, and sustainable buildings. The construction of the now almost finished area started in 2016 and are expected to be finished in 2021.

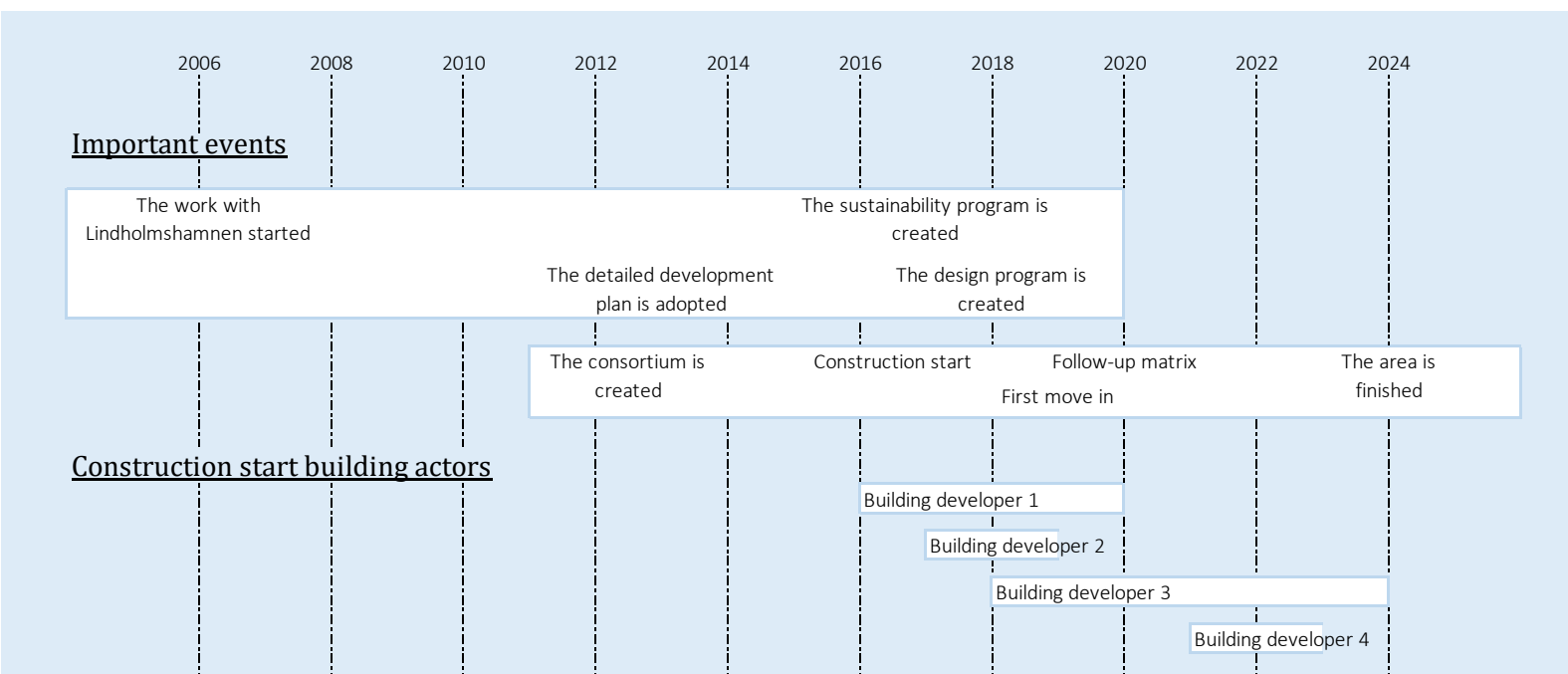


Figure 4.4: Timeline of project Lindholmshamnen

In 2009, ÄU sent out an invitation to the building developers in the construction industry in Gothenburg and asked them to be a part of the new area Lindholmshamnen. The aim with the area was to take a further step in the sustainable urban development. In the land designation there were already distinct requirements about innovation, green space factors and that the buildings should be built in accordance with Miljöbyggnad Guld. The four final developers were selected after an evaluation of 19 applicants and signed a land and development agreement. The development of the new area could then start.

To create a basis for the development of the area have, in addition to the detailed development plan, a sustainability program, henceforth referred to as SPL, and a design program been developed. The SPL, that was produced by ÄU in collaboration with the four building developers in the consortium (Älvstaden, 2016), contains four main goals, presented in table 4.1.

Table 4.1: ÄUs environmental requirements in SPL (Älvstaden, 2016)

ENVIRONMENTAL REQUIREMENTS IN SPL	
Main goals	Number of requirements
Climate in focus – impact and adaption	54
Vibrant and dynamic city life	38
Convenient waste management with climate-smart city logistic	10
Learning processes for sustainability work	9

The main areas are further divided into 48 associated goals and works as a guiding and controlling document for the builders when developing the different quarters. Together with the SBP1, a matrix, where the goals were further defined as 111 performance requirements, was developed. The aim with the matrix is to facilitate the steering and follow up of the building developers and their work.

In the SPL one requirement is that the buildings should be built in accordance with the SAM Miljöbyggnad Guld or another equivalent SAM. Regardless which SAM the actors select, it must be reported in which way they have strived towards Miljöbyggnad Guld and if there are any gaps between the chosen systems and Miljöbyggnad Guld. One of the actors in Lindholmshamnen have chosen to work in accordance to Miljöbyggnad Silver, while the others have chosen to work with Svanen. Process leader L1 at ÄU explains that the diversity of SAMs selected by the actors is a result of discussions in the consortium. After the contracts were written two actors proposed that they wanted to certify according to Svanen. ÄU accepted this if the actors met the performance referred to in Miljöbyggnad Guld. ÄUs decision to “let go” of the requirement was a prioritization of focus since other important issues such as design, waste management, open stormwater solutions and apartment distributions were more critical by that time (personal communication, 16 April, 2021). The project manager also expressed an awareness that it became hard to report the requirements for the actors, since different SAMs are formulated in different ways.

4.3 Masthuggskajen

Masthuggskajen, which is a part of Södra Älvstranden, is today characterised by hardened surfaces and traffic barriers. The area is located in the south west part of Älvstaden, alongside the river and will now be developed into a “new” district, complementing the old area (Masthuggskajen, 2021).



Figure 4.5: *Map of Masthuggskajen (Älvstaden, 2017)*

Masthuggskajen aims to be an extended part of the city centre of Gothenburg, with a bustling city life where everyone feels welcome. Furthermore, the project has a great focus in sustainability and the ambition is to create an area where it is easy to live and act in a sustainable way. The construction started in September 2019 and the new district, with 1300 new housings and 6000 workplaces, expects to be finished in 2028. The consortium, consisting of six private building developers, see table 3.2, will together with ÄU and the city administrations of Gothenburg, develop the area. The private building actors signed a land and development agreement with ÄU when entering the project.

Masthuggskajen is, together with 12 other urban development projects in Sweden, a pilot project for the SAM Citylab Action (Masthuggskajen, 2016), which is owned and developed by SGBC, used for green urban development projects, where a whole district is certified instead of separate buildings (Sweden Green Building Council, 2021b). Citylab is a certification system with four certifications at different stages in the urban development process, from early planning to the management. The decision to participate in the pilot project was made by Masthuggskajen’s consortium in 2015.

