

3.0 ENVIRONMENT

Effective land use planning necessitates a comprehensive understanding of the natural features, physical resources and environmental limitations of the land. Appropriate uses for land are determined through an inventory of the soils, slopes, wetlands and vegetation.

Geology

Independence lies within two general landscape units, as identified in "Landscapes of Hennepin County" published by the Hennepin County Soil Conservation Service in 1976. The western central part, lying west of County Road 92, is part of the Corcoran Till Plain and is the best farmland in the community. The land is gently rolling with wet basins, low knolls, and ridges, and is primarily a utilitarian landscape rather than a scenic one. According to the report, it is a land formation "made for agriculture in a world that needs this land". Many of the soils in this landscape unit have a high seasonal water table, hence are unsuitable for residential developments utilizing conventional on-site sewage disposal systems.

The balance of the City is in the landscape unit known as the Loretto Highlands, a landscape with more relief containing soils with more clay content. Steep slopes, deep marshes and poorly drained upland flats dominate the landscape. Although suited for agriculture, they pose problems for efficient utilization of the land. Farm managers must use effective planning to realize a profitable use for this land.

Soils

Independence has three general identifiable soil characteristics.

1. The Erin-Kilkenny-Peat Association is located in the central and northwest portion of the City and occupies the largest area of the three associations. This association is characterized by rolling to hilly relief with major soil conditions consisting of clay loam, heavy clay and peat. The clay soils are found on gentle to steep slopes, are well drained and generally suited for urban development. Heavy clay is, for the most part, a subsoil condition and is also conducive for development. Peat soils located in low-lying areas have high moisture capacity and are generally poorly drained. Peat soils are a limiting factor for development.
2. The Lester-Hamel-Peat Association, located in the southern and southwestern portions of Independence, is characterized by undulating relief with major soil conditions consisting of black loam, clay loam and peat. The black and clay loams are suited for urban development.
3. The third association, Hayden-Cordova-Peat, is located in the northwest part of the City and is the smallest in area of the three groups. The terrain is basically undulating to rolling. The soil conditions generally consist of brown loam, clay loam and light clay loam. Many of the soils in this association are poorly drained, and wet areas are often intermingled closely with

better-drained soils. The sporadic wetness and poor drainage of the soil must be a consideration for any development. Peat soils severely restrict development because of their wetness and location.

On the soils map (Figure 2), in addition to the three soil associations, a breakdown has been given as to the suitability of the land for development. The categories are broken down into four groups: marsh, peat, loam and clay loam. Basically marsh is not developable, while peat areas offer very limited opportunities due to lowness, wetness, and close proximity to marshes. Certain areas in the loam category have poor drainage and relatively steep slopes could hinder development of areas with clay loam.

Suitability

The soils of a particular site are important in determining which uses are compatible with the environment. Soil fertility, permeability, stability and so on, limit certain types of development or use. This soil assessment is only a preliminary overview, not site specific. It is an approximation of area soil limitations and should function to guide general planning determinations.

Soil suitability was based according to urban land use characteristics. The Soil Conservation Service inventory rated soils according to similarity of limitation. These ratings were based on:

| | | |
|-----------------------------|------------------------|-----------------------------------|
| Slope steepness | Permeability | Corrosivity of steel and concrete |
| Depth to water table | Erosion hazard | |
| Soil strength and stability | Frost action potential | |

Steep Slopes

Altering land with slopes in excess of 12% is both environmentally hazardous and very expensive. Due to their shallow soils, steep slopes have a greatly reduced capacity for water retention. Alteration can increase the already rapid runoff to produce sheet erosion, damaging the land and causing subsequent sedimentation to lakes and streams. When steep slope land is converted to urban use, runoff increases by a factor of 10 to 100 times. Increased runoff causes "flashy" streams and flooding problems in lower areas.

The general relief of Independence can be described as gently rolling. This is especially true in the central and western area. This type of terrain has a slope of 5-20%. Those areas approaching 12% slope are susceptible to erosion, especially during construction. Areas that contain a 0-5% slope are the marshlands and their perimeters. As noted before, wetlands are located throughout the community.

