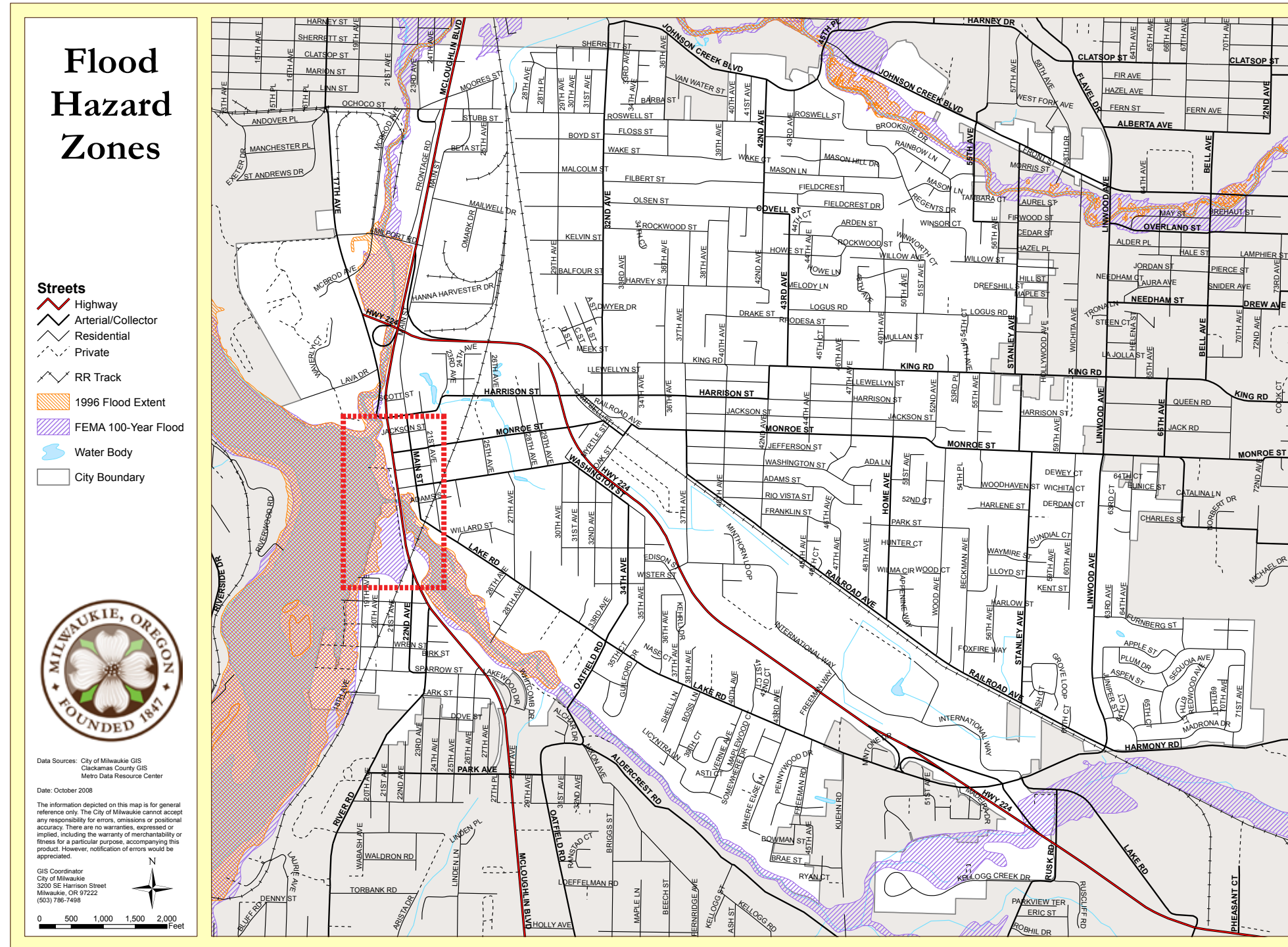
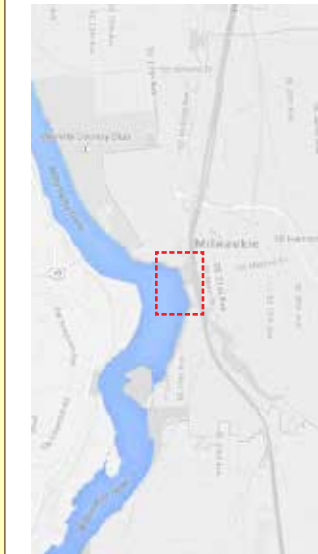