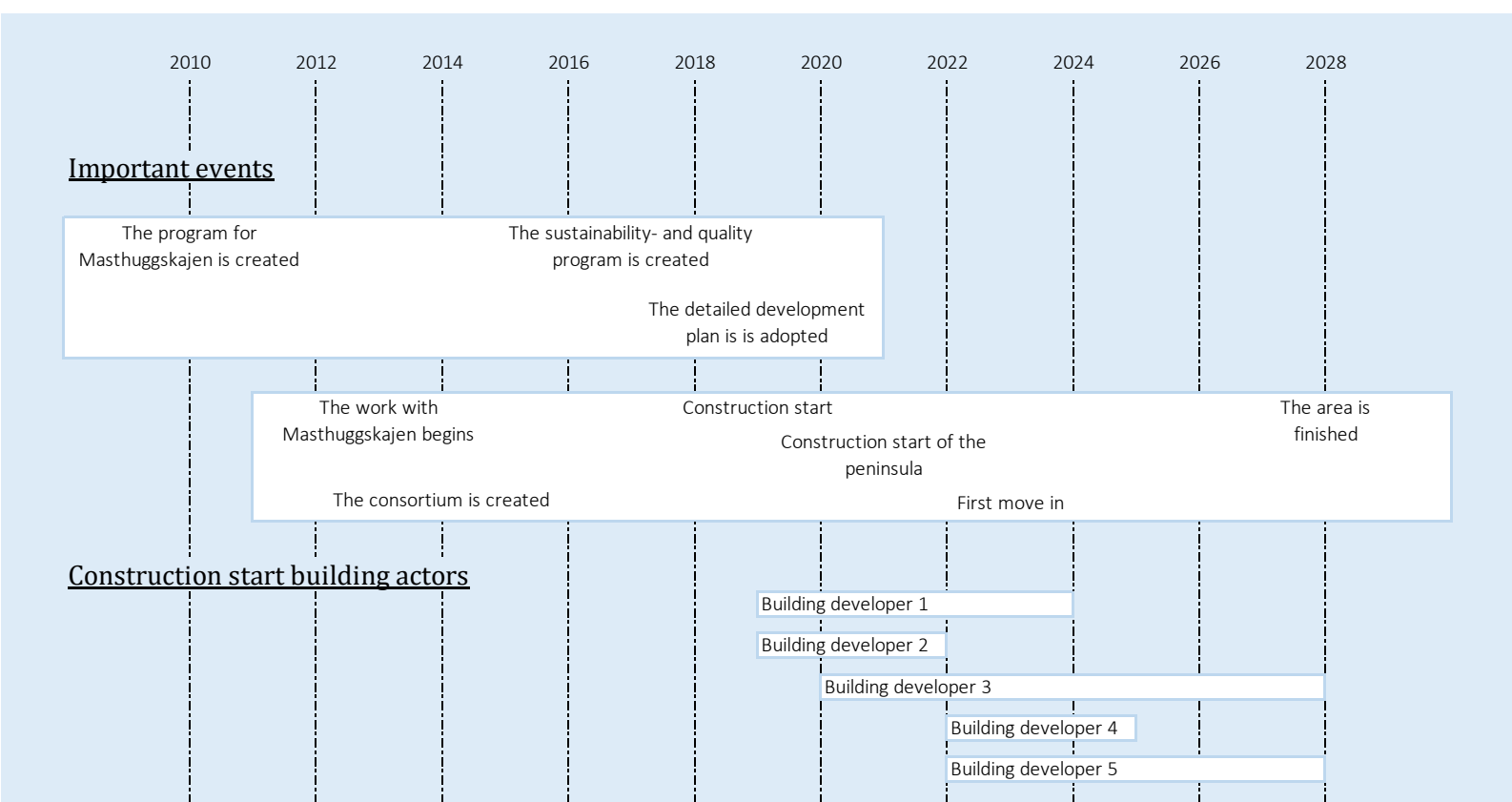


Figure 4.6: *Timeline of project Mashuggskajen*

Mashuggskajen has been developed based on a collaborative process in the consortium where everyone contributes to reach the common goals. The consortium partners, where Älvstranden takes the role of facilitating the developing process, had meetings at least once a month to discuss the development of Mashuggskajen. To ensure a sustainable development of the area, a sustainability program, henceforth referred to as SPM, was developed by the consortium in 2017 (Älvstaden, 2017). The SPM is also a part of the reporting that takes place within the framework of the certification according to the Citylab Action. The SPM includes nine main goals which in turn contains 124 requirements. The nine main goals are presented in table 4.2.

Table 4.2: *ÄUs environmental requirements in SPM (Älvstaden, 2017)*

ENVIRONMENTAL REQUIREMENT IN SPM	
Main goals	Number of requirements
At Masthuggskajen you can come as you are and be who you want to be. The strength is in the contrasts.	15
All citizens of Gothenburg, regardless of social or economic background, should want and be able to visit Masthuggskajen.	10
All citizens of Gothenburg, regardless of social or economic background, should have the opportunity to settle on Masthuggskajen.	6
At Masthuggskajen, people want, regardless of differences, to meet and stay outdoors during all seasons and times of the day.	79
At Masthuggskajen, children and young people should be able to move freely, on foot and by bicycle between home, play, preschool and school.	10
On and to Masthuggskajen, it is easiest to travel on foot, by bicycle or by public transport.	10
The energy performance in new production on Masthuggskajen meets Gothenburg's climate goals.	7
At Masthuggskajen, it is easy to reuse, save energy, share and borrow.	18
It is easy to live and work climate-smart on Masthuggskajen.	9

However, 72 of the 124 requirements are for the private building actors to address, while the rest are for the city administrations to handle. Process leader SÄ2 at ÄU explained that the way of setting the environmental requirements in Masthuggskajen was not done solely as a response to experiences of Lindholmshamnen and its SPL, it rather happened as a result of the choice to work with Citylab Action, and the associated goal formulations in that SAM (personal communication, 19 May, 2021).

Based on the SPM with the nine main goals and the 72 requirements the private builders should form individual action plans for their specific projects in Masthuggskajen. It is up to the building actors to implement the parts of the sustainability program, which are applicable in their projects, and present it in the individual action plans. The plans should then be presented for the consortium and approved by ÄU to ensure that the entire project meets the formulated goals of the SPM. The conditions for the projects in Masthuggskajen are different depending on whether it is residential buildings, offices, a parking garage or a park that should be developed.

In the development of SPM, the city's administrations and the consortium were equally involved, still ÄU lacks the ability to demand an individual action plan from the city's administrations through agreements. This is because ÄU do not sell building rights to the city as they do to the private builders. However, Process leader SÄ1 states that ÄU are working to ensure that the city's administrations do so on a voluntary basis (personal communication, 18 May 2021).

Beside the SPM, the contractors also must act upon the detailed development plan and a quality program (Älvstaden, 2017). These three documents have been developed by different groups, but to ensure an objective goal for the programs a coordinating group were appointed to be responsible for the process. In case of conflict, conscious choices and compromises has been made to create interplayed directions in the documents. The aim with this work was to create a good foundation for the development of Masthuggskajen.

During the realization of Masthuggskajen, there have been quality forums where ÄU, the building actors, Trafikkontoret, and Stadsbyggnadskontoret have participated (Älvstaden, 2017). These forums are arranged like workshops with an aim to review the goal fulfilment and increase the focus on the common goals for the whole area. In the quality forums, there is one building developer which present their project on each occasion. The idea is that the building developers present their projects in the quality forum, where the other participants, supports, influence and learn from each other. After the presentation, the quality council, consisting of Älvstranden and Stadsbyggnadskontoret, approves that the project meets the formal goals before the building permit application is submitted. The actors and their work have furthermore been followed-up to ensure that they fulfil the common goals in the SPM. ÄU have during 2020 developed a follow-up report that shows which goals that have been fulfilled by the different actors and which have not (Älvstaden, 2021c). Process leader SÄ1 at ÄU describes that a follow-up matrix was developed and implemented during spring 2020 as a part of the data collection to the follow-up report and was intended to be used by each actor to self-assess their work towards the common goals in the SPM, formulated in their actor specific action plans (personal communication, 16 April 2021).

4.4 Skeppsbron

Skeppsbron is an area located between Stenpiren and Rosenlundskanalen and a part of Södra Älvstranden. The area is both central and river close, adjacent to Masthuggskajen. Skeppsbron has been recognized as an area with much traffic acting as a barrier, but thanks to the construction of Götatunneln there is now a chance to reconnect the area with the water (Älvstaden, 2021b). The area will consist of 450 new residential units and 30 000 square meter premises for offices, shops, and restaurants. The plan is also to create a new meeting place for the citizens of Gothenburg by the river with a travel centre, a lively wharf/quay with facilities for swimming (Göteborg stad, 2021c). The land allotment closed in march 2017, and the selected actors will be a part of a consortium together with Älvstranden and city administrations of Gothenburg (Älvstaden, 2021b), with an aim to have the area fully developed by 2025. The development of Skeppsbron has been going on since 2005. The work with the detailed development plan started in 2008 and was adopted in 2014. The project has engaged many people, since the expansion of public land has proven to require a larger investment than initially

estimated (Göteborg stad, 2021a). This resulted in a postpone of the project due to extensive investigations regarding costs and possible savings pending political decision. In November 2020, the City Council of Gothenburg made the final decision that the project could proceed, and the construction is expected to start in the early 2022.

Unlike the areas, Lindholmshamnen and Masthuggskajen, there is not yet a finished sustainable program made for Skeppsbron. However, Process leader SÄ2 at Älvstranden explains that one building developer has been given the opportunity to start in advance and therefore this actor had to comply with the environmental requirements specified in an appendix in the land allocation (personal communication, 19 April, 2021).

Since the realization of project Skeppsbron will start after Lindholmshamnen and Masthuggskajen there is an opportunity to take advantage of experiences and knowledge from earlier projects, when arranging the sustainability work for the area to be developed.

4.5 A comparison of BBR, SAMs, and Sustainability programs

The sustainability programs in the different areas of Älvstaden is developed to create a basis for sustainable development. In a comparison between the different steering documents and its directions, similarities and differences are presented, see appendix B, or the simplified version in table 4.3. The documents that has been compared are the sustainability programs in Lindholmshamnen, Masthuggskajen and Skeppsbron, and the external steering documents, in this case; BBR, and the SAMs Svanen, Miljöbyggnad, LEED and BREEAM-SE. These are the SAMs investigated since they are applicable at a building level, this is why Citylab Action is not a part of the gap-analysis, since it encompasses the spaces between the buildings.

Table 4.3: *Simplified version of the Gap-analysis, illustration the criteria that are handled in the steering documents. For the whole analysis, see appendix B*

	Energy	Indoor environment	Building material	Transportation	Water usage	Stormwater	Green space factors	Waste management	Sound	Climate
SPL	x	x	x	x	x	x	x	x	x	x
SPM	x	x	x	x	x	x	x	x	x	x
Skeppsbron	x		x	x	x	x	x	x		x
BBR	x	x	x			x		x	x	
Svanen	x	x	x	x	x	x	x	x	x	
Miljöbyggnad	x	x	x						x	
LEED	x	x	x	x	x	x		x	x	
BREEAM-SE	x	x	x	x	x	x		x	x	x

When comparing the different SAMs with BBR, it is distinguishable that all SAMs, except Miljöbyggnad, handle categories and criteria in addition to what BBR regulates. Although specific values in the SAMs are not visible in the gap-analysis, it is noteworthy that requirements in the SAMs have also been more sharpened

than those in BBR. One example is that the SAMs have a stricter requirement for energy performance than BBR.

