

HOW IS STORMWATER MANAGEMENT REFLECTED IN PLANNING INTENTIONS, REGULATIONS AND CURRENT PRACTICE? LØRENSKOG - A CASE STUDY IN THE SUBURBAN OSLO

/ ELISABETH SJÖDAHL

The Oslo School of Architecture and Design

Elisabeth.Ulrika.Sjodahl@aho.no

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ABSTRACT

The study looks at how stormwater management is reflected within today's municipal planning: Is there awareness and appreciation of the possible ecosystem services of water at the moment of deciding future land use?

The site-specific case study presented in this paper – Lørenskog, an adjacent municipality to Oslo – has been suffering from flooding and is at present one of Norway's fastest growing municipalities. The recreational protected area Marka to the north and to the south meets the expansion of housing, logistics and the industrial areas that are located along the motorway E6 connecting to the Gardermoen Airport. Significant features include the urban expansion that replaces woodland along the river and worsens an already documented existing flood risk along Ellingsrudelva.

Here, there is a need for reading the territory from the urban perspective to the landscape and back again, in order to find solutions that are beneficial for both the environment and for the urban development.

INTRODUCTION

The research question posed in this paper is: What relation is there between planning intentions, regulations and current practices when it comes to ecosystem services and, particularly, stormwater management? In order to answer this question, I have studied current practices in the municipality of Lørenskog, and in this paper I include brief descriptions of three actual transformation cases within the municipality.

BACKGROUND

The swiftness with which natural resources are consumed implies that there is a need for awareness and for change. This study focuses on water in an area where important decisions on land uses are at play. Lørenskog updated its municipal plan in 2015, and it exposes the actual state of how stormwater management is reflected in the municipal planning practice today. It provides insight into what the intentions are and if, indeed, they are being put into practice. (Figure 1)

WORKING METHODS

The research is done through a case study, Lørenskog, which permits an in-depth understanding of a contemporary, context-related question (e.g. Bromley, 1986; Yin, 2013). The area of investiga-