NATURAL ENVIRONMENT: WATER

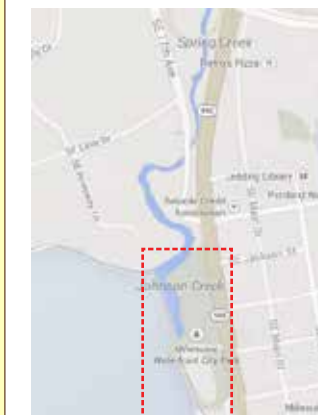
The Three Rivers and the 100-year Flood



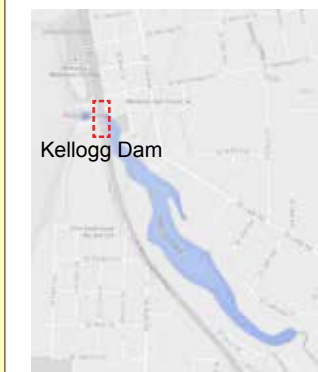
Rich with water resource, the City of Milwaukie is covered with three major rivers.



Willamette River, the major river way that used to transport logs in the early logging industry, originated from South going through major cities like Eugene, Corvallis, Milwaukie, and Portland. Connecting to Columbia River on the North border of State of Washington and State of Oregon. It is also a major migration for local Salmon population.



Johnson Creek, a smaller creek through the Northern Milwaukie. Due to its frequent flood, the city has been improvising flood treatments such as controlling stormwater run off, stream meanders, reducing erosion, replacing impervious surfaces, and protecting riparian buffers.



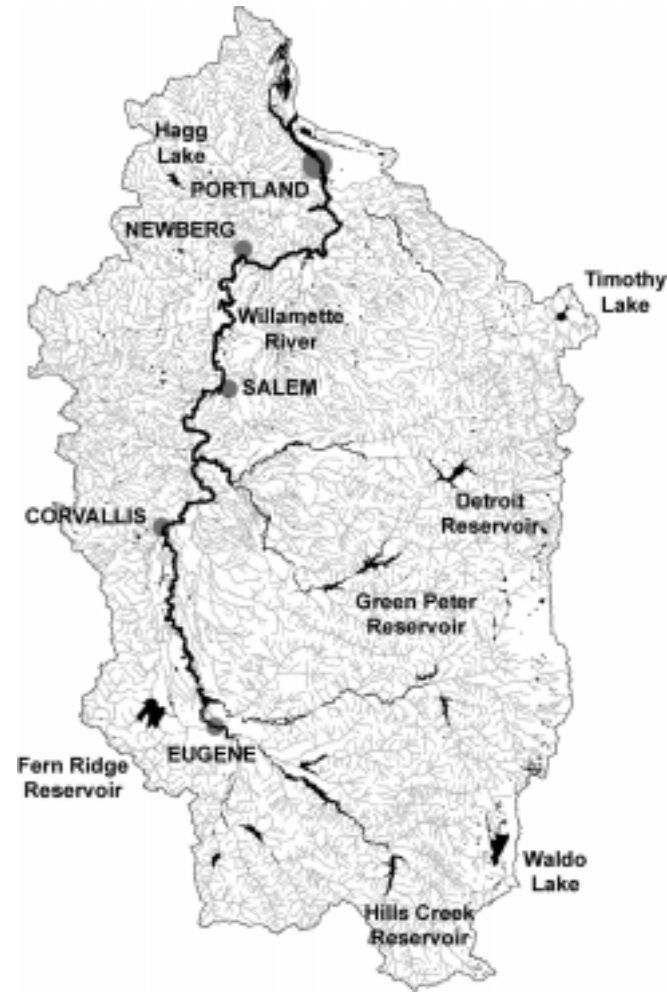
Kellogg Creek, a smaller creek through the Southern Milwaukie. Kellogg Lake's appearance is created by Kellogg Dam locate at the mouth of Kellogg Creek. The City of Milwaukie is planning to remove the dam to encourage Coho and other salmon's migration.