The gap-analysis furthermore shows that the different sustainability programs and the external steering documents, in particular the SAMs, regulates the same type of environmental requirements. Even though the requirements are set and formulated slightly different in the various documents, every one of them handle the categories energy and building materials. Other types of requirements such as indoor environment and water usage also handle quite similar factors in the different documents while other categories such as green space factors, climate and local disposal of stormwater have more regulations in the sustainability programs than in the external requirements. The sustainability programs further handle the space between the buildings, such as street levels, parks and mobility, more than the other steering documents.

5 Result interviews

Large urban development projects are characterised by long 'lead' times, complex relationships and networks involving many parties with different knowledge and preferences. This section presents the building developers experiences from working with ÄUs environmental requirements in Lindholmshamnen, Masthuggskajen and Skeppsbron. The section will further present the perceptions of ÄUs role as a coordinator and the collaboration between the different parties.

5.1 Perceptions of the environmental requirements

The importance of sustainable urban development is an often-mentioned topic both in research and literature, as well as in the society. Both Lindholmshamnen and Södra Älvstranden has pronounced sustainability focus in their projects, something that the building developers in the consortia have agreed and must act upon. Project developer L1 from Lindholmshamnen stated that sustainability questions are highlighted more if you focus on them in these cases, than if you just follow municipally requirements and the internal requirements of each building developer. A similar opinion was expressed from Sustainable specialist 1 who thought that the purpose of overriding legislation through a sustainability program is positive. Further the same interviewee stated that ambitions are good, because if companies do not try there will be no development and innovation. Real estate developer SÄ1 from Södra Älvstranden also emphasizes that it is positive with a high ambition when it comes to sustainability and explained that it goes hand in hand with the ambition of its company. Working against strict environmental requirements may even be easier than not to, claimed Project manager L1 from Lindholmshamnen, which compared it to getting a seal of excellence on their projects.

Regarding environmental requirements in large, hence long-term, urban development projects several interviewees expressed a difficulty in making them relevant long-term, since the market will change over time. For example, Real estate developer SÄ3 stated that it is obvious that the office space demand has changed over the past 10 years. The conditions for the developers, which started their projects early versus the ones which are last to start, becomes different. This is the opinion of the interviews from both Södra Älvstranden and Lindholmshamnen. While time passes, the legal requirements are also tightened, and issues building developers put a lot of effort in today may be industry practice in a few years. Something that has change over time is the habit of working with SAMs, according to several interviewees. Project manager L1 expresses that it has become a non-issue to work with SAMs. It used to be more expensive to build with eco-labelled materials, but it has caught up. The same interviewee thinks that the awareness about sustainability has increased in the construction industry the past

years, when the project Lindholmshamnen started around year 2013, the awareness was not at the same high level as today.

5.2 Älvstranden's attempt to set environmental requirements

Regarding ÄU's role as coordinator, with a responsibility to set environmental requirements, all interviewees in the investigated consortiums' commonly expressed that they think that ÄU is doing an important work in the aim towards a sustainable city. Most of the interviewees expressed an awareness that the set requirements were included in the consortium agreement, which the building developers have approved, even though several interviewees were not entirely satisfied with how the work with the environmental requirements were managed by ÄU. Therefore this section will first address the scope of the environmental requirements in the investigated projects and its associated perceptions. Second the economic consequences of the requirements linked to administrative work and material selection will be discussed. Further ÄU's attempt to follow up the requirements are elaborated and analysed. Finally, issues occurring through contradictions in the steering documents are discussed.

5.2.1 Requirements

As presented in section 4.2 and 4.3, both Lindholmshamnen and Masthuggskajen are projects with stated sustainability goals and large amounts of environmental requirements. Head of project SÄ1 declares it as ÄU has put on a leader shirt, which in turn put demands back at themselves, since ÄU need to ensure that the project execution corresponds to what is planned. The interviewees in Lindholmshamnen perceived that the environmental requirements were complicated and far too many. Some of them claimed that ÄU had a very high ambition with the requirements, which resulted in a comprehensive level of detailed controlling that ÄU were not able to handle. Project manager L2 had never experienced a more complex project regarding environmental requirements. Sustainable specialist 1 opined that there were a lot of double work to bring both the requirement from Älvstranden and the company's internal environmental requirements together. Further Project manager L2 suggested that it would have been better with less requirements and that these are based on the requirement from an existing SAM. This could then be combined with a competition among the building developers in the consortium, where the developer collecting largest amount of points in one SAM-system is rewarded. Similar opinions were stated by several interviewees who thought it would be better to have less requirements and rely more on the SAMs. Several interviewees also stated that there were a lot of time spent on administration without developing the sustainability issues forward and improving the result. However, Project manager L1 and Project

developer L1 in Lindholmshamnen though that Älvstranden should not be afraid to set many requirements, but that it is important that the requirements are objective.

The requirements in Lindholmshamnen and Södra Älvstranden have been structured and formulated differently. Sustainable specialist 1, who has been involved in both areas believed that the environmental requirements in Södra Älvstranden has been less detailed in comparison with Lindholmshamnen. However, another interviewee, Real estate developer SÄ3, was of a different opinion that ÄU's requirements were still too governing in Södra Älvstranden. One of them argue that too much control can inhibit new ideas and Interviewee 10 thought that some of the requirements did not create any value for the costumer.

Since it is the builder's job to fulfil the requirements, Real estate developer SÄ2 expressed a feeling that Älvstranden may have thought that they can set strict requirements and hence expect the private building developers to implement them and take the responsibility to ensure the sustainable development of the area. Another opinion was that the high ambition and the work with the requirements have, like in Lindholmshamnen, resulted in administration and lots of resources, which is connected to high costs.

5.2.2 Requirements and economy

Several interviewees states that work with the environmental requirements has led to much additional administration and hence, costs among the building developers. The interviewees had an understanding that urban development projects with consortiums entails costs and time compared to projects where they control everything by themselves. Real estate developer SÄ1 also mentioned that the requirements themselves did not add extra costs since the company already have much internal requirements, but that the costs are connected to presentation and follow-up of the requirements. However, for the companies without any sustainability department in their organisation, an extra cost incurred since they had to hire consultants to help with the individual action plans and work in the consortium. The green space factor, such as green roofs and facades, was brought up as costly.

Even though the requirements have brought extra cost for all companies, some of the interviewees believed that there are positive financial incentives connected to environmental work. Real estate developer SÄ2 declared that within the company there are so-called green bonds, which can finance projects with a high sustainability ambition.

5.2.3 Follow-up

In both Lindholmshamnen and Södra Älvstranden, the interviewees had many opinions regarding the follow-up of the environmental requirements. Some of the

actors thought that there were too much follow up while others wanted to have more. Project developer L1 claimed that it is good with continuous follow-up of the requirements, but that it takes lots of time, and highlights the importance of structured approach. Another opined that if Älvstranden sets this number of requirements, they also must be prepared to follow them up. However, Sustainable specialist 1, whose project started later than the others, expressed a feeling:

“It feels Älvstranden have started to get tired and that they do not manage to follow up in the same amount as for the early building developers.”

- Sustainable specialist 1

ÄU have been using a follow-up matrix for the requirements in both Södra Älvstranden and Lindholmshamnen. In Lindholmshamnen, the matrix was developed together with the sustainability program, while the matrix for Södra Älvstranden were developed first for the follow-up report, as mentioned in section 4.3xx. The interviewees attitude towards the follow-up matrix is different depending on when in the process their project started. Real estate developer SÄ1, in Södra Älvstranden, who started the work with their project before the matrix was developed, explained that they had to make their own excel file in a try to structure the presentation and follow-up of the requirements. Other interviewees, who had the matrix in their project from start, experienced that it worked better.

Although Lindholmshamnen's SPL and follow-up matrix were developed together, one building developer, Large construction company A, had started their project before, see figure 4.4. One of the other interviewees, Project developer L1 express an awareness that it is not possible to work in projects were all the documents is in order before the projects start:

“When we start the projects, everyone wants it to move forward and that the construction should start.”

- Project developer L1

In both areas, some interviewees declared a common opinion regarding the difficulty to translate requirements stated in running text to a follow-up matrix. Project manager L2 mentioned that it took a lot of time to understand how, and to whom, the requirement should be presented. However, the interviewees thought that is important to have a clear structure in the presentation and follow-up of the requirements. One interviewee, Head of department SÄ1, claim that it is good since it keeps the sustainability issue on the agenda, while Project manager L1 raises the importance of good documentation because of the long project time with many parties involved and states:

“People are often replaced in such large and long projects, both internally and externally.”

-Project manager L1

Another interviewee, Sustainable specialist 1, thought that it was good with structured presentation and documentation of the requirements but mentioned that it cannot be too comprehensive, otherwise there will be too much administrative work and important things will be forgotten.