There are a few isolated locations in the City that have slopes of over 20%. One such area is near the City's southern boundary, east of Lyndale. Another location is in an area that runs between Lakes Independence and Sarah. These slopes should not be developed, as they are very susceptible to severe erosion damage. With the large amounts of rolling to level land in Independence, the slope of the terrain cannot be considered as a major factor that will limit development.

Figure 2: Soils Map

Permeability

Permeability is the capability of soils that allows water to pass through them. Excessively coarse soils, soils with bedrock close to the surface, or soils with a high water table are severely limited for many types of development. These soils are subject to pollution problems when used for on-site sewage disposal systems. Coarse soils percolate too rapidly, tight soils too slowly. Development can increase flood hazard on soils with low permeability. These lands are also susceptible to excessive shrink-swell alterations with changes in moisture content.

Flood Hazard

Flood plains and wetlands are generally recognized as unwise to develop for any urban use if it restricts the flow of floodwater or hinders the capacity of soils to absorb and store runoff. The costs of altering water recharge areas and spaces subject to periodic flooding have become very apparent. Flood-prone soils are better used as recreation and open space areas.

Water Resources

Water quality and supply are primary elements used to determine the location and amount of development appropriate for an area. The abundance of local lakes has stimulated the current demand for housing development as well as sustaining local and regional recreation facilities. Water can provide transportation, create recreational opportunities, supply wildlife habitat, assimilate sewage effluent, and of course, replenish well water facilities.

Historically residential development has altered natural drainage routes, destroying the land's ability to store and retain water. Wetlands have been filled or drained and paved and runoff and erosion problems have developed. Subsequent flooding and sedimentation occurs in drainageways, necessitating costly repairs or control devices to retard overflow and pollution hazards. Laws intending to preserve wetlands including the State Wetland Conservation Act make the filling of wetlands much more difficult.

Responsible water resource management by local government is necessary to protect the community's natural systems. This is being accomplished by implementation of the City's Local Surface Water Management Plan in cooperation with the Minnehaha Creek Watershed District and the Pioneer Sarah Watershed Management Commission. Utilizing appropriate development in accordance with land capabilities is the first step in effectively ensuring future public health and safety.

Watersheds and Drainage Patterns

The City of Independence is within the jurisdiction of the Pioneer-Sarah Creek Watershed Management Commission (PSCWMC) and the Minnehaha Creek Watershed District (MCWD). In general, water from the PSCWMC drains west to the Crow River then north to the Mississippi River and water from the MCWD drains to Lake Minnetonka and Minnehaha Creek then east to the Mississippi River.

With the existing creeks and ditches in place, the drainage patterns for the City of Independence are fairly well defined. Four major watersheds were identified for Independence; they include Painter Creek, Pioneer Creek, Sarah Creek and South Fork Crow River. These four watersheds and the Watershed District and Watershed Management Commission boundaries are shown on Figure 3.

The Painter Creek Watershed is located in the southeast corner of Independence. This is the only watershed in Independence under the jurisdiction of the MCWD. The drainage area includes parts of Independence, Medina, Orono, and Minnetrista. The drainage flows from Katrina Lake in Medina to the west and south to Jennings Bay in Lake Minnetonka.

The Pioneer Creek Watershed is located in central Independence. It drains from Lake Independence to the west and south to Ox Yoke Lake in Minnetrista. The drainage area includes parts of Independence and Medina. Approximately 65% of the City drains to Pioneer Creek. Major water bodies in the watershed include Lake Independence and Lake Robina.

The Sarah Creek Watershed is located in northeastern Independence and includes drainage from Greenfield, Corcoran, Medina, and Independence. The general flow is from east to west through Lake Sarah to the Crow River. Lake Sarah is the only major water body in this watershed.

The South Fork Crow River Watershed is located in western and northwestern Independence. The drainage flows from east to west to the Crow River. Major water bodies in this watershed include Lake Rebecca and Haughey Lake.

MnDNR Protected Waters, Wetlands and Water Courses

The Minnesota Department of Natural Resources (MnDNR) has designated certain waters of the state as public waters (Minn. Rules 6115.1060). MnDNR “Protected Waters and Wetlands” maps show public waters within the City. A MnDNR permit is required for work within a designated public water.