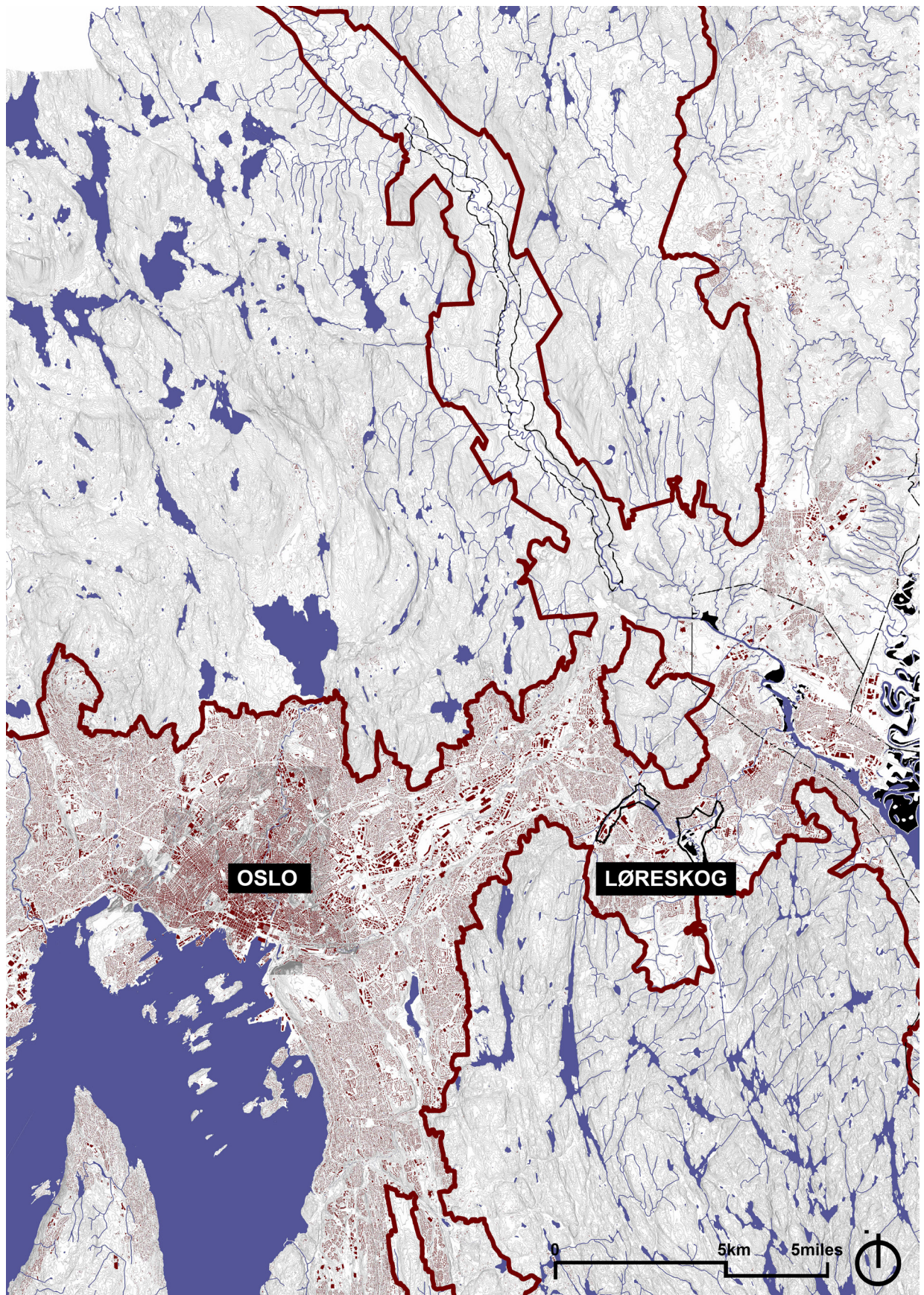


FIGURE 1. Localization of the case study area Lørenskog. The natural reserve Marka is defined by the red line. Areas marked in black correspond to the flooding zones. (Plan by Elisabeth Sjødahl. source: <http://www.geonorge.no>. Accessed Feb. 2016)

tion is chosen for its documented flood risk exposure and urban pressure. The municipality has several ongoing projects in which it is possible to see the application of the intentions regarding water management.

Observations within the technical department of the municipality, carried out as part of my research, shows the concerns within practice (D. Fallmann, 2008). The engineers of this department are co-located with the technical maintenance staff, this gives them direct information on the problematic areas with respect to maintenance and flooding. However, there is an administrative separation between this unit and the planning department, which is situated closer to the politicians. Communication between these units happens through written recommendations and formal meetings. One of the challenges is that the municipality focuses on building as response to the pressure from urban developers', while there is a scarcity of time for evaluating the future projects with regards to urban ecosystem services.

STORMWATER MANAGEMENT IN PLANNING PRACTICE TODAY: LØRENSKOG

Lørenskog, as well as in the neighboring municipality of Oslo, has a clear delimitation of the recreational protected area called Marka. It was initially defined by the height to which water could be pumped when it was established in 1934, and it largely followed the +220m contour line. The reserve is now regulated by law, (Lov 6. juni 2009 nr. 35). The major fresh water supply source for Oslo is today situated within this natural reserve, and it is thus an important ecosystem service. Lørenskog imports its drinking water from the river Glomma to the East.

One of the challenges for the municipality is the rise in precipitation intensity and the runoff water that this produces. This is in some parts due to an increase in built-up areas with impermeable surfaces, which has enhanced runoff, something that was demonstrated in the '60s when US research showed that urbanization can increase the annual flooding by up to six times (L. Leopold, 1968). Another problem in Lørenskog is that the sewage system is aging, and pressure on it steadily increases because of urban expansion. (Figure 2)

'Traditional storm drainage practice protects local streets, basements, and parking lots from flooding, while contributing to major flood damage downstream' (A.W. Spirn, 1984, p. 131).