City of Milwaukie: <http://www.milwaukieoregon.gov/gis/hazard-maps>
 Johnson Creek: http://en.wikipedia.org/wiki/Johnson_Creek_%28Willamette_River%29
 Kellogg Creek: http://en.wikipedia.org/wiki/Kellogg_Creek
 Wei-Cheng Chang



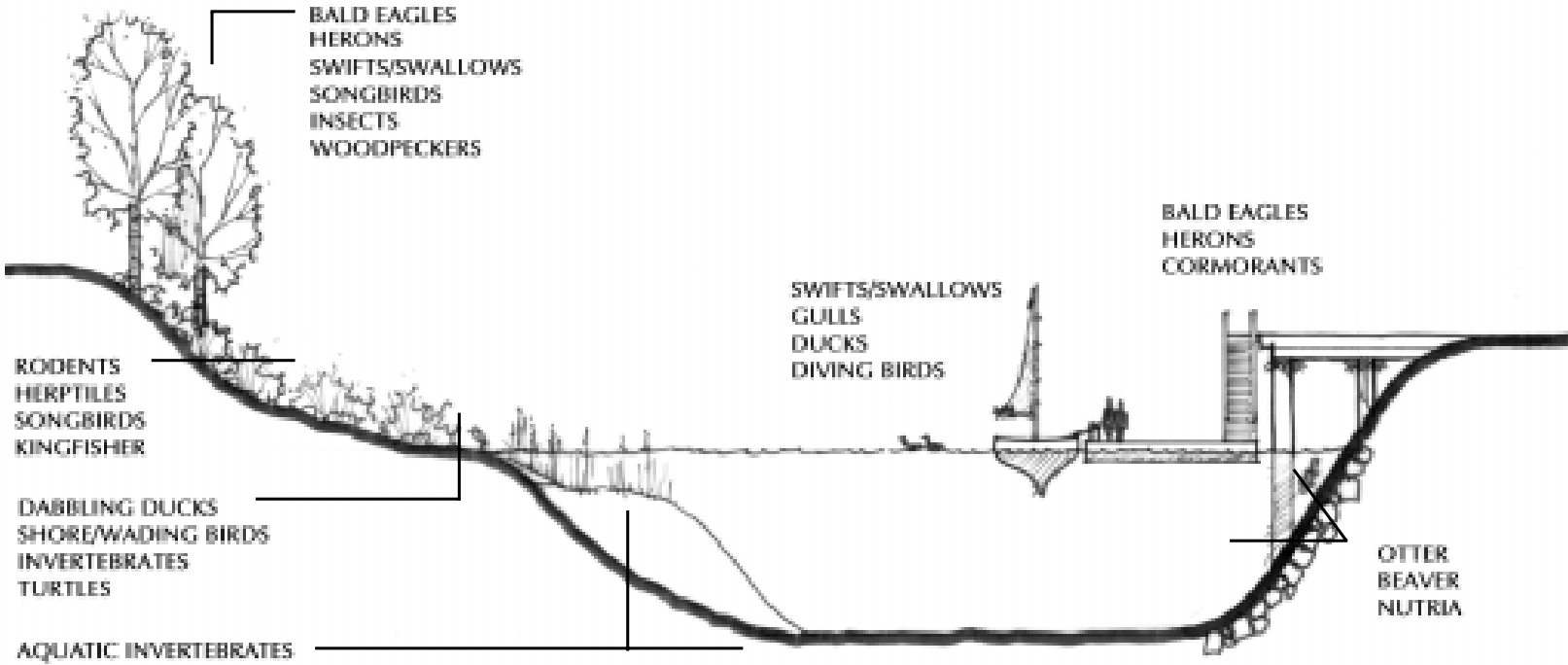
NATURAL ENVIRONMENT: WATER

Willamette River Water Treatment Plan: Vegetation



Wildlife Habitat

Riverbank designs can provide opportunities to create or enhance habitat for aquatic and terrestrial wildlife species.