The annual sustainability report of Masthuggskajen, shows the requirements that has been fulfilled and those that have not. One example of a requirement that has not yet been fulfilled is the encouragement of sustainable activities in the buildings. One of the interviewees Head of project SÄ1 thought that it was good while Real estate developer SÄ1 thought it was unfair that only the work from the private building developers were presented and not included the city’s administrations work. The actors in Södra Älvstranden thought it was good that the main goals in the sustainability program were specified according to the projects in their specific action plan. However, the follow-up presented in the sustainability report was in consistency with the sustainability program. Sustainable specialist 1 mentioned that even though the company had put time and effort on their individual action plan, the follow-up from ÄU was still made in accordance with the sustainability program, which led to even more double administrative work. In response, Process leader SÄ1 at ÄU claims that this is not the original strategy from ÄU when following-up the requirements, but occasionally if misinterpretations occur this must be done.

Despite the comprehensive follow-up, none of the interviewees discerned any direct consequences if an building developer did not fulfil the requirements. Real estate developer SÄ2, who thought that the follow-up was too voluminous, still had an understanding that it is necessary. Since the building developers have promised lots of things in their individual action plan, without legal action, the interviewee saw no other solution to deal with consequences except the comprehensive follow-up. Same interviewee further expressed that this is good since it is not reasonable that the building developers should pay a fine if they do not fulfil the requirements. However, another interviewee, Real estate developer SÄ1 thought that ÄU should be stricter in the consequences, as it is not good for Masthuggskajen as an area if some building developer does not deliver what they have promised. On the other hand, as Project manager L2 mentions, if one building developer repeatedly times does not deliver what they are supposed to, they adventure the possibility to buy land from ÄU in the future.

“It becomes like a self-preservation, that you want to deliver a good project”

- Project manager L2

As a response to the perception that there are no consequences if an actor does not fulfil some requirements, Process leader SÄ2 from ÄU explains that the SPL and SPM are a part of the legal documents, which the building developers have signed, but that they are not connected to any penalty. Even though ÄU formally could claim that a lack in the fulfilment of the requirement has led to direct disadvantage in the project, this is considered difficult, and it is uncertain if it would be successful legally. Hence, there is no penalty connected to the environmental requirement.

5.2.4 Contradictions in documentation

An opinion that recurred from many of the interviews in Lindholmshamnen concerned the content of the sustainability program and the design program. Many claimed that the programs did not always steer in the same direction, and Sustainable specialist 1 meant that the design program often becomes most governing. On the other hand, Project manager L2 mentioned another discussion that has appeared with the design program and the facades. The requirements were not as specified which resulted in conflicts since the interpretations of the design were different among the building actors. Furthermore, Project developer L1 contradictions that was brought up was that the detailed development may not always meet specific requests from the sustainability program, as for the storm waters solutions as the building right does not have room for downpipes. Project manager L2 also commented this problem and told that they spent lots of time trying to understand all the different documents and map the requirements that are contradictory, align or complement each other, this to avoid double work.

Despite much critics directed towards the contradictions of the design program and the sustainability program from the consortium in Lindholmshamnen one of the interviewees, Project developer L1 highlighted the benefit of having design meetings, where the design and sustainability solutions of the projects are reviewed, before applying for building permit. At the meetings a building permit administrator from Stadsbyggnadskontoret was involved to consolidate the consortium regarding requirements in the detailed development plan. Even though this building permit administrator were not the one to ultimately approve the building permit, he had the knowledge of what was required. However, in Södra Älvstranden a building permit administrator has not been included in the quality forums to facilitate the building developers in their attempt to meet the requirements in both the detailed development plan and Real estate developer SÄ2 expressed dissatisfaction with this:

“You, ÄU, have an organized form in the quality forum where we go through everything, and then you get approved. Afterwards you must apply for a building permit, and then the authority comes in, the urban development office, and they don’t care about what was said in the quality forum.”

- Real estate developer SÄ2

Further the interviewee explained that the work from the quality forums therefore are worth nothing. First it is perceived almost as an approval, but it is not, it is only approved internally within the consortium.

5.3 Networks and Collaboration in urban development projects

There are several actors that need to work together in the projects Lindholmshamnen and Södra Älvstranden. Except the interaction between Älvstranden and the consortiums, many of the city administrations are also involved in the attempt to complete the area. Sustainable specialist 1 discussed the planned outcome of an area:

“It is a district to be built, not only the buildings but also public land and everything else.”

- Sustainable specialist 1

This section will address different perceptions of how it is to work in a urban development project, from a consortium perspective. First, both identified strengths and barriers will be presented followed by a discussion of the involvement of several stakeholders. Last, the challenge to make environmental requirements adapted to different buildings depending on the prerequisites, which is reflected in all investigated projects, is elaborated.

5.3.1 Strengths in consortium projects

In Lindholmshamnen Project developer L1 expressed the opinion that Älvstranden has managed its role in the consortium well, sometimes acting like a mediator. Another of them, Project manager L2 also thought that ÄU have been good when dealing with the critics that has occurred regarding the requirements, and that ÄU has realized that it has been hard to work with. There has been a good dialogue within the consortium. In each case the associated sustainability programs, SPL and SPM, were developed jointly in the consortium, which according to the actors has been good rather than if Älvstranden would have developed the programs themselves. However, Real estate developer SÄ1 from Södra Älvstranden claimed that their company even had to support Älvstranden

in the work with the sustainability program due to that the company sometimes had more knowledge than ÄU regarding sustainable building. It appeared that consortium work can contribute in different ways depending on what skills or characteristics the involved actors possess. Consortium work in combination with sustainability work in terms of environmental requirements and programs can, according to Project developer L1 from Lindholmshamnen, entail changes in the internal organization:

“I can personally think that if you have some kind of quality manual or sustainability program, or if you have something that is agreed externally with other building developers, then you also have much greater opportunities to argue internally why things we do are a little more expensive than it could have been if we took the simplest solution. Also, I could much more easily argue why we should try different new ideas.”

- Project developer L1

Further the interviewee gave credit to Älvstranden for pushing the sustainability issue and making it possible to do more than normally in projects. Resembling experiences was noted from several interviews in Södra Älvstranden, where one thought that there is an emphasis behind the commitments made when working in a consortium. The joint decisions that a consortium equals, has made the actors involved in the changes connected to the environmental requirements. In Södra Älvstranden Real estate developer SÄ2 argued that good collaboration is created when the involved parties have the same vision and goal with their projects, and that it is a strength that several building developers want to go in the same direction in the consortium:

“In practice you do not guard each other, instead you are happy for each other”

- Real estate developer SÄ2

A similar opinion was stated by Head of project SÄ1 explaining that if building developers want their projects to be successful, they must be loyal to their project, therefore problems or frictions between the actors rarely occur. In the case of Lindholmshamnen, the building developers did not know which specific sites to build on when they entered the consortium. In terms of the sustainability program elaboration, this was positive according to Project developer L1. The building developers hence focused on making the whole area as good as possible, instead of solely sub-optimizing for their own conditions.

Regarding the quality forums in Masthugskajen, presented in section 4.3. Real estate developer SÄ1 perceived the forums very positive and said that it has been very good to get an insight into how other actors have developed the

buildings to be built. According to Sustainable specialist 1 there is a good exchange of experience when coming up with advice, tips and tricks. The quality forums in Södra Älvstranden has to a large extent covered the issues related to the design parameters in the sustainability program, although the subject of environmental sustainability is brought up in the solutions as well. Yet the foregoing interviewee additionally advocated a specific forum for sustainability issues only, since the mentioned is passionate about sustainability issues.

5.3.2 Barriers in consortium projects

In the cases of Lindholmshamnen and Södra Älvstranden, mostly of the interviewees claims that there have not been any severe troubles regarding the collaborations between the building developers in the consortium, although potential barriers and difficulties are emphasized. Project developer L1 from Lindholmshamnen described working in a consortium project is like a group work in school, where you do not like everybody. The collaboration becomes complex when the involved parts are both partners and competitors. Further the interviewee explained that rancorous discussions can arise, still all parties want the result to become as good as possible and therefore must try to find solutions to get the projects started as well as finish them. The interviewee thought that collaboration barriers is a part of the work, but also pointed out that the all involved parties in the consortium have based their work on the goal to making district as good as possible:

“As I said, it is both rewarding and difficult to work in a consortium, but it is fun to see that it is starting to look like the end result will probably still be quite good.”

- Project developer L1

The joint effort to develop the area is stated as a driver for the consortium work from several of the building developers in both Lindholmshamnen and Södra Älvstranden, since if no agreement is reached between the actors the whole consortium will be affected. Further several interviewees mentioned that the amount of collaboration needed between the builders depends on the geographical location of the building plots. The more the plots adjoin, the more coordination around construction is required.