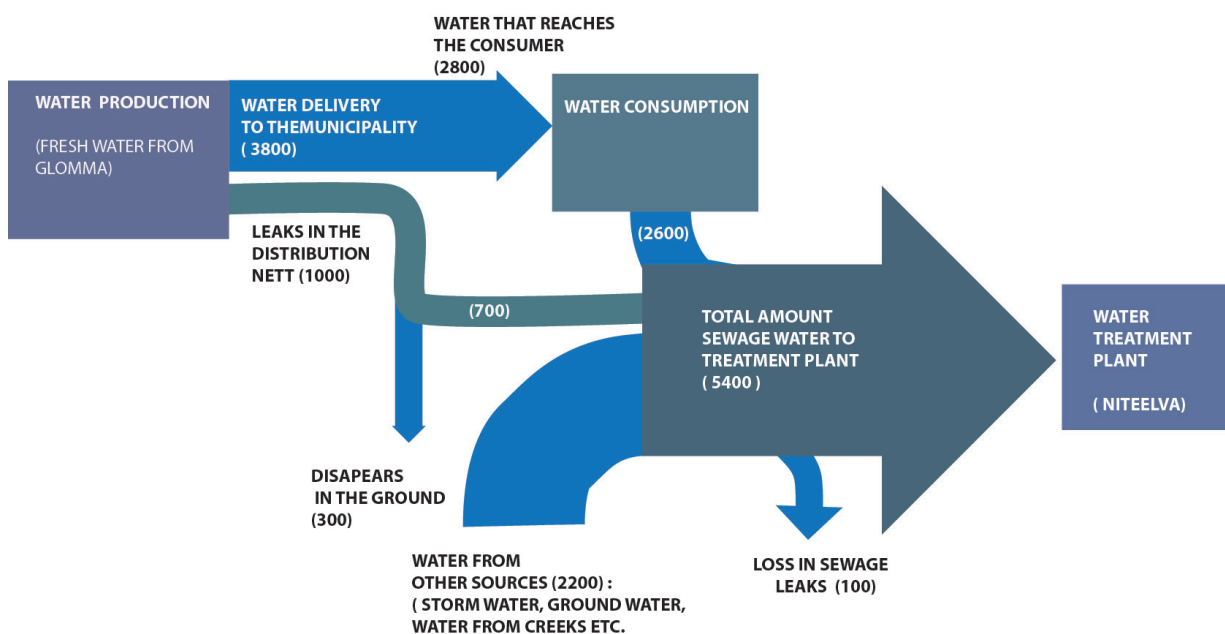


FIGURE 2. Illustration by Elisabeth Sjødahl based on water and sewage diagram from Lørenskog municipality, 2014.

Nationally, there has been a change in how water is dealt with when it comes to urban development. During most of the 20th century it was seen as positive to add rainwater in order to flush the sewage pipes (Johansen, 2001). Nowadays, with an increase in population and therefore a rise in the use of water, this has become a problem, and the pipe dimensions no longer support the rising pressure which occurs during heavy rains. Such events lead to an obstruction in the sewage network, and waste-water is drawn back into the system and into cellars in some parts of Lørenskog. This is a health problem and it is one of the threats of the ecosystem of rivers and lakes in Norway (NOU, 2013:10 p.13).

In order to counteract the storm water problem, a plan for reduction of runoff water from the built-up environment in the municipality is being developed. This can partly be achieved by ensuring that all runoff can be managed within the individual plots of all new buildings. Runoff water is not permitted into the sewage water system, and for newly planned areas there should be a plan of installations that store, infiltrate and clean the water from roofs and other impermeable surfaces. Owners of each plot are responsible for rain and snow management, and the municipality is in charge of public land and major floodways. In order to achieve this, new regulation plans are required to reserve areas for water management, including storage, infiltration and cleaning. In order to fulfill the planning intentions, different laws, regulations, indirect taxes and subsidies are important. Here follows a short overview of the most important planning parameters with respect to storm water management in Lørenskog:

National laws. There is no definition of storm water in Norwegian law and no overall legislation on it. Currently, the theme is spread over various laws and codes which mostly regulate the effect that stormwater has on activities and economic sectors the effect that activities and economic sectors suffer from storm water (NOU, 2015). The Water Resource Act aims to maintain the hydrological cycle balance and prevent flooding and inundation.¹ It is prohibited to prevent the water from running into its natural watercourse. Interventions in watercourses that can reduce its capacity, including blocking or channeling, which can have negative consequences in case of heavy precipitation, is prohibited. Any intervention that can lead to a considerable damage or inconvenience to common interests is not permitted. A change in the waterway is therefore dependent on authorization from the watercourse authorities.