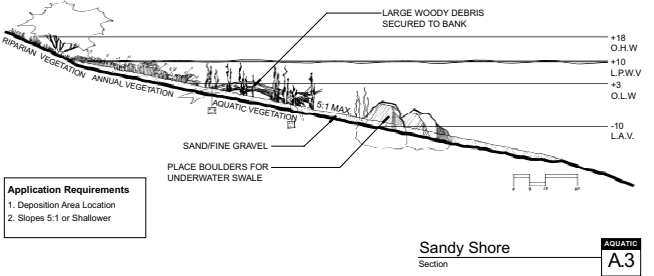


*Wildlife Habitat Areas
(Generalized River Cross-Section)*

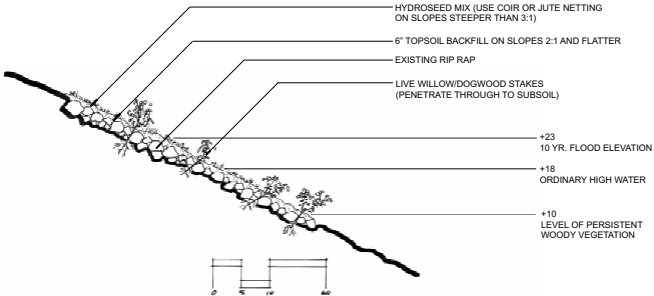
Wildlife Habitat (Notebook pg 11)

The design notebook includes many important design factors along the river edge. The most important is to preserve the riverbank design that provides opportunities for both aquatic and terrestrial habitat.

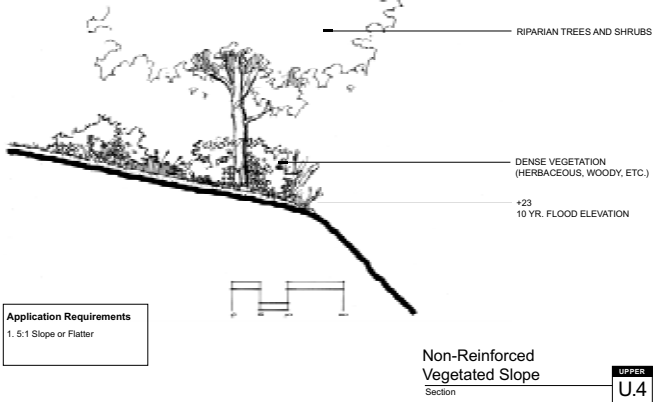
Willamette River (Notebook pg 3)
With the watershed area of about 11,460 square miles and 13 major tributaries, Willamette River is an important waterway connection for Western Oregon. Due to its important presence, water treatment and environment preservation along the riverside is an important focus for the State of Oregon.



Sandy Shore (Notebook pg 36)



Planting Existing Rip Rap (Notebook pg 44)

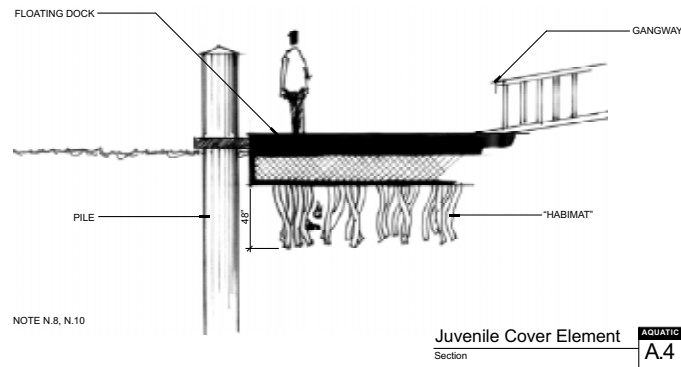


Non-Reinforced Vegetated Slope (Notebook pg 45)



