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Wetlands and retention basins in Lomma municipality

**: EKOLOGI
GRUPPEN**

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Front page photo: Löddesnäs – view towards east, photo: Lomma Municipality

Project overview

Ekologigruppen Ekoplan AB has been contracted by the municipality of Lomma to evaluate sites for stormwater retention basins or wetlands, and to design a wetland on the most suitable location. The assignment is a part of the EU project LIFE Coast Adapt, in which municipality of Lomma participate. The purpose is to promote retention and purification of stormwater, with the aim of counteracting eutrophication and erosion on the coast of the sound Öresund. The retention basins or wetlands shall additionally be designed so that they provide as much environmental benefit as possible for biodiversity and recreational values.

In the application for EU project LIFE Coast Adapt, the site in Lomma was designated, and initially the focus was to design a wetland on this location (site A, Figure 1). After investigating this site, it was clear that, although strategic in terms of catchment area, water volumes and need for measures, the area was too small and the pipe elevations too low for a proper wetland design. It was then decided that 5 other sites should be investigated. Altogether, the contract has included assessing 6 sites located centrally and on the outskirts of Lomma and Bjärred's urban areas, based on environmental and technical criteria. A preliminary design of a retention basin or wetland has been carried out for the most suitable location, the site north of Bjärred.

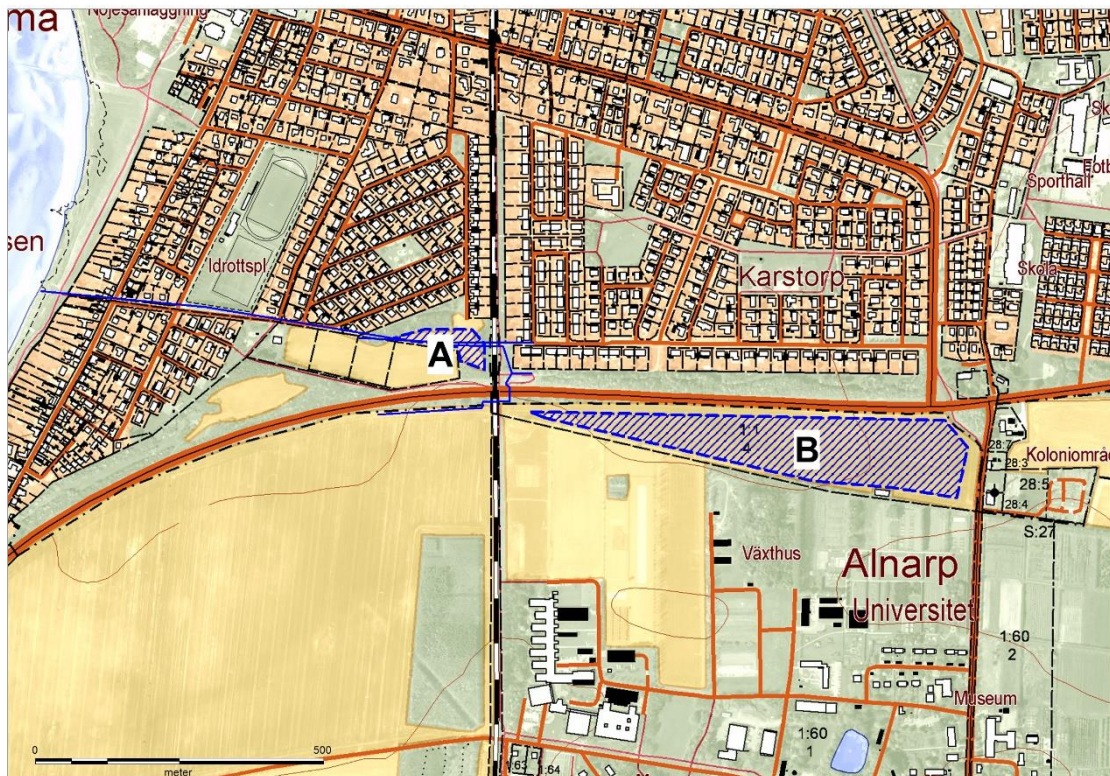


Figure 1. Assessed sites for retention basins or wetlands in the southern part of Lomma.