Municipal regulations. The Lørenskog Municipal Plan (LMP) has recently been updated for the period of 2015–2026. It stipulates that storm water should be handled locally within each property or planning zone. It should be handled, as far as possible, at the source in order to maintain the water balance. The natural floodways should be maintained, and the storm water is to be planned in ways that enable it to be part of the usable outdoor area, securing the biological diversity. Impermeable areas should be minimized (LMP 2015-2026 - Part 3 p. 15). The goals are in relation to water, to make risk analyses as a base for planning and reduce the probability and effects of undesirable events. The actions to be undertaken are:

- To pay attention to climate adaptation in municipal planning and not open up for expansion in flood risk areas.
 - To prevent the effects of floods and landslides through local management of storm water and secure blue green areas.
 - To have sufficient preparedness to meet probable risk scenarios.
- (LMP 2015-2026 - Part 1 p. 13)

CASE STUDY AREAS

Here follows a short description of each case study area in order to see how the initial intentions in the municipal plan are implemented. The case study areas of Visperud and Fjellhamar are sites for expansion proposed within this municipal plan of 2015–2026 and the site of Vinterparken is proposed by private initiative.

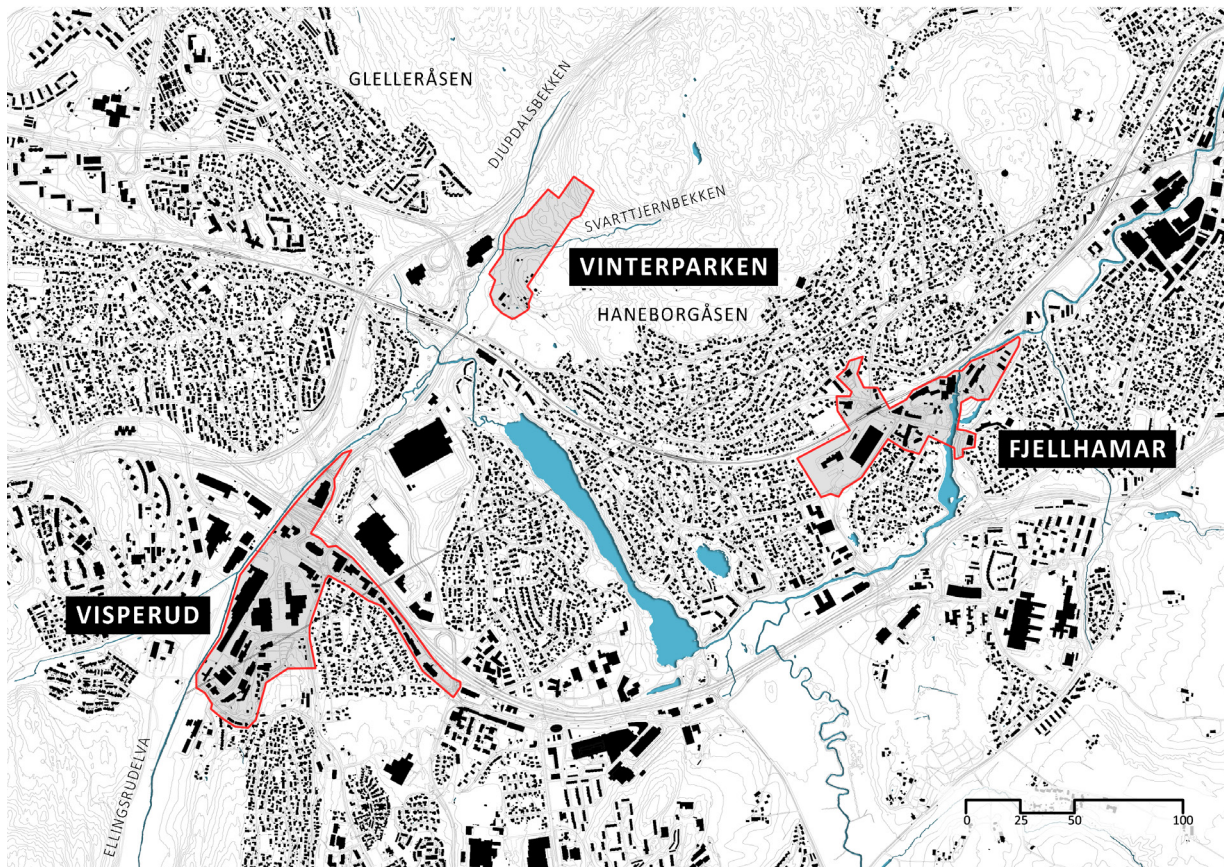


FIGURE 3. Plan showing the three case study areas within Lørenskog Municipality. (Plan by Elisabeth Sjødahl. source: <http://www.geonorge.no>. Accessed Feb. 2016)

At present, the technical department will analyze and define the floodways of Lørenskog during autumn 2016, and start work on modeling the terrain in order to establish and form the waterways of the municipality.