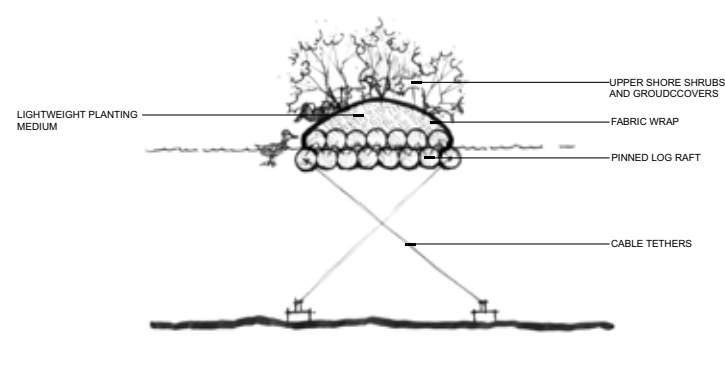
NATURAL ENVIRONMENT: WATER

Willamette River Water Treatment Plan: Architecture



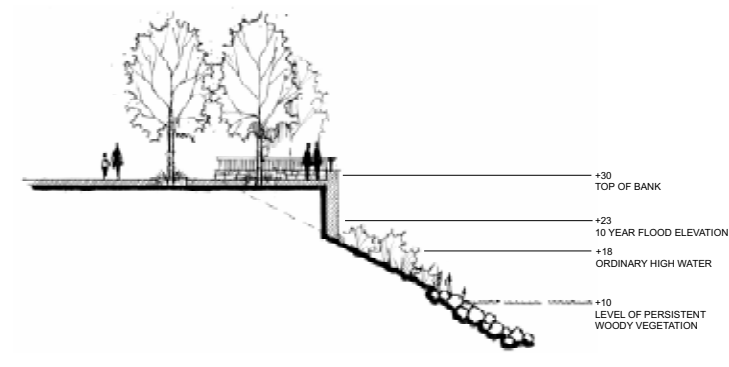
Juvenile Cover Element
Section
AQUATIC
A.4

Juvenile Cover Element (Notebook pg 37)



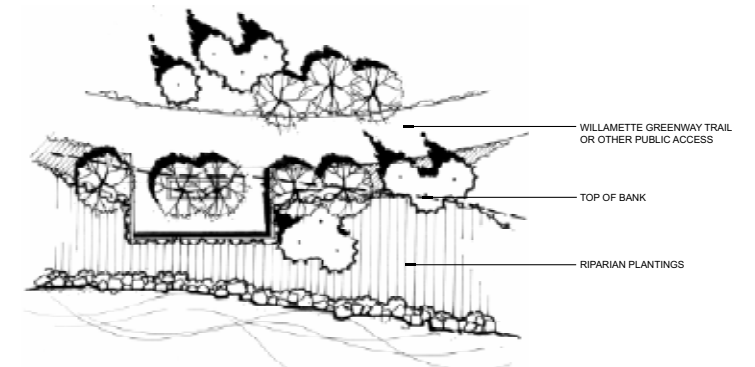
Floating Planted Breakwater
Section
AQUATIC
A.7

Floating Planted Breakwater (Notebook pg 40)



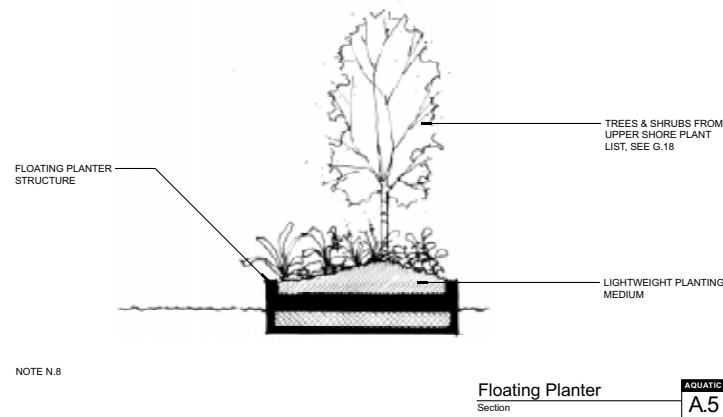
Overlook Options: Retaining Wall
Section
UPPER
U.6

Overlook Options: Retaining Wall (Notebook pg 47)