In Lindholmshamnen a forum where the building developers jointly tried to solve issues did not exist and Project manager L1 explained that it has more been in informal talk. Another Project developer L1 from Lindholmshamnen had not experienced any collaboration problems regarding sustainability issues, rather coordination issues with the city's administrations of Gothenburg. On the other hand, Real estate developer SÄ2 from Masthuggskajen, claimed that is very clear if an actor is treated unfairly in a consortium. One example is if one building

developer gets away from certain requirements, that the other building developers need to follow, it can have an effect in terms of cost. According to Sustainable specialist 1 in Södra Älvstranden, this could be a possible conflict that could arise in a consortium. Likewise, the company's various internal engagement in sustainable building could be a reason for conflict about cost. In that respect the internal engagement in sustainable building can have a direct impact on the effort needed from different building developers to contribute to the joint consortium work. Continuing on the same track regarding the joint contribution, Head of project SÄ1, listed some inevitable obstacles associated with consortium work for the involved building developers:

“People are replaced in projects and people have different willingness to cooperate. It is the human factor, both what you have written on paper, how you understand an agreement and interpret things differently”

- Head of project SÄ1

This statement is not merely applicable/compatible for projects within consortium, but for construction projects in general. However, as described by the previously interviewee, large urban development projects entails difficulties in coordination and communication between different parties and it is a challenge to find the right communication channels.

5.3.3 Involvement of several stakeholders

It is well known that large city development projects involve several actors beside the coordinator, ÄU in this case, and the private building developers. The different city administrations of Gothenburg, such as Trafikkontoret, Park och Natur, och Krettslopp och Vatten, expects to develop the areas between the buildings. In both Lindholmshamnen and Södra Älvstranden, the building developers perceived that the city administration's work not always works as well as hoped. Project developer L1 in Lindholmshamnen told that Älvstranden had an intuition that the city administrations should be a part of the consortium and claimed that, even though there have been clear requirements and schedules, there have been a lot of problem with their work. The intuition is good since it would facilitate the communication, and the development of the area would have been even more successful if it had worked well.

In Södra Älvstranden, several interviewees emphasised the importance in the work of the city administrations. They opined that it is an entire district to be developed and that the city is an equally important part in the work as the private actors. As mentioned in section 5.2.3, follow-up, a few of the interviewees thought that it was unfair that they had to present their work in individual action plans and that their work was followed-up in the sustainability report, while the city administration did not need to do this. Process leader L1 at ÄU defends the city

administrations meaning that ÄU have not sufficiently involved them in the work with sustainability programs, which they will try to do in the future (personal communication, May 17, 2021). Head of project SÄ1 claimed that if the city administration avoids delivering in some aspects, why do the building developers then have to deliver in every aspect. Further, Sustainable specialist 1 declared that the company entered the project with a believe that it would be a green district, aligned with the sustainability program, thus it is important that all actors deliver what they have promised, city's administration as well. However, real estate developer SÄ3 understood that Älvstranden is in a difficult position since they do not have the same mandate to control the city administration's as they have for the private building developers.

5.3.4 Adjusted requirement for different buildings

During the interviews, a challenge in urban development projects regarding setting similar requirements for all actors, were discussed by the respondents. Several of the interviewees claim that the buildings have different prerequisites depending on what should be built, and where it should be built. One of them mentioned an example regarding the energy efficiency in buildings:

“Residential buildings have a different driving force in terms of energy, which differs from hotel buildings”

- Real estate developer SÄ2

Since the energy in residential buildings are paid by each resident. Another of the interviewees, Project developer L1, explained that the requirement considering daylight is connected to specific sites and that some building developers have great conditions to reach the goal while others do not. Green space factor and solar cells are other examples which depend on the physical condition on the site. Furthermore, Business developer SÄ1, which company build offices, thought that the requirements were customized towards residential buildings and therefor were hard to adapt.

In Lindholmshamnen both Project developer L1 and Project manager L2 mentioned that it would have been good if the companies could have developed a building that suits their property, which had made the buildings more edgy. Several of the interviewees in Södra Älvstranden thought that the flexibility around the requirements and individual action plans have been good.

5.4 Summary interview result

To summarize the previous sections and the result of the interviews with the building developers table 5.1 has been developed to visualise the identified strengths and issues regarding ÄUs work with the environmental requirements. First, resembling findings from both areas are presented followed by area-specific findings in Lindholmshamnen and Södra Älvstranden, including Masthuggskajen and Skeppsbron.

Table 5.1: *Summary of the identified strengths and issues regarding ÄUs work with the environmental requirements from the interviews*

	Both Areas	Lindholmshamnen	Södra Älvstranden
Identified strenghts	ÄU keeps sustainability on the agenda	Creates opportunities to argue about sustainability at the companies	Individual action plans
	Consortium work and common goals creates significance		The quality forums
	Most building developers are used to working with SAMs	The presence of a building permit administrator in design meetings	
Identified issues	Difficult to keep requirements relevant long-term	Unfinished documentation at project start	Lack of a building permit administrator at the quality forums
	Too comprehensive	Contradictions in SPL and design program	
	Much administrative time and cost to implemet the requirements in the project		
	Double work to bring all steering documents together		
	Hard with the follow-up for both ÄU and the building developers		
	Private actors have experienced higher expectations compared to other involved actors		

6 Discussion

This chapter will be divided into three sections, each one related to the sub research questions of the study. The sections will, in combination with the literature review, analyse and discuss the results from the case study. The research questions are:

- a) What strengths and issues can be identified in the environmental requirements set by Älvstranden Utveckling and how do they relate to SAMs, industry practise and laws?
- b) How has the building developers experienced the requirements in their own projects?
- c) Based on the findings and previous research, what measures can be done to improve the implementation and follow-up of environmental requirements?

6.1 Identified strengths and issues related to environmental requirements

As argued in previous research (Dwaikat and Ali, 2018), the construction industry is one of the sectors who needs to embrace sustainability the most. The pronounced focus on sustainability in Lindholmshamnen, Masthuggskajen and Skeppsbron highlights ÄUs effort, as a urban developer, to put sustainability on the agenda. This section will discuss the strengths and issues in ÄUs attempt to set environmental requirement towards the building developers.

Findings from the interviews show that when ÄU is gathering various actors, that together strives towards the same goal, it creates a greater significance to the work, both as a complete consortium, but also internally at the different companies. To work in a consortium with expressed sustainability focus also entails a positive incentive to take a step further than the legislation and municipal regulations regarding environmental sustainability. Today, many companies in the construction industry strive to work with sustainability, as also shows in the interviews where the building developers in the consortiums did not see a problem in the event of receiving environmental requirements themselves, rather in the formulation and the scope of requirements. The fact that the sustainability programs, SPL and SPM was developed jointly in the consortiums is one probable reason for the support from the building developers, since they had a say and a will in the creation. This also goes in line with previous research (Feretti, 2016) which argues about the importance to involve multiple parties, in the decision making in urban development projects to engage, gather knowledge and promote future involvement. The belief of the positive outcome of involving several actors

is also demonstrated in the interview findings as most of the interviews advocates the joint venture when developing the sustainability programs.

As the foundation of the consortium model in the City of Gothenburg partly are built on the common strive for the best of the area, to be developed (Älvstranden Utveckling AB, 2021a), it seems like ÄU has conveyed the message of the Vision Älvstaden (Göteborg Stad, 2012) to the actors successfully. Seeing this from the perspectives of ANT, the shared attitude of the high sustainability ambitions among the actors in Masthuggskajen and Lindholmshamnen could be equated with a successful implementation of the *interessement* and *enrolment* moment of translation (Aka, 2019) by ÄU. The environmental requirements in SPL and SPM, could be seen as the strategy to reach the goals of the areas to be developed, hence they are also a non-human actor regulating the sustainability work in ÄU's areas. Regulations which according to (Häkkinen and Belloni, 2011; Winston, 2012; Zou and Zhao, 2014), can be an effective way of achieving results and help steering the actors in the right directions to a certain extent, yet the wrong type of steering may hinder sustainable building.

Even though the building developers in the consortiums see the importance in setting environmental requirements in urban development projects, the work with them has not always been done without hindrance. Findings from the interviews shows a difficulty regarding long-term urban development project with many parties involved. Looking at the timeline from Lindholmshamnen in figure 4.4, it is visible that the first building developer to start its project, did this before the SPL and design program was developed. Not having all steering documents ready before project start could cause difficulties when the project needs to be adapted and compromised afterwards. Further the sustainable development in the industry constantly evolving, laws and regulations becomes stricter and the SAMs are frequently updated (Berardi, 2012). To set environmental requirements, which are kept relevant in a urban development project that runs for more than 10 years, therefore becomes challenging. The interviewees mean that today's legal requirements may be a non-question in several years. Further, the sustainability programs consisting of about 100 requirements in both Lindholmshamnen and Masthuggskajen, see table 4.1 and table 4.2, is very comprehensive, and as one mentioned, noting is left to change. Still, the study shows that the requirements in the sub areas are differing, as the building developers in Masthuggskajen had to develop individual action plans in relation to the goals of the SPM, while the building developers in Lindholmshamnen did not. The initiative to develop individual action plans is positive since the requirements gets adopted to each specific project and building, and the building developers gets even more familiar with what is expected from them. On the other hand, it requires an extra effort for the building developers.