Figure 4 shows the protected waters, wetlands, and water courses located in the City. Sections below summarize the protected waters, wetlands and watercourses in Independence.

Figure 3: Watershed Map

Figure 4: Protected Waters Map

1. Protected Waters

There are 12 protected waters, identified with a number and the letter “P”, in the City of Independence. With the exception of Lake Independence and Lake Sarah, all of these basins are relatively shallow, ranging from partially-drained wetland areas to moderately shallow lakes (average depth less than 10 feet). Table 16 lists the protected waters within Independence.

**Table 16
Independence Protected Waters**

| I.D. No. | Name | Twp./Range | Section(s) | Local Government Unit | Area (acres) | DNR Shoreland Classification¹ | OHW |
|-----------------|-------------------|-------------------|-------------------|------------------------------|---------------------|---|------------|
| 27-176P | Lake Independence | 118/23,24 | 7,12,13,18,19,24 | PSCWMC | 1024 | RD | 956.8 |
| 27-178P | Ox Yoke lake | 117,118/24 | 5,6,31,32 | PSCWMC | 325 | NE | 915.4 |
| 27-188P | Lake Robina | 118/24 | 8,9,16,17 | PSCWMC | 395 | RD | N/A |
| 27-189P | Lake Irene | 118/24 | 22 | PSCWMC | 27 | RD | N/A |
| 27-191P | Lake Sarah | 118,119/24 | 1,2,3,34,35 | PSCWMC | 635 | RD | 979.9 |
| 27-192P | Lake Rebecca | 118,119/24 | 5,31,32 | PSCWMC | 260 | NE | N/A |
| 27-379P | Unnamed | 118,119/24 | 6/31 | PSCWMC | 15 | NR | N/A |
| 27-380P | Unnamed | 118/24 | 6 | PSCWMC | 24 | NR | N/A |
| 27-381P | Unnamed | 118/24 | 5 | PSCWMC | 9 | NR | N/A |
| 27-411P | Unnamed | 118,119/24 | 6,31 | PSCWMC | 81 | NR | N/A |
| 27-412P | Unnamed | 118/24 | 6 | PSCWMC | 32 | NR | N/A |
| 27-926P | Unnamed | 117,118/24 | 4,5,32,33 | PSCWMC | 245 | NR | N/A |

¹ NE = Natural Environment, RD = Recreational Development, GD = General Development, NR = Not regulated by DNR shoreland rules.

2. Protected Wetlands

In addition to the 12 protected waters, there are 40 other basins within the Independence area that have been inventoried by MnDNR. All of these basins are known as public waters wetlands (M.S., section 103G.005, subdivision 18) and therefore their beds along with the lakes are subject to regulatory authority of the MnDNR.

Public waters wetlands means all types 3, 4 and 5 wetlands, as defined in United States Fish and Wildlife Service Circular 39 (USDI, 1971), not included within the definition of public waters, that are ten or more acres in size in unincorporated areas, or 2.5 acres in incorporated areas. Table 17 lists the public waters wetlands subject to MnDNR jurisdiction.