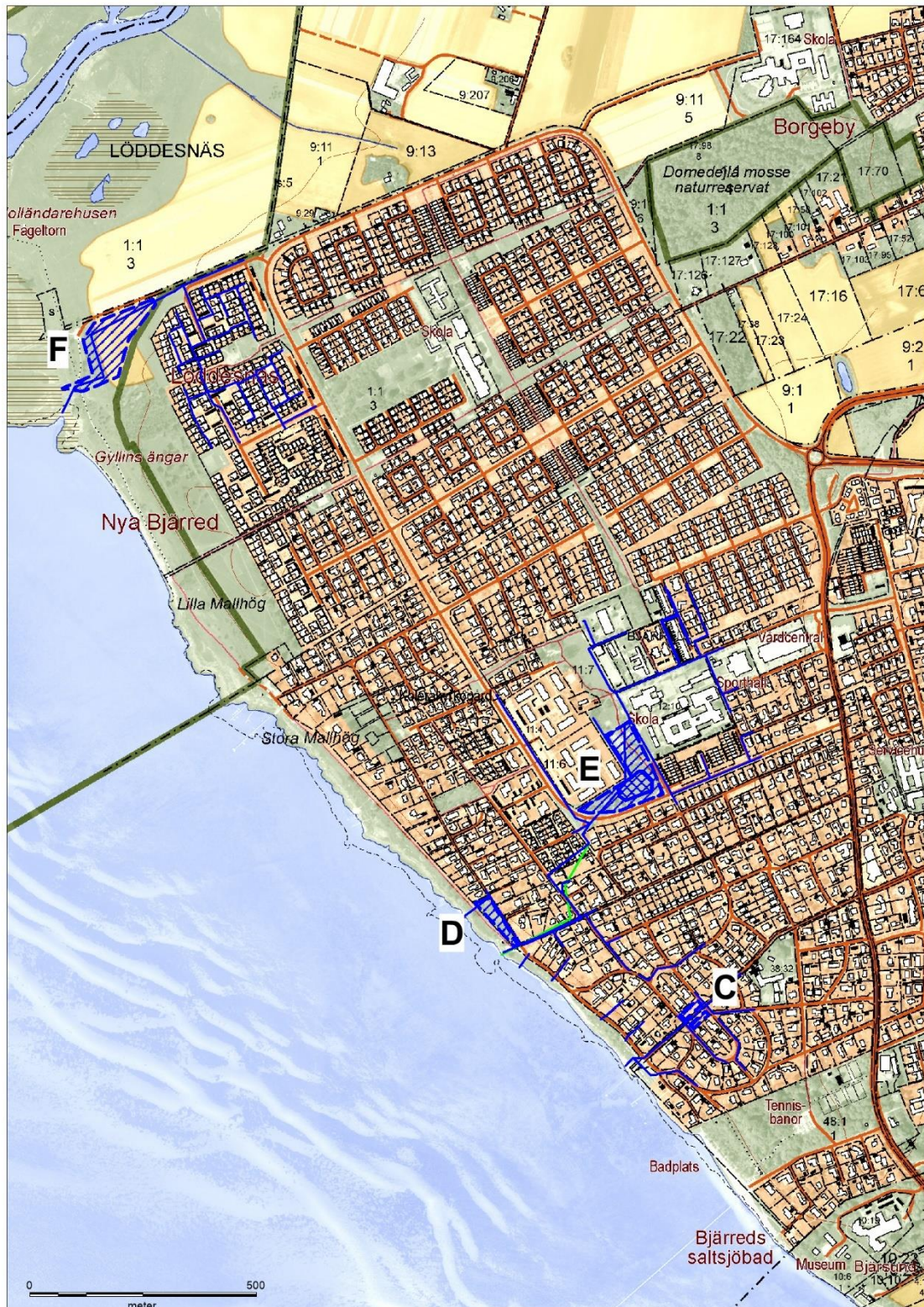


Figure 2. Assessed sites for retention basins or wetlands in Bjärred.