The building developers have done an extensive work to translate and implement the requirement in their specific projects, which has resulted in both administrative time and costs. However, one thing that has taken lots of

administration and double work is to combine the environmental requirement from ÄU with the company's internal requirement. Looking back at the problematization behind the proposal for this thesis, that ÄU themselves had a hard time to manage the follow up in the areas, due to the comprehensiveness of the set environmental requirements, it is visible that both ÄU, as developer, and the building developers are affected by the amount of the requirements. The detailed steering has made many of the building developers confused, since the documentations do not always ask the same things of them, and they interpret the written things differently. On the other hand, ÄU themselves have realized that they lost the holistic view of what they wanted to achieve in Lindholmshamnen because of the detailed steering, and the meticulous follow up that the set requirements required from them as coordinator. These findings, align with the statement from Goulden et al. (2015), saying that the adoption of several and various standards, non-human actors, could be both difficult and costly for the human actors. If considering the case from an ANT perspective, the mobilization moment in the four step process (Aka, 2019) hence become critical when the human actors; ÄU and the consortiums, interpret and understand the non-human actors; the regulation documents, differently, because of how they are written and formulated. Here potential difficulties in remaining the network stable could arise, which according to Aka (2019), is the purpose of the mobilization moment of translation, to keep the network functioning.

As shown in the result from the gap-analysis, there are similar requirements in the different steering documents in ÄUs areas, especially at a building level. Even though the specific values are not exactly the same, the requirements still treat similar criterions. If ÄU chose to rely on that the external regulations, such as SAMs, are good enough as environmental requirements at the building level, the building developers would not have to spend the same amount of time and costs in the process to adopt various regulations and standards. This solution was also suggested by several of the interviewees in the consortium, which would have preferred if ÄU had been contented with the criterions in the SAMs for the buildings, and then could have focused at other things in their requirements, such as innovative solutions or the space between the buildings, like the street level, parks or mobility. Otherwise there is a risk that the requirements themselves become a hinder and prevent what ÄU wants to achieve in terms of sustainability. ÄU themselves have, as already mentioned, had a demanding work with the follow-up of the requirements and to make sure that the building developers perform what they have promised, especially in Lindholmshamnen. To make the gap-analyse as a part of this thesis, was a suggestion from them, as the idea to rely more on the already existing requirements could facilitate ÄU in their work and follow-up of the requirements, but still ensure that no aspects were missed. The reliance of the already existing requirements would also keep the requirements relevant over time, as laws, regulations and SAMs are frequently sharpened and updated.

6.2 The actor's experiences regarding the environmental requirements

The construction industry is built upon large networks of actors and as stated by (Jin et al, 2017), every construction project involves numerous stakeholders. No less, urban development projects bring together and affects many parties, and requires extensive planning processes to meet objectives from laws and other steering documents. Hence, this creates spaces for different interpretations and perceptions among the involved actors. This section will discuss the experiences of ÄUs way of working with environmental requirements revealed through the interviews of the building developers in the consortiums.

Regarding the set environmental requirements, the findings from the interviews proves that the investigated building developers are of the same opinion, an opinion that ÄU are doing an important work in the aim towards a sustainable city. ÄU has, in their role as coordinator, a responsibility towards the building developers in the consortiums since they originally put the demand on the building developers, and the building developers need to relate to this in their projects. Although the initial focus of the study has been to examine the perception of ÄUs environmental requirements at building level, the study has come to include other implications of cooperation inevitable to shed light on. Noteworthy findings from the interviews show that the building developers sometimes experience that the city administrations are treated with less demands by ÄU, even though they have agreed and promised commitments in the projects, just as the building developers. It is perceived as non-motivating among the building developers since all parties, such as ÄU, the consortiums and the city administrations have agreed upon the same goal of the project. ÄU themselves say that they are partly responsible for the criticism, and that they should try to involve the city's administrations more in the planning processes in the future. This to eliminate misunderstandings about expected contribution, both from the city's administrations and the building developers.

As shown in the interviews several strengths from working in a consortium in ÄUs urban development projects were also revealed. The strengths concerned that it helps to raise awareness in the internal organisations of the building developers, and thus the awareness throughout the construction industry could be improved. Regarding the building developers' own organizations, depending on the internal knowledge about sustainable building, the high ambition in ÄUs project could entail a possibility for a certain employee to argue internally why they should try new ideas or why things might get more expensive than if the simplest solution were chosen. In this sense, looking at the projects in Lindholmshamnen and Masthuggskajen from the perspective of ANT (Aka, 2019), as two actor-networks, it is obvious that the range of the network branches off and affects more actors than those who are directly involved in the projects. Thus, the

consortium network can also be seen as an external network used to enrol and mobilize the involved companies internal work with sustainability. Further, this opens for another discussion about the value of the performed sustainability work. This concern was also lifted by one interviewee who meant that all the requirements set by ÄU did not create value for their end customers. Consequently, this could be seen as a conflict of interest, since value is perceived differently among people. Working with sustainability could either symbolize environmental prestige and justify design solutions, as mentioned both in the interviews and literature (e.g. Spinks, 2015), or hypothetical result in higher rents or prizes for renters or buyers of the premises. Do the high ambitions of the areas to be developed matter for the ones who will live there in the future? Surely yes for some, and surely not for others. Again, this reflects the complexity of construction projects, with all parties and perceptions involved.

The findings from the interviews regarding the follow up of the requirements are united. The building developers would prefer to have the follow-up occurring continuously, preferably 1-2 times a year, since a building project undergoes many different phases during that time, and much can happen. Although this needs to be done structured, e.g. with a clear template or a matrix. The desired continuously follow-ups also becomes a proof of the effort the building developers have put into their projects to meet the goals and the environmental requirements from ÄU. It also creates a significance for ÄU to do the follow up as they show that they are serious and completing the work they initiated. Otherwise the building developers might lose faith for ÄU in the role as coordinator. On the contrary ÄU can lose confidence in the building developers, if they do not do what they have promised, or ignores any of the requirements. However, the interview findings show that the building developers are aware of this and the possibility to be refused to participate in ÄUs projects in the future, is one reason to deliver what they have promised. For ÄU, the negative side of not having any penalty-consequences regarding the environmental requirements is that ÄU has no actual hold over the building developers, more than the trust between them. On the other hand, the findings from the interviews and previous literature (Kadefors, 2002) shows that networks where trust among the actors is present, facilitates the collaboration and encouragement to do what you have promised. Further, several building developers from the interviewee study suggested that some sort of competition regarding environmental solutions could motivate them to deliver what they have agreed. The reward could for example be that ÄU highlights the best solutions on public platforms or report, to show the good example.

6.3 Measures that can be done to improve the process

ÄU have noticed that the process of setting environmental requirements that are manageable, both in implementation and follow-up, and facilitates the strive

towards sustainability in urban development projects needs to be improved. In Lindholmshamnen and Masthuggskajen, experienced difficulties regarding the work with the requirements have been revealed. This section will, based on an elaboration of the experiences and findings from ÄUs projects and previous research discuss measures that can be done by ÄU to improve the process of setting environmental requirements. The suggestions will be arranged based on the four categories presented in the following figure 6.1.

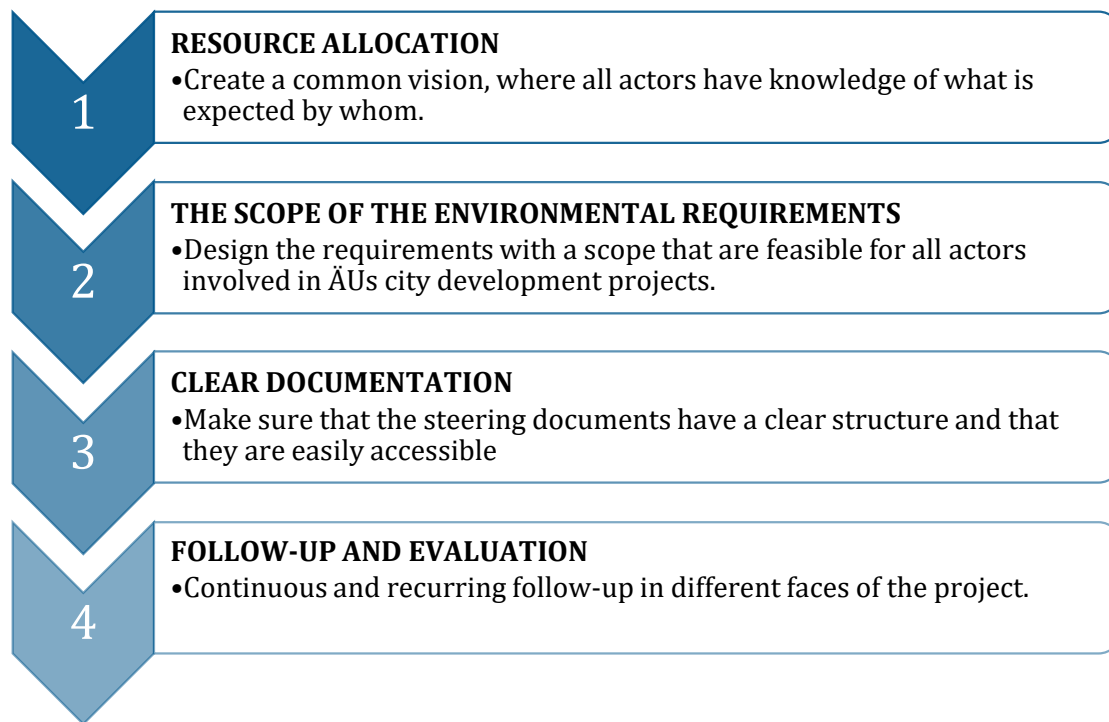


Figure 6.1: Measures that can be done to improve the process of setting environmental requirements