VISPERUD

Visperud is defined by The Norwegian Water Resources and Energy Directorate as an area of inundation. As late as in September 2015 the area suffered from flooding. (Figure 4, 5)

Recommendations in the municipal plan: The argument for further development of this area is based around transport facilities and the plan proposes more industry and large-scale commer-

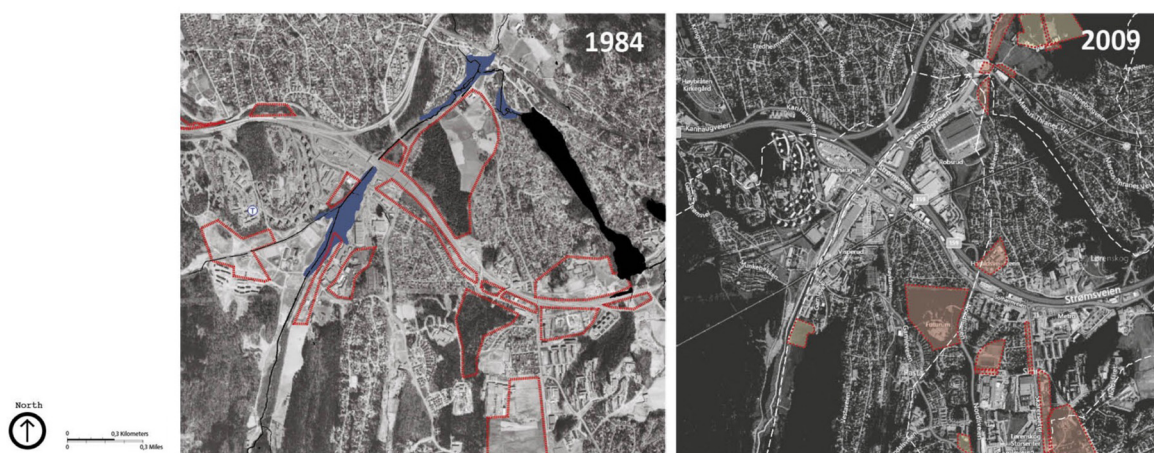


FIGURE 4. Aerial photos of Visperud showing densification over time from 1984 to 2009, where the building mass substitutes vegetation that absorbed surface water. Plan by Elisabeth Sjødahl based on areal photo.



FIGURE 5. Area of proposed densification in Visperud, marked in red. (Plan by Elisabeth Sjødahl. source: <http://www.geonorge.no>. Accessed Feb. 2016)

cial activity. The river is mentioned as a quality that should be made accessible and function as a link between the urban structure and the natural reserve to the south. Important natural and environmental aspects should be safeguarded. Traffic is considered as the main risk factor in the municipal plan. (LMP 2015-2026 - Part 3 [p.25])

Comments: It is remarkable that nothing is mentioned about flooding in the LMP, even though the first part of it mentions risk estimation and minimization, including “not to open up for expansion in flood risk areas”.

VINTERPARKEN

This project of 35,000m² is an indoor ski center. Its footprint steps over the border of the national reserve Marka with approximately 4% of its extension. This exception is approved by the municipality and the regional authority (fylket). The project includes the closing of an existing creek, while passing through the project area. This waterway functions as drainage for the watershed of Marka and for the future development of the nearby housing area of Ødegård, where approximately 1,200 new housing units are planned. The indoor ski center in itself corresponds to a great roof surface, which will lead to even more runoff water. Even though the intention of the municipality is to open up the creeks, and despite the fact that the Technical Department of the municipality has remarked that the project is not satisfactory in respect to its management of

the runoff water, the project has at present not been modified to incorporate the aspect of storm water. (Figure 6)

Recommendations in the municipal plan: The paths that connect Haneborgåsen and Gjelleråsen and those with Østmarka along Ellingsrud river and the Lørenskog paths must be secured. North of the railroad, a connection should follow Djupdalsbekken. The Ellingsrud river adds quality within the area and the riverbed shall be made publicly available and elaborated as a park or as a part of a path system. Important natural and environmental qualities must be safeguarded. (LMP 2015-2026 - Part 3 | p.25)

Comments: The municipalities have a responsibility, by law, to provide adequate floodways. Allowing the new project of Vinterparken to channel the water through the site aggravates the inundation situation further down the watershed. The low point, 500 meters to the south, where the water runs into Ellingsrudelva, is a point that has already suffered from flooding as late as in 2015. Here the infrastructural network was blocked by flood water as the road is found in a lower level than the surrounding terrain in order to cross the train tracks.