Method

Officials at the municipality has specified sites where they see need and potential for retention basins, wetlands or other open stormwater management solutions. Initially, the focus was site A which was designated in the application for EU project LIFE Coast Adapt. As mentioned above, other more suitable sites were identified, and Ekologigruppen has evaluated them. The assessments are based on the depths of the sewage system (data from VASYD), ground levels (Lantmäteriet's height data) and surface area available for construction. The latter has been assessed based on map material, aerial photographs and field observations.

Two of the sites are located on the southern edge of Lomma (Figure 1). Site A is a grass area on municipal land where stormwater pipes pass through the area. Site B, Alnarp 1:1, is a grass area south of area A, located on private land with passing drainage pipes that connect to the municipal stormwater network.

Four sites are located in, or adjacent to, Bjärred's urban area (Figure 2). Area C is located at the extension of the street Öresundsvägen, where a stormwater outlet empties into the sound Öresund. At this site, a parking space has been pointed out for investigation. Area D is located at the street Västra Kennelgatan, where a stormwater outlet empties into the sound Öresund. The stormwater pipe passes the short side of an elongated park area. The same stormwater system is connected to upstream pipes which run through, the park and residential area Bjärehov. The possibility of open stormwater management has been assessed at this site (area E). Area F is located by the Löddesnäs nature reserve, where a stormwater pipe merges into an open ditch that empties into the sound Öresund, just south of the reed area at the mouth of the river Löddeå.

The sites are shown in Figures 1 to 7 and the assessments in Table 1.

Assessment result

A. Retention basin in Lomma

Site description

The specified area is located on municipal land (Figure 3). The area is delimited by property boundaries, pipes (stormwater, drinking water and wastewater) and electricity/signal cables (Figure 3). There is also a spontaneously formed walkway south of the street Nyhemsgatan towards the cycle path

Assessment

The feasibility of constructing a retention basin or wetland at this site is poor. Although seemingly good with an available open ground and large stormwater pipes it turned out that it was not. After investigating the prerequisites, it became evident that the combination of deep lying stormwater pipes and a limited available area would result in too steep slopes and a small effective wet area small. The benefit for stormwater purification and retention of stormwater is thus limited. The recreational value is also not optimal with this design, due to the steep slopes. Regarding the slopes, there are also safety aspects to take into account (see below).

Positive	Negative
Strategic location for stormwater retention basin or wetland. A major part of the area is not used today	Small obtainable area Deep-lying pipes Interfering pipes and cables - telecommunications, electricity, signal, wastewater, drinking water