Resource allocation

First, the study concludes that urban development projects of the extent, as the projects in this case study, with many stakeholders involved, each one contributing in different aspects, needs a clear resource allocation. Previous studies (Aka, 2019; Zhang et al., 2017; Wang et al., 2017) show the importance of actors having knowledge and understanding of each other the in temporary network, as the projects in Södra Älvstranden and Lindholmshamnen could equal, to promote their common interest. The joint process in developing the SPL and SPM is beneficial and the findings from the interviews show that it has been appreciated by the building developers, hence it is a strategy to keep. Here ÄU, as the coordinator, has the liability to early gather and involve, both the consortium members and the city administrations, to assign different areas of responsibilities. This to ensure that everyone understands what is expected by whom in the projects, and the available resources. This because different actors have different amount of time and resources to contribute with, which must be conveyed early,

to avoid misunderstandings later in the projects. Further, a recommendation is that ÄU should continue to hold monthly meetings with the consortiums, as it is an efficient way to remain collaboration and communication between the actors and to keep build knowledge during the evolvement of the project since people are replaced in projects. However, additional measures that could be taken for future projects is to involve the city administrations to a larger extent. Partly in the development of the sustainability programs and the ongoing work with the projects, but also to involve a building permit administrator in the consortium meetings, like ÄU did in Lindholmshamnen.

The scope of the environmental requirements

Secondly, the results from the interviewee indicates that ÄUs requirement is to comprehensive and that ÄU needs formulate the scope of the environmental requirements more feasible for all actors in the project. The study shows that there are several benefits that ÄU could gain from using SAMs as the base for the requirements at a property level. As Goulden et al. (2015) opine, that public developers can save both time, cost and resources if they let a third-party organisation develop and update the requirements. As already discussed in section 6.1, the reliance that already existing regulations are good enough as environmental requirements for the buildings could facilitate ÄUs work with the requirements and follow-up. Mostly of the building developers are already working with SAMs, so, having SAMs as a requirement for the buildings in the areas would not give them extra work. Further the follow-up is handled by a third-party organisation, which owns and develops the SAM, and the building developers could just show ÄU that they have passed their review. These third-party organisations also update the SAMs frequently which keeps the requirement up to date during the whole urban development project. The benefit of recruiting a third-party actor is also reflected in the mobilization phase of the four step process in ANT (Aka, 2019), which implies, that the support from external actors and methods could help the network to remain stable.

Experiences from Lindholmshamnen indicates problems that could appear if ÄU sets a requirement that all the building developers should use a specific SAM. This has led to numerous of discussions in the consortium which has resulted in a decision from ÄU to 'let go' and accept other SAMs since there were other requirements that were considered more important at the time. Different SAMs are used and suites different types of buildings, see figure 1.1. As the result from the interviews shows, a difficulty in the environmental requirement in urban development project could be to set requirements that are relevant and fits for buildings with different functions. If the building developers themselves could choose the SAM that fits for their building and as they have experience to work with from before, both them and ÄU would benefit from this. However, there are a risk that ÄU takes if they chose to rely more on the SAMs. It has during many years been a discussion regarding the weighting systems in the SAMs (Ding, 2008).

Since the points in the criteria are weighted equally there is a risk that actors make choices based on points rather than sustainability performance in, order to achieve a high score. ÄU must consider if they are willing to take this risk and relieve their own workload, or if they think that the environmental requirement is too important to let go of the control over them. Further, to still secure a good level, a recommendation is to set a minimum level of SAMs, corresponding to the level in NollCO₂ (Sweden Green Building Council, 2020b); Miljöbyggnad Silver, BREEAM-SE Very Good, LEED Gold or Svanen.

Even though ÄU would lose some control over the environmental work in their sub areas by decreasing their own requirements and use SAMs instead, it would still be good to have a few strict environmental requirements. Thus, ÄU would not entirely lose the control over the environmental aspects of the buildings and could pinpoint some aspects they see as the most important and are adamant in the follow-up of them. ÄU would then also have time and resources left to set requirements in aspects that the SAMs not include, and additionally create innovation opportunities for the building developers instead. The suggestion to have stricter requirements could, according to previous mentioned research, inhibit innovations. However, the authors of this thesis believe that a few stricter requirements still could entail a greater space for new solutions and innovations, if ÄU also makes sure that good efforts are highlighted in the consortiums, rather than having over 100 requirements for the building developers to act upon .

Clear documentations

Thirdly, the interview result, and the discussion from section 6.2, shows that the building developers in the consortium have different experiences from the work with ÄUs environmental requirements. Looking at the requirements as a non-human actor in the network of a urban development project through an ANT perspective , the interest-moment phase, saying that the primary actor, ÄU, needs to make the other actors see the validity of what they have proposed (Aka, 2019). It hence becomes important that ÄU develop a clear documentation of the requirements. As findings from the interviews indicates, there have been problems regarding contradictions in different requirements, as described for Lindholmshamnen where the design program did not align with the SPL. However, in the work with the SPM and steering documents in Masthuggskajen, a coordinating group has been responsible to ensure that the documents align with each other, which seems to have worked better. Urban development project needs to meet the demand in many different aspects, not only the environmental one. It is therefore important to have different steering documents, but ÄU must make sure that they have a clear structure and that the other actors understand what ÄU have proposed in the requirements.

A translation difficulty regarding the individual action plans in Masthuggskajen was demonstrated in the interview study. As the action plans

from the beginning were written in running text, the building developers found it hard to translate them to a matrix for the follow-up. In Lindholmshamnen, another difficulty appeared, as already discussed in section 6.1, the SPL were not finished before the first building developer started their project, see figure xx. The projects then need to be adapted and compromised afterwards. These two examples indicate the importance of having clear and structured documents prepared in the beginning of the project. Yet, as stated in the interview result, everyone wants the project to move forward and it is impossible to have all the documents finished from the beginning. Nevertheless, in the discussion regarding the individual action plans and the difficulty to translate running text into a matrix, the problem could be solved if ÄU developed a clear template on how to structure these action plans. If the building developers had the matrix, to write their individual action plans in, from the beginning, they would have similar structure which would facilitate ÄU in the review and follow-up, and at the same time relieve the workload it takes for the building developers to translate their individual action plan for the follow-up.

Follow up and evaluation

Finally, the development of a structured template for environmental requirements would facilitate ÄUs follow-up and evaluation of the project. The result from the interviewees proves that the building developers think that it is useful to follow-up the requirement and that they do not object being followed up. In projects of this length, people often quit and are replaced by new ones. Continuous and structured follow-ups would further necessitate a clear documentation of the work with the requirement, which facilitates the transfer of information and knowledge when someone being replaced. However, both ÄU and the building developers think that the follow-up of the environmental requirements have been complicated to handle, due to the comprehensiveness in the SPL and SPM. As already suggested, ÄU should set less environmental requirements at a building level and let the SAMs handle those aspects, still the remaining requirements should have a clear structure. In addition to this, ÄU should perform continuous follow-ups, for example, 1-2 times a year or after a completed moment in the projects. Thus, the process of following up would be divided into several occasions and final evaluation of the work would be more manageable for ÄU.

7 Conclusion

This thesis aims to investigate how to improve the process of setting environmental requirement in urban development projects, more specific how Älvstranden Utveckling, as a public landowner and urban developer, can set environmental requirements towards the building developers to facilitate sustainable development in urban development projects. To address the overarching research question and to conclude the study, the three sub research questions will be answered.

- a) What strengths and issues can be identified in the environmental requirements set by Älvstranden Utveckling and how do they relate to SAMs, industry practise and laws?*

The main strength identified with ÄUs ambitious work with environmental requirements in their projects is that it keeps sustainable development on the agenda for all the involved actors. ÄUs strategy to develop the sustainability programs in a joint process with the building developers in the consortiums and the city's administrations is positive since this not only creates a common vision and goal for the project, but also entails engagement among the actors. However, identified issues regards the scope of the requirements in the investigated projects. It has been too comprehensive with a large amount of different requirements, that overlaps with other steering documents. This creates a difficulty in the management of the implementation and follow-up, both for the building developers and ÄU themselves. Hence resources are required to deal with time-consuming administration, which otherwise could have been utilized to develop the sustainability ambition further.

- b) How has the building developers experienced the requirements in their own projects?*

The most noteworthy conclusion regarding the building developers' experiences is that they perceive and interpret the set requirements differently depending on earlier experiences, knowledge, and engagement in the context of sustainability. Even though no direct consequences exist, if not meeting the set requirements, the building developers still want to fulfil the goals of their projects to maintain the trust from ÄU and the possibility to participate in future projects. On the contrary, if ÄU are no delivering in their role of facilitating the development process, the building developers might lose confident in ÄU. To further keep up the motivation among the building developers, it is important that the collaboration and coordination between all involved actors, both the consortium and the city's administrations, of the urban development project are functioning. Here ÄU, as the coordinator, has the responsibility to enrol and integrate all involved actors.

c) Based on the findings and previous research, what measures can be done to improve the implementation and follow-up of environmental requirements?