FJELLHAMAR

Fjellhamar is in the eastern part of Lørenskog, situated along the train line 15 minutes from the Oslo city center. As depicted in the latest regional plan, the areas near public transport nodes are



FIGURE 6. Area of proposed construction of Vinterparken, marked in red, which implies the channeling of the creek Djupdalsbekken. (Plan by Elisabeth Sjødahl. source: <http://www.geonorge.no>. Accessed Feb. 2016)

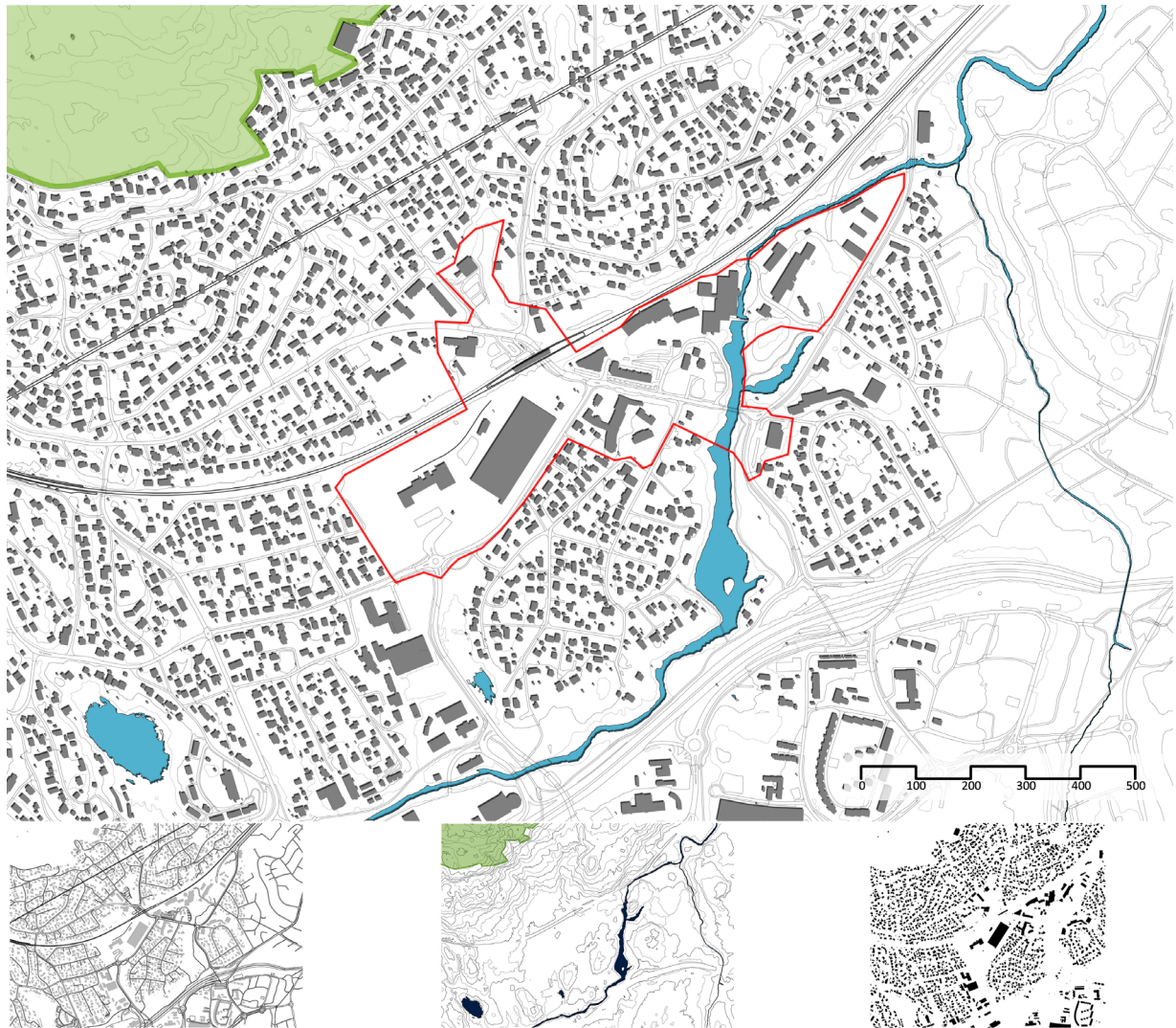


FIGURE 7. Area of proposed construction at Fjellhamar marked in red, next to the dam of Fjellhamarelven. Plan by Elisabeth Sjødahl based on GIS maps from GeoNorge 2016.

considered potential development areas within the larger Oslo region. A zoning plan was initiated by the municipality in 2014. This plan demands an analysis of flood risk factors in the area. At the moment (November 2016), the municipality is waiting for each developer to make their proposals for their sites. At present, there is no plan for floodways or storm water management for the area by the municipality. (Figure 7)

Recommendations in the municipal plan: The area of Fjellhamar has been proposed as a local center with housing and school facilities next to the train station. The municipality is responsible for the overall plan and the developers should promote their plans within that framework. The river Fjellhamar should be seen as an area of importance and quality. The river bank should be made accessible as a park. Attention should be paid to important natural and environmental values. Concerning traffic, joint solutions for several properties for the delivery of goods, disposal of waste and rules for traffic security should be promoted. (LMP 2015-2026 – part 3 p.25)

Comments: There are various potential water-related ecosystem services that can be elaborated in the future development of Fjellhamar. These include provisioning services: collection of clean rainwater for irrigation or other uses, and the provision of drinking water. Regulation and maintenance services include: Reduction of storm water during heavy rains; cleaning of water from roads; regulation of the micro climate; strengthening biodiversity by creating a variety of habitats,



FIGURE 8. Fjellhamar, potential ecosystem services. Illustration by Elisabeth Sjødahl 2016.

and reducing the pressure on the local sewage system which would result in less pressure and cost for the water cleaning infrastructure etc. In order to obtain these ecosystem services, they should be integrated early in the planning process.

CONCLUSION

The three case studies show that the question of storm water management is often ignored within planning, even in defined flooding areas.