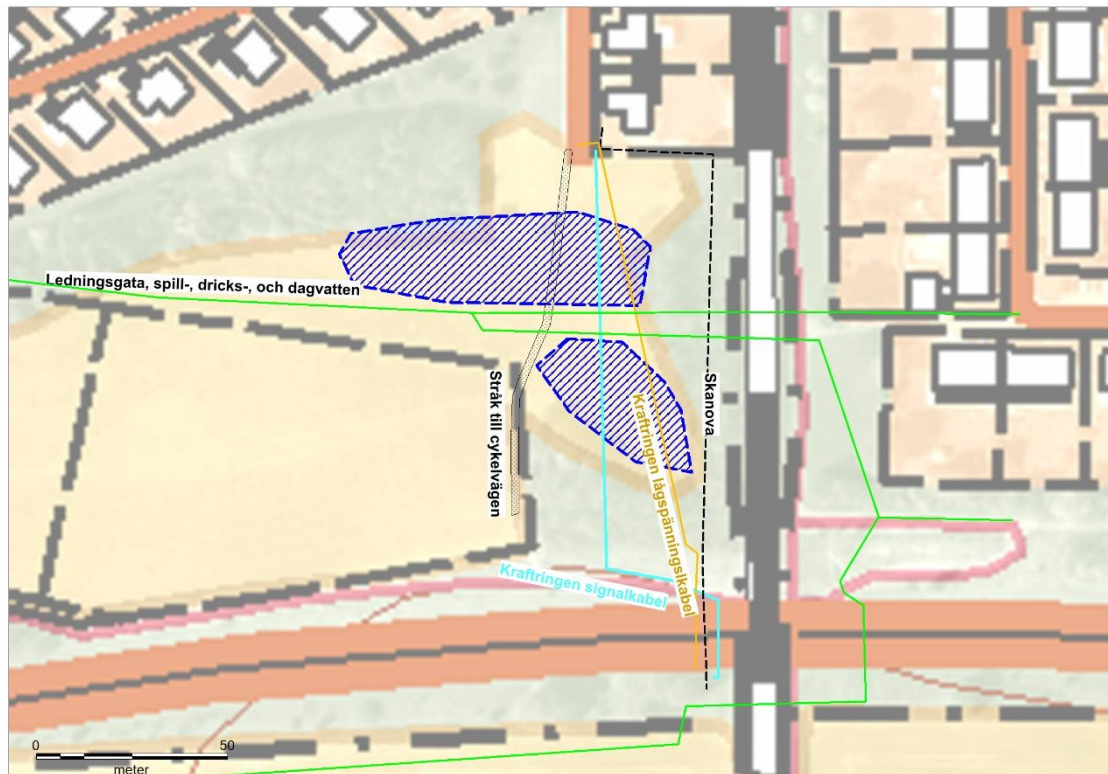


Figure 3. Area A, south of Lomma urban area. Stormwater pipe (green line), telecommunication (black line), Kraftringen signal cable (blue line) low voltage cable (brown line).

B. Retention basin in Alnarp

Site description

The specified area is located south of Lomma urban area. Stormwater pipes connect to the stormwater system just upstream of area A (Figure 1). Both the property and the pipe network are owned by SLU and not available for the municipality to utilize. No further investigations have been carried out.

C. Stormwater outlet at Öresundsvägen

Site description

A stormwater pipe runs parallel to the street Öresundsvägen and ends at Öresund's shore in the street extension (Figure 4). The only area along the pipe that does not constitute an estate or a street, and which has been pointed out by the officials at the municipality, is a parking area of approximately 0.07 hectares 170 m upstream of the outlet in the sound Öresund, and a later identified green area of approximately 0.05 hectares on the opposite side of the street Öresundsvägen. The stormwater pipe has a diameter of 400 mm and an invert elevation that lies more than 2 m below the ground surface.



Figure 4. Area C, at the street Öresundsvägen, Bjärred. Stormwater system (green line).

Assessment

The feasibility of constructing a retention basin or wetland at this site is poor. Since the available area for construction is small and the stormwater pipes invert elevation is deep in relation to the ground surface, the slopes of the basin will be steep and the effective wet area small, it not possible to construct a basin that meet the general design criteria which require flat side slopes.

Positive	Negative
Strategic location for stormwater retention basin or wetland	Small areas Deep-lying pipes Conflict with other needs – parking area, green area

D. Stormwater at Kennelvägen – outlet location

Site description

A stormwater pipe with a dimension of 800 mm runs through the area with an invert elevation between 1.6 and 2 m below ground level. The only possible area for open stormwater management is a park with an area of about 0.3 hectares which is located parallel to the shore between the streets Strandpromenaden and Norra Villavägen (Figure 5). The park is elongated with a width between 17 and 40 m. The park has an average ground level of about 3.90 masl and the larger stormwater pipe where it passes the park has an invert elevation of about 1.90.



Figure 5. Area D, the street Kennelvägen, Bjärred. Stormwater system (green line).

Assessment

The feasibility of constructing a retention basin or wetland at this site is poor. The available area is too small to accommodate a protective distance to the street Strand promenaden and Norra Villavägen, as well as meeting general design criteria of flat slopes of maximum 1:4 and a reasonable large bottom area. A smaller stormwater pipe (160 mm) empties into the sound Öresund north of the park, but due to its small size, the need for measures here is minimal. Construction of a wetland or retention basin at this site would also affect existing public land.