Table 17 Independence Protected Waters Wetlands

| I.D. No. | Name | Twp./Range | Section(s) | Local Govt. Unit | Area (acres) | DNRShoreland¹ Classification | OHW |
|-----------------|--------------|-------------------|-------------------|-------------------------|---------------------|--|------------|
| 27-187W | Haughey Lake | 118/24 | 7,8 | PSCWMC | 51 | NE | 953.2 |
| 27-362W | Unnamed | 118,119/24 | 1,36 | PSCWMC | 17 | NR | N/A |
| 27-367W | Unnamed | 118/24 | 1 | PSCWMC | 12 | NR | N/A |
| 27-368W | Unnamed | 118/24 | 1 | PSCWMC | 7 | NR | N/A |
| 27-369W | Unnamed | 118/24 | 1 | PSCWMC | 5 | NR | N/A |
| 27-373W | Unnamed | 118/24 | 12 | PSCWMC | 11 | NR | N/A |
| 27-374W | Unnamed | 118/24 | 2,11 | PSCWMC | 20 | NR | N/A |
| 27-375W | Unnamed | 118/24 | 2 | PSCWMC | 3 | NR | N/A |
| 27-376W | Unnamed | 118/24 | 2 | PSCWMC | 10 | NR | N/A |
| 27-377W | Unnamed | 118/24 | 2 | PSCWMC | 10 | NR | N/A |
| 27-378W | Unnamed | 118/24 | 2 | PSCWMC | 68 | NR | N/A |
| 27-382W | Unnamed | 118/24 | 4 | PSCWMC | 30 | NR | N/A |
| 27-383W | Unnamed | 118/24 | 8 | PSCWMC | 7 | NR | N/A |
| 27-385W | Unnamed | 118/24 | 16,21 | PSCWMC | 47 | NR | N/A |
| 27-386W | Unnamed | 118/24 | 16 | PSCWMC | 6 | NR | N/A |
| 27-387W | Unnamed | 118/24 | 16 | PSCWMC | 3 | NR | N/A |
| 27-388W | Unnamed | 118/24 | 21 | PSCWMC | 18 | NR | N/A |
| 27-389W | Unnamed | 118/24 | 21 | PSCWMC | 5 | NR | N/A |
| 27-391W | Unnamed | 118/24 | 22 | PSCWMC | 4 | NR | N/A |
| 27-392W | Unnamed | 118/24 | 22,27 | PSCWMC | 43 | NR | N/A |
| 27-393W | Unnamed | 118/24 | 23,24 | PSCWMC | 278 | NR | N/A |
| 27-394W | Unnamed | 118/24 | 13,14,23,24 | PSCWMC | 63 | NR | N/A |
| 27-395W | Unnamed | 118/24 | 24 | PSCWMC | 4 | NR | N/A |
| 27-396W | Unnamed | 118/24 | 25 | MCWD | 29 | NR | N/A |
| 27-397W | Unnamed | 118/24 | 10 | PSCWMC | 8 | NR | N/A |
| 27-398W | Unnamed | 118/24 | 11,14 | PSCWMC | 47 | NR | N/A |
| 27-399W | Unnamed | 118/24 | 14,15 | PSCWMC | 15 | NR | N/A |
| 27-400W | Unnamed | 118/24 | 14 | PSCWMC | 5 | NR | N/A |
| 27-401W | Unnamed | 118/24 | 14 | PSCWMC | 4 | NR | N/A |
| 27-402W | Unnamed | 118/24 | 12 | PSCWMC | 3 | NR | N/A |
| 27-413W | Unnamed | 118/24 | 18 | PSCWMC | 12 | NR | N/A |
| 27-414W | Unnamed | 118/24 | 19 | PSCWMC | 10 | NR | N/A |
| 27-921W | Unnamed | 117,118/24 | 1,36 | MCWD | 88 | NR | N/A |
| 27-922W | Unnamed | 118/24 | 25 | MCWD | 52 | NR | N/A |
| 27-923W | Painter Lake | 117,118/24 | 2,3,34,35 | MCWD | 292 | NR | 938.4 |
| 27-924W | Unnamed | 118/24 | 27 | MCWD | 36 | NR | N/A |
| 27-925W | Unnamed | 118/24 | 29,32 | PSCWMC | 49 | NR | N/A |
| 27-927W | Unnamed | 117,118/24 | 4,33 | PSCWMC | 7 | NR | N/A |
| 27-1090W | Unnamed | 118/24 | 7 | PSCWMC | 7 | NR | N/A |
| 27-1097W | Unnamed | 118/24 | 8 | PSCWMC | 10 | NR | N/A |

¹ NE = Natural Environment, NR = Not regulated by DNR shoreland rules.

3. Watercourses

Public waters also include all natural and altered watercourses with a total drainage area greater than two square miles. Painter Creek, Pioneer Creek, Robina Creek and Loretto Creek are four protected watercourses in Independence. The four watercourses are discussed below.

- ***Painter Creek***

Painter Creek is located in the southeast corner of Independence. The creek is the outlet of Katrina Lake and flows west to south to Jennings Bay on Lake Minnetonka.

- ***Pioneer Creek***

Pioneer Creek is located in central Independence. The creek is the outlet of Lake Independence and flows west to south to Ox Yoke Lake, which is south of Independence. Ox Yoke Lake eventually discharges to the South Fork Crow River.