The investigation of sustainable land-use planning in Norway carried out by the National Audit Office (NAU, 2006) indicates that the planning of future land use frequently does not follow national sustainability targets. The national guidelines underline that interventions within the protected rivers and waterways should be avoided, but the survey by NAU shows that there has been an increased construction along rivers in Norway from 1985 to 2006. In fact, this increase has happened to the same extent both in protected as well as non-protected areas. This means that there are fundamental changes in respect to given dispensations that need to be revised. Various minor changes can seem insignificant, but the sum of the whole can give completely different readings and effects in terms of flooding. When the dispensation becomes a rule, it puts the urban planning out of order. The present case study shows that this tendency is still a currently occurring event, even though Norway was one of the first countries to sign the European Landscape Convention (EUC) on the 23rd October 2001, and later put it into force in 2004. One of the concerns of the Convention is “to achieve sustainable development based on a balanced and harmonious relationship between social needs, economic activity and the environment” (EUC 2000). What responsibility does the entity and the individuals that give the dispensation have? And what responsibility does the Ministry of Climate and Environment have to follow up their commitments?

The municipality is today responsible for the floodways, which demands that they must take a leading role in obtaining an environmentally based planning model. Næss, L.O., et.al indicates that: “when strong local political and economic interests coincide with national level willingness to pay and provide support, measures are often carried out rapidly at the expense of weaker environmental interests.” (Næss, L.O., et.al, 2005 p.125). Today, plans are to a great extent initiated by the private sector (approximately 70% of the regulation plans that are approved are elaborated by the private sector (NAU 2006–2007)). This means that the larger scale elements that structure the site, such as the landscape’s topography and watercourses, might not always be taken into account. The territorial structures of the landscape have to be put forward, first and foremost, by the region and the municipalities, if the latter is to manage and secure the greater floodways. Planning in Norway has to re-establish an overall view, in order for the planning authorities to be capable of working with more meaningful stormwater management that is not merely derived from the perspective of a single site, but more broadly extends to a larger territory.

ENDNOTES

1. Vannressursloven, Lov 24. november 2000 nr. 82 om vassdrag og grunnvann

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