Positive	Negative
Strategic location for stormwater retention basin or wetland	Small obtainable area Deep-lying pipes Conflict with other needs – park area

E. Stormwater outlet at Kennelvägen – location Bjärehovskolan

Site description

Stormwater pipes pass through park areas around schools, sport centre and estate area in Bjärehov in central Bjärred (Figure 6). Pipes included in *Flädie drainage association of 1934* have previously passed through the area. The depth of stormwater pipes varies with invert elevation from 1.7 m below ground surface to more than 4 m below ground surface. The most suitable place for open stormwater management thus, seems to be in the southern part of the area, where the stormwater system has larger dimensions (1000 mm) and is not located too deep. Here is a park area of about 1.5 ha consisting of lawns, shrubberies, playgrounds, dog rest area, skate park and walking/cycling paths. Stormwater measures are possible here but strongly interfere with the functions that the park has today. Here, for example, there are several paths between the residential area and the school/sport centre.

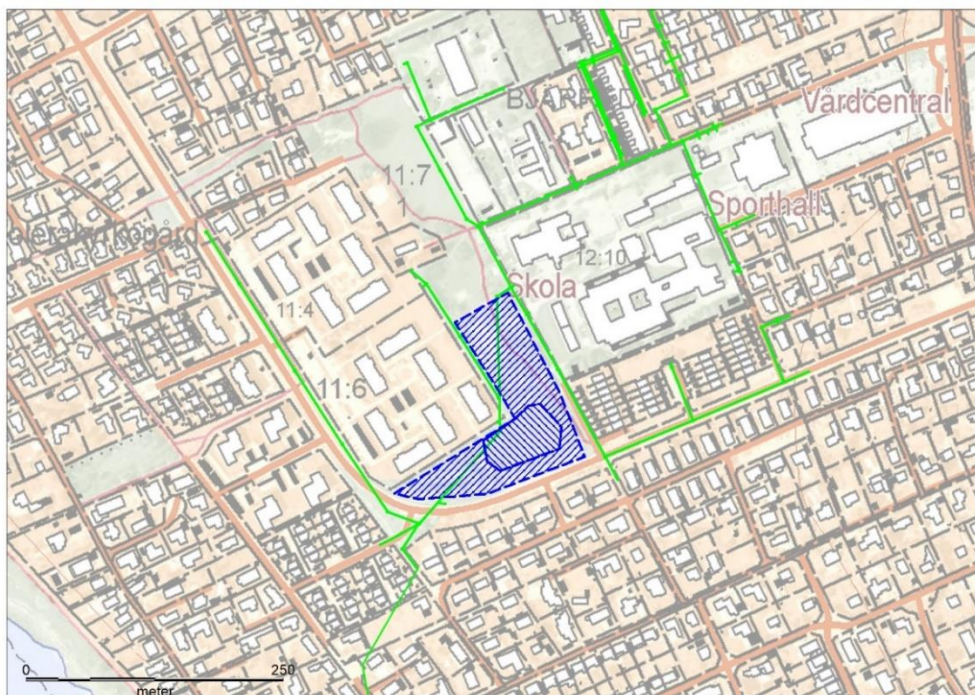


Figure 6. Area E, school area at Bjärehov, Bjärred. Stormwater system (green line).

Assessment

The area's average ground level is approx. 6.9 masl, which means an average excavation depth of approx. 2 m to reach the invert elevation of the stormwater pipes, and a slope length of 8 m on each side of the potential basin given a slope of 1: 4 (which is the limit for what is recommended by VASYD). It is possible to construct a retention basin or wetland in this area, but doubtful given the function of the green area today. The safety aspect is also important to consider in this area, where many children are staying, and slopes should possibly be designed even flatter than 1: 4, which means that more ground surface needed. It is possible to construct a smaller retention basin or wetland, but it should then be considered that a large part of the retention basin or wetland will

consist of slopes, slopes that do not provide any function with regards to flow regulation. If measures are desired, a smaller pond can be constructed (0.3 ha in figure 7), but with recommended slopes that meet the design criteria the basin would be very small. Furthermore, it would affect park areas that are important for outdoor activities.