- ***Robina Creek***

Robina Creek is a tributary of Pioneer Creek and is located in central Independence. The Creek is the outlet of Robina Lake and flows from north to south to Pioneer Creek.

- ***Loretto Creek***

A portion of Loretto Creek is located in the northeast corner of Independence. The creek flows from east to west and discharges to Lake Sarah. Lake Sarah then discharges through Sarah Creek to the west to the South Fork Crow River.

Other Regulated Wetlands

In addition to the MnDNR waters previously discussed, many additional wetlands within the City are included on the National Wetland Inventory (NWI) maps but are not MnDNR water bodies. Figure 5 includes other regulated wetlands based on the NWI maps. The following three characteristics make these water bodies exclusive from the MnDNR public waters and public waters wetlands.

- First, an individual basin may be dominated by wetland habitat (Types 1, 2, 6, and 7 [USDI, 1971] not statutorily covered by MnDNR and yet is immediately adjacent to an inventoried MnDNR basin or watercourse.
- Second, an individual isolated wetland basin may be smaller than the minimum MnDNR size (2.5 or 10 acres) as discussed previously.
- Third, an individual isolated wetland basin may be dominated by habitat types (Types 1, 2, 6, and 7) not statutorily covered by MnDNR.

Figure 5: NWI Map

Excavation, filling, grading and/or development actions which may adversely affect these resources may be subject to federal permitting authority under Sections 404 and 401 of the Clean Water Act, (33 USC 125 et. seq.) and City approval under the 1991 Wetland Conservation Act (WCA). The City is the local governmental unit that administers the WCA.

Water Quality

Water quality is directly affected by seepage, percolation and runoff. When these actions adversely alter water quality, they are termed either point source or non-point source pollution. Point source pollutants enter water and wetlands at specific locations via a pipe or a permanent outfall structure; the most common examples being sewage treatment plant outfalls and industrial discharge pipes. Non-point source pollutants are far more dispersed, entering waterways via runoff, seepage and sedimentation. Common examples of non-point pollution include stormwater runoff, agricultural field drainage and septic systems.

Uncontrolled stormwater runoff is currently the greatest single pollutant of our water resources. Common pollutants in stormwater runoff include: sediments, nutrients, oxygen-demanding substances, heavy metals, chlorides, oil and grease, pesticides, PCB's and bacteria. These pollutants may create a "shock" load on lakes and streams during low flow conditions associated with warm weather. Sediment from stormwater runoff may carry those pollutants to local wetlands causing water quality degradation and eutrophication.

Non-point pollution may be caused by the improper use of fertilizers and pesticides on both agricultural and residential land. Compact development in non-sewered areas can lead to overburdening of the area's soils, causing pollution of local groundwater. The result is the same as an inadequate septic system - a health hazard to individuals using local water supplies. Any development that has not provided necessary water retention facilities, erosion control devices, or stringent control of individual septic systems may create a potential pollution hazard to local residents.

Cover Types

Independence is covered with three basic cover categories—vegetation, open water and artificial or manmade surfaces. Vegetated cover includes land that is cultivated or planted, woodland, shrubland, herbaceous, oak forest, maple-basswood forest, lowland hardwood forest, forest on flooded or saturated soils or other upland forest.

Agriculture - A large share of the land area is under cultivation, with the major crops being corn, alfalfa, soybeans, small grains and orchards. Other fields are used for open pasture and the grazing of horses and cattle.

Overstory - The deciduous forest of the dry phase category is characteristic in central Minnesota. In the City, the forests are scattered, with no one area predominating. Large stands of trees exist on many farms and along lakes and streams. The most common trees are oak, maple, elm, linden, box elder and a variety of evergreen.

Pioneer - This form of vegetation and plant life is found near creeks and drainage basins. Soils are well drained, and are usually covered extensively with vegetation. Predominant plants found are willow, poplar, cottonwood and sumac.

Native Grasslands and Prairie - In the areas that have escaped cultivation, these forms of grasses are found to be rich, moist and poorly drained. Tall prairie grasses generally are found adjacent to the deciduous forest. In Independence these grasses frequently can be found in higher lands. Cover types are shown on Figure 6.

Figure 6: Cover Types