In summary, the measures that can be taken to improve the process of setting environmental requirements has been divided into four categories, which are:

1. Resource allocation
2. The scope of the environmental requirements
3. Clear documentation
4. Follow-up and evaluation

First, ÄU is responsible to create a common vision where all involved actors understand what is expected by whom and how much resources the actors have available for the projects. Second, the scope of the environmental requirements developed must be feasible for all actors. This by decreasing the amount and detailed control in ÄUs own requirements. Instead ÄU could use SAMs, sustainability assessment methods, at a building level, as the environmental requirement covered in these would be sufficient and further managed and followed-up by a third-party organisation. ÄU could then focus on the categories that are not included in the SAMs. To ensure the sustainable development of the areas, ÄU could still set a few requirements at a building level, thus, they would be easier to address. The reduced detailed control would be less time consuming for ÄU and at the same time create space for sustainable innovations among the building developers. Third, ÄU must make sure that the steering documents have a clear structure and are easily assessable for all actors to translate and implement into their own projects. Finally, it is important that ÄU executes continuous, and recurring follow-up in different phases of the projects. The above-mentioned improvements would facilitate this process.

However, regardless of which measures being taken, it is inevitable to neglect the complex characteristics of urban development projects, with long lead times and many actors involved. This will always entail a difficulty in keeping the requirements relevant over time, and different actors will always have different perceptions and opinions regarding environmental requirements. Therefore, it is important to keep developing and always strive towards an improved process when setting environmental requirements.

7.1 Future research

This study has resulted in an awareness in the difficulty to keep environmental requirements relevant over time. Because of complexity in urban development project and the long lead times, the requirements must be kept up to date in the meantime. An interesting study could be to further investigate the process in

keeping the requirement relevant and adaptable over several years. As this study mainly examined the environmental requirement at a building level, from the experiences of the building developers, a broader understanding could be gained if also including other divisions, such as architects and site managers, to cover the perspective of different phases in urban development projects. Another interesting aspect would be to investigate sustainability requirements for the whole area, not just the buildings but the areas between them as well.

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A

Appendix Interview Guide

ALLMÄNT

Kort presentation av dig själv, bakgrund och vad din roll har varit i det här projektet.

Har ditt företag interna metoder, regler, målsättningar, certifieringar för miljömässig hållbarhet som ni måste följa inom företaget för projekten, kan du ge oss exempel?

Vilken typ av miljökrav får ni annars från beställare och kunder, hur ser de ut?

MILJÖKRAV

Hur upplevde du miljökraven i början av projektet och under projektets gång?

- Har de varit lätta eller svåra att följa/förstå?
- Föredrar du om krav är strikta, exempelvis går in på exakta värden, eller om de är mer mjuka/löst ställda?
- Har du varit delaktig i utformningen av utvecklingen av kraven?

Hur hade du/ni önskat att Älvstranden arbetar med kravställning på ett annat sätt?

- Finns det några "Hygienfaktorer" som ni alltid kommer uppfylla oberoende av kravställning från kommunen?

Har det uppstått några konflikter angående kraven i utförandet?

- Om så är fallet; hur hanteras det?

Finns / fanns det ett bra stöd från ÄU gällande kraven utförandetraven eller önskas mer stöd?

Hur upplever du uppföljningen av miljökraven?

- Vad fungerar bra / mindre bra?
- Har du något förslag på hur man skulle kunna jobba med uppföljning på ett annat sätt än det som gjorts?
- Finns det tydliga konsekvenserna om kraven inte uppfylls?

EKONOMI

Vilka kostnader är miljökraven som ÄU ställer förenade med för er?

- Det kan handla om produktionskostnad för det man bygger?
- Administrativt arbete kring det, extra miljöadministratör i projekt med Älvstranden?
- Är det genomförbart? Kan det stoppa upp arbetet?

KUNSKAP

Känner du att det finns tillräckligt med information och kunskap inom er organisation för att utföra och genomföra miljöarbetet och uppfylla de krav som ÄU förväntar sig av er?

SAMARBETE INOM KONSORTIET

Hur delas information och kunskap mellan aktörerna?

- Tycker du att detta är tillräckligt effektivt?
- Om inte; vad skulle du föreslå för att förbättra situationen?

Om ni är överens om en målsättning och det är någon aktör som inte levererar det (så att hela projektet inte levererar på målen), hur agera ni i en sådan situation?

Hur fungerar samarbetet mellan aktörerna inom konsortiet, Älvstranden utveckling och stadens förvaltning?

- Har det under projektet uppstått någon konflikt i konsortiet, om ja; hur löstes det?
- Känner du att det finns förtroende/tillit mellan aktörerna?
- Hur skapar ni ett förtroende gentemot varandra i konsortiet för att kraven ska uppnås?

ÖVRIGT

Har du något som du vill tillägga, som vi inte har tagit upp, och som du tycker är viktig information angående detta problem/ämne?

B

Appendix GAP-analysis

	Energi	Inomhusmiljö	Byggnadsmaterial	Transporter	Vattenanvändning
Miljökrav Lindholmshamnen	Energiprestanda Effekt Förnyelsebar energi Egen energiproduktion	Radon Förrenad luft Ventilation Termisk komfort Elektriska och magnetiska fält Legionella bakterier Dagsljus	Dokumentation av byggvaror Utfasning av farliga ämnen	"Klimatsmarta transporter"	Vattenmätning Incidenter för minskad användning
Miljökrav Masthugskajen	Energiprestanda Egen energiproduktion Egen energianvändning i byggskedet	Dagsljus	Dokumentation av byggvaror Materialval ur ett livscykelperspektiv	"Grön transportplan"	Incidenter för minskad användning
Miljökrav Skeppshorn	Energiprestanda Effekt Egen energianvändning i byggskedet Miljömärkt fjärrvärme		Klimatpåverkan (LCA) "Icke godkända" material	Alternativa transportsätt* Närhet till bekvämligheter	Vattenmätning
Lagstiftning BBR	Energiprestanda Effekt	Radon Ventilation Luftkvalitet Fuktsäkerhet Termisk komfort Dagsljus	Godkända material		
Svanen	Energiprestanda Effekt	Radon Ventilation Fuktsäkerhet Dagsljus	Dokumentation av byggvaror Utfasning farliga ämnen Kemiska produkter "Icke godkända" material	Alternativa transportsätt*	Vattenmätning
Miljöbyggnad	Energiprestanda Effekt Förnyelsebar energi	Radon Ventilation Fuktsäkerhet Termisk komfort Legionella bakterier Dagsljus	Dokumentation av byggvaror Utfasning farliga ämnen Klimatpåverkan (LCA)		
LEED	Energiprestanda Effekt Egen energianvändning Förnyelsebar energi	Radon Ventilation Termisk komfort Dagsljus	Klimatpåverkan (LCA) EPD Utfasning farliga ämnen	Alternativa transportsätt*	Vattenanvändning Vattenmätning
BREEAM-SE	Energiprestanda Effekt	Radon Fuktsäkerhet Termisk komfort Dagsljus	Klimatpåverkan (LCA) Utfasning farliga ämnen Materialeffektivitet	Tillgänglighet kollektivtrafik Alternativa transportsätt* Närhet till bekvämligheter	Vattenanvändning Vattenmätning

*T.ex. främja cykel

	Dagvatten	Grönytefaktorer/Biologiska faktorer	Avfall	Ljud	Klimat
Miljökrav Lindholmshamnen	Lokalt omhändertagande av dagvatten (Lokalt omhändertagande av dagvatten)	Ökad biologisk mångfald (genom grönytefaktorer)	Möjliggöra källsortering Göteborgsregionens avfallsplan Lindholsleveransen	Ljudklass B Bullderskydd	Utvärdering klimatpåverkan Klimatsmart liv
Miljökrav Masthugskajen	Lokalt omhändertagande av dagvatten Dagvattenutredning Användning av dagvatten	Grön Yta/Görna tak Urban odling	Möjliggöra källsortering Byggarvfall Återbruk	Ljud I byggskedet Bullderskydd	Studie klimatpåverkan Klimatsmart liv
Miljökrav Skeppsbron	Lokalt omhändertagande av dagvatten	Gröna tak Ökad biologisk mångfald	Möjliggöra källsortering + Byggarvfall		Låg klimatpåverkan
Lagstiftning BBR	Behandlas		Möjliggöra källsortering	Bullderskydd	
Svanen	Lokalt omhändertagande av dagvatten	Gröna tak och fasader Ökad biologisk mångfald Urban odling	Möjliggöra källsortering Byggarvfall	Ljudklass B	
Miljöbyggnad				Ljudklass B	
LEED	Behandlas	Minska påverkan på den biologiska mångfalden	Möjliggöra källsortering + Byggarvfall	Ljudklass (ANSI standard)	
BREEM-SE	Dagvattenutredning	Förbättrat ekologiskt värde Minska påverkan på den biologiska mångfalden	Möjliggöra källsortering Byggarvfall	Ljudklass B Bullderskonsekvensutredning	Klimatpåverkan

+ även krav på vad som ska finnas