Positive	Negative
Strategic location for stormwater retention basin or wetland	Conflict with other needs – park area

F. Stormwater outlet at Löddesnäs

Site description

A stormwater pipe, that drains residential areas in northeastern part of Bjärred, empties into a ditch at the nature reserve of Löddeåns mynning (Figure 7). The ditch has a length of about 250 m and leads out into the sound Öresund, in the southern part of the reed area at the mouth of the river Löddeån. Downstream of the stormwater pipes outlet, the ditch runs along a shrubbery before turning 90 degrees towards the shore. South of the ditch is a relatively newly constructed wetland with an area of between 0.1 and 0.2 hectares. The stormwater pipe has a diameter of 600 mm and is located with an invert level between 1.4 and 2 m below ground level. Along the stormwater pipe and ditch, the ground is lower, here it is possible to create retention basins or wetlands.

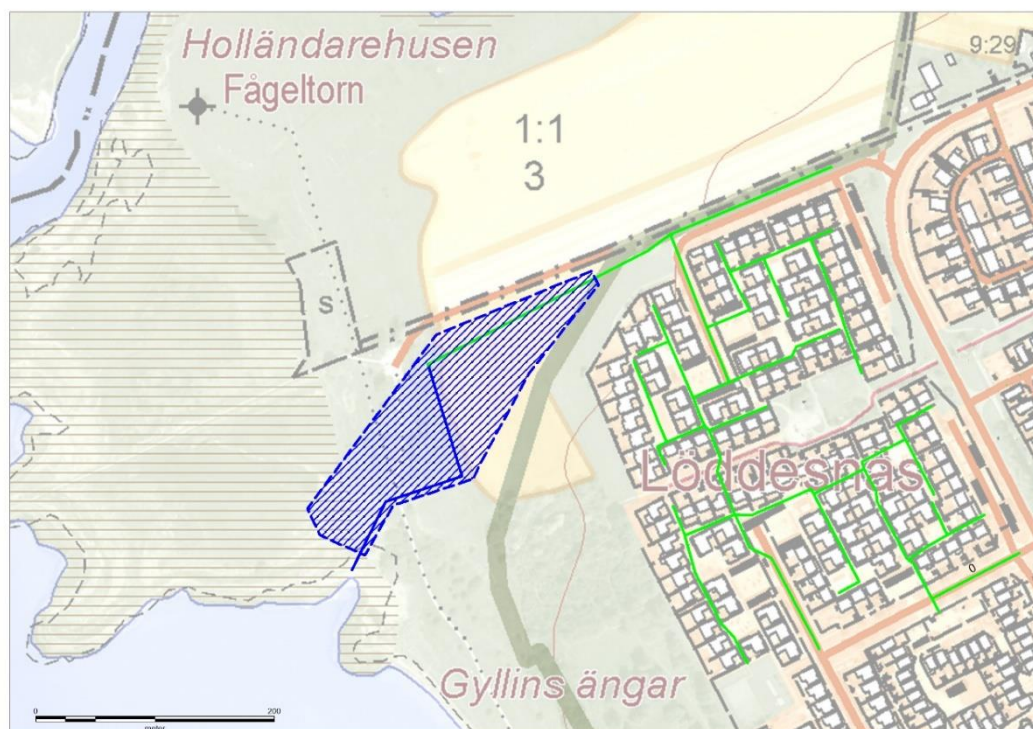


Figure 7. Area F, at Löddesnäs, Bjärred. Stormwater system (green line), ditch (blue line).