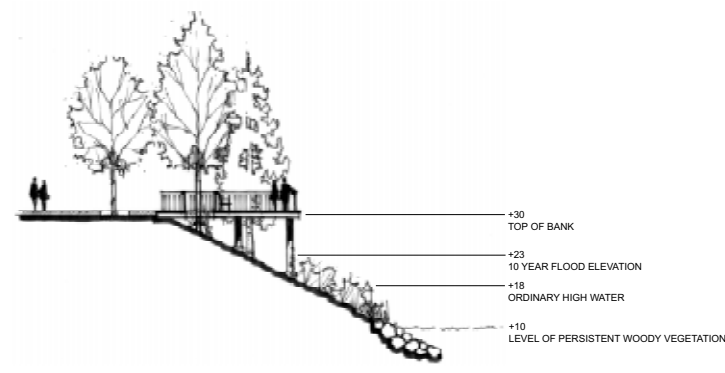
Overlook Options: General
Plan
UPPER
U.8

Overlook Options: General (Notebook pg 49)



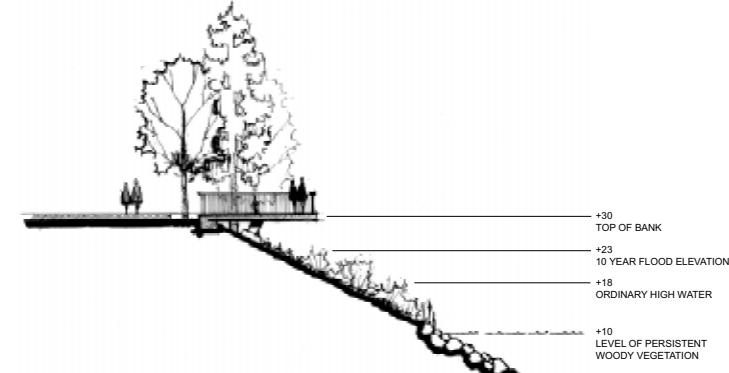
Floating Planter
Section
AQUATIC
A.5

Floating Planter (Notebook pg 38)



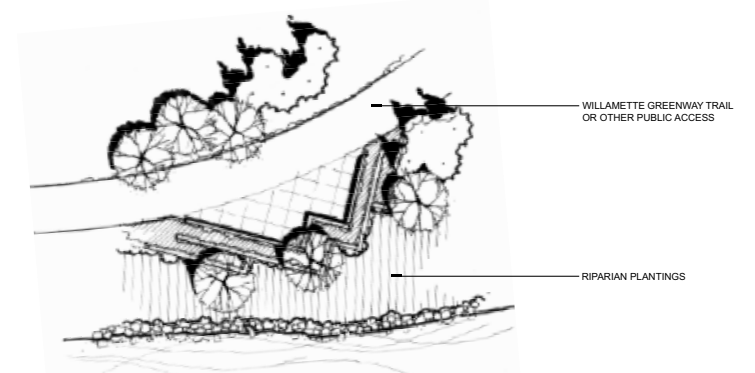
Overlook Options: Pile Supported
Section
UPPER
U.5

Overlook Options: Pile Supported (Notebook pg 46)



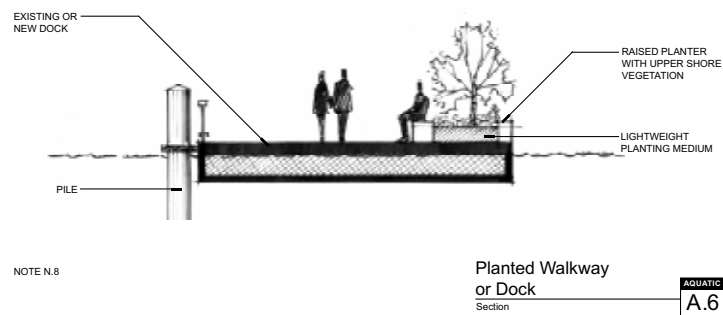
Overlook Options: Cantilever
Section
UPPER
U.7

Overlook Options: Cantilever (Notebook pg 48)



Overlook Options: Stepped
Plan
UPPER
U.9

Overlook Options: Stepped (Notebook pg 50)



Planted Walkway or Dock
Section
AQUATIC
A.6

Floating Planter (Notebook pg 39)

Willamette River Design Notebook: <https://scholarsbank.uoregon.edu/xmlui/handle/1794/8601>