Assessment

At this site the prerequisites for a retention basin or wetland are good. Although the stormwater pipes are relatively deep, the large available area makes it possible to design a wetland with flat slopes, which is in line with the general design criteria. Storm water from an area of 15 hectares of streets, houses and gardens can be retained before emptying into the sound of Öresund. After discussions with officials at the municipality, the east part of the investigated area has been selected

as the main alternative and for further design of a retention basin or wetland (Appendix 1). The pros and cons of this alternative are discussed below (chapter Environmental benefits).

Positive	Negative
Strategic location for stormwater retention basin or wetland Available land Flows peaks of stormwater can be minimized Water can be purified before entering the sea Increases biodiversity in the area Increased recreational values	Legislative protection regarding, shore, biotopes and nature reserve

Summary assessment

The conditions for stormwater retention and purification at the specified sites varied (Table 1).

Table 1. Information about assessed sites and feasibilities regarding open stormwater management.

	Available/ specified area	Conflicting interests	Stormwater pipe depth (m below ground surface)	Technical prerequisites	Landowners
A. Lomma	0,06 + 0,14 ha	Footpath, sewage- and drinking water system, along with other cables in the ground.	0,8 - 2,2	Poor. Too small obtainable area and deep- laying pipes give steep slopes.	Municipality
B. Alnarp1:1	-	Private landowner	-	Unknown	SLU
C. Bjärred Öresundsvägen	0,07 + 0,05 ha	Parking + green area	> 2	Poor. Too small obtainable area and deep- laying pipes give steep slopes.	Municipality
D. Bjärred Västra Kennelvägen	0,3 ha	Park with short side towards the stormwater pipe.	1,6 - 2	Poor. Too small obtainable area and deep- laying pipes give steep slopes.	Municipality
E. Bjärred Bjärehov	0,3 ha *	Park area with many existing activities.	2	Poor. Too small obtainable area and deep- laying pipes give steep slopes.	Municipality
F. Löddesnäs	0,6 ha	Area protection (exemption from reserve regulations, biotope protection and shore protection required). The lease is unclear.	1,4 - 2	Good – Land areas available	Municipality

* refers to a location in the park that to a lesser extent interferes with outdoor activities.

Recommended site for stormwater wetland

Taken all aspects into account, the best site for construction of a stormwater retention basin or wetland, and where further planning and design has been carried out, is area F at Löddesnäs nature reserve north of Bjärred. Here, it is both relatively simple from a technical point of view and there are enough available land where a wetland not seem to conflict with other land uses. A preliminary design of a stormwater retention basin at this site is presented in Appendix 1. This document can be used as a basis for further internal discussions and can be sent to the County Administrative Board for legislative matters regarding water activities.

Other investigated sites

The assessed areas inside Lomma and Bjärred's urban areas (A, B, C, D, E) have proved to conflict with other interests and/or are too small for construction of stormwater retention basins or wetlands if design criteria regarding slopes are to be met.

Environmental benefits

The stormwater retention basin or wetland at Löddesnäs provides ecological services, such as purification of particles and nutrients and water flow detention. It should be pointed out, however, that during discussions within the project group, no information has emerged that the area would be particularly affected by flooding, neither upstream nor downstream of the current location of a suggested stormwater retention basin or wetland. To manage flow peaks and thereof related problems, it is important to work with upstream measures, retention near the source, since it is usually difficult to modify or alter existing stormwater pipes.

The ditch empties into the sound Öresund just south of a widespread reed area around the mouth of the river Löddeån (Figure 7). The reeds expansion in this area has increased heavily over the past 50 years and the outflow of nutrients and sludge from land sources via ditches and watercourses is an important contributor to this process. This processes can be observed when comparing aerial photos from different years (Figure 8). The proposed measure of constructing a stormwater retention basin or wetland is a step, although small, to counteract this, and it can also serve as a pedagogical example of how to work to counteract eutrophication. The measure is also a step towards creating a more natural water flow out from the ditch.

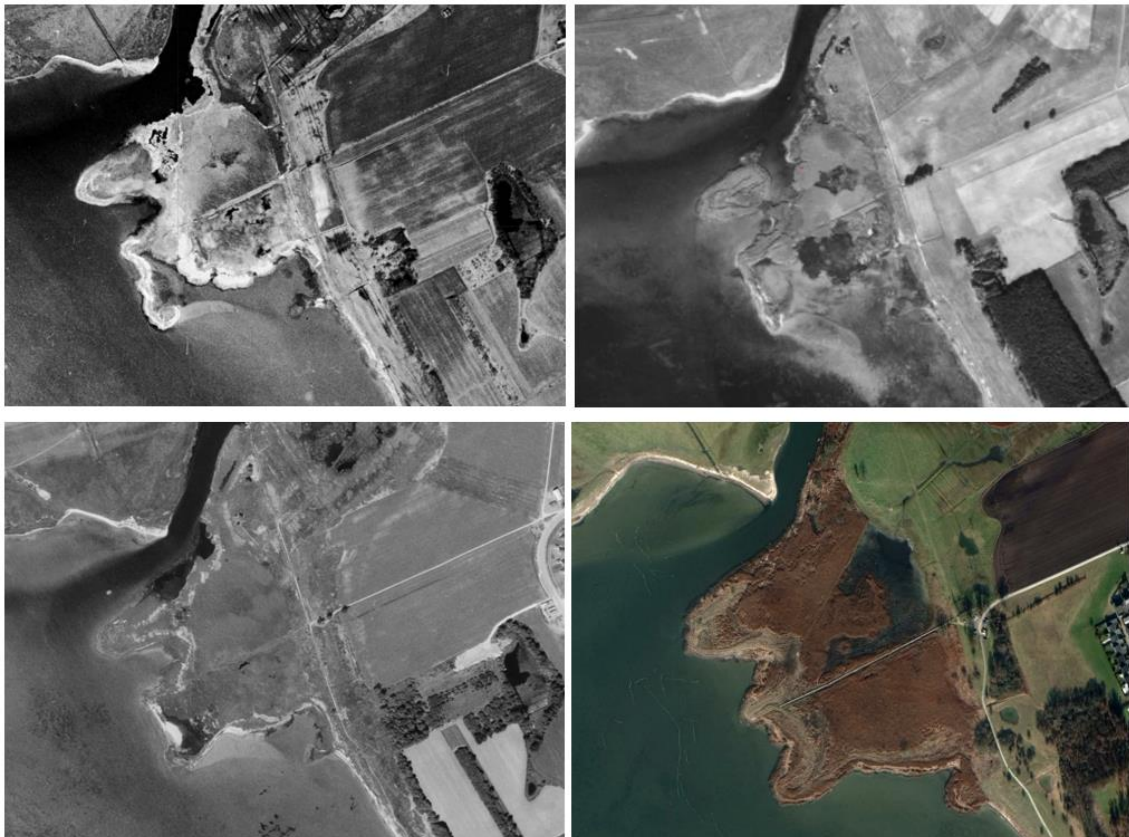


Figure 8. Aerial photos from 1940:s upper left, 1960:s upper right, 1970:s lower left, and 2019 lower right.

The stormwater retention basin or wetland also provides an addition to the area's already rich biodiversity and can also constitute a recreational environment for residents and visitors in the area.

Open stormwater management and safety aspects

VASYD follows guidelines for the design of new stormwater retention basins and wetlands, and according to these guidelines the slopes of a basin should not exceed 1:4. It is also recommended that the water depth 2 meters from the edge of the basin should be a maximum of 0.5 meters, and 1 meter out a maximum of 0.2 meters. Construction of terraces is a way to avoid personal injury if you slip down the slope. Another option is to build barriers of vegetation or rocks that stop people from slipping into the water.

Maintenance

An open stormwater solution requires monitoring and maintenance, which mainly applies to inlets and outlets. The management of slopes and surrounding areas depends on what needs are to be met, and what ambition and size of the budget of the operating departments. VASYD has announced that it undertakes to take care of inlets and outlets, provided that these are accessible. Surrounding area, slopes, terrace, and bottoms have been proposed to be managed by Lomma municipality.