

Appendix B

ENVIRONMENTAL

FEATURES

Geology & Topography

During the Paleozoic era of geological history, Ingham County and the state as a whole was inundated by successive warm, shallow seas during which large amounts of sediment were deposited. These deposits subsequently lithified to form bedrock. Nearly the entire area of Locke Township sits upon Saginaw Formation bedrock, consisting of sandstone with interbedded shale, limestone, coal and gypsum. The Ice Age brought four successive continental glaciers across the Great Lakes area. As these ice sheets moved southward from Canada, they scoured and abraded the surface of the land leaving behind deeper valleys and more rounded hilltops. The advancing glaciers carried large quantities of rock materials scraped and gouged from the land's surface. These materials were then deposited during the melting of the ice to form drift materials covering the bedrock below. While the depth to bedrock exceeds 800 feet in some parts of Michigan, the depth of the drift layer in Locke Township ranges between approximately 50 to 150 feet, and generally increases as one moves northeast.

The Township's topography can be generally described as nearly level to gently rolling. There is only approximately 70 feet in difference between the Township's highest and lowest elevations. The lowest elevations, along the Red Cedar River in the southern edge of the Township, are approximately 870 feet above sea level. The highest elevations, approximately 940 feet above sea level, can be found in Sections 17 and 25.

The character of an area's geology and topography has bearing on development and land use planning. Land use planning guidelines recommend that development be generally discouraged in areas dominated by 12% – 18% slopes, and severely limited in steeper areas. Geology can also impact the availability of potable water, and this issue is further discussed under "Groundwater."

Drainage & Water Courses

Drainage is facilitated through a network of watercourses (see Wetlands and Floodplains Map). The most dominant is the Red Cedar River. The Red Cedar River travels west along portions of the Township's southern periphery. The Red Cedar River is fed by two principal drains that extend northward through the Township. Wolf Creek drains much of the Township's eastern half. Squaw Creek drains much of the eastern and central portions of the Township. Wolf Creek flows into the Red Cedar River just east of Webberville Road and south of Allen Road. Squaw Creek flows into the Red Cedar River south of Rowley Road and west of Dietz Road. The Red Cedar subsequently flows into the Grand River in Lansing and the Grand River ultimately empties into Lake Michigan. All runoff in Locke Township flows into Lake Michigan. A network of wetlands also help to aid drainage. There are no natural lakes or ponds in excess of ten acres in the Township.

Lands abutting or in close proximity to drainage courses, such as streams and creeks, are subject to flood conditions where the drainage courses do not have the capacity to accommodate the rate of runoff from a single heavy rainfall or numerous lighter rainfalls over a relatively short period of time. Serious flooding has not been a common occurrence in Locke Township. This is due in large part to the comparatively limited development (limited impervious surfaces) in the Township, and the network of drainage courses and wetlands that carry and store runoff.

The Federal Emergency Management Agency performed a flood study for the Township. The study identified portions of the Township's drainage corridors as areas located within the 100-Year floodplain. These areas primarily follow the Red Cedar River corridor and portions of the northern limits of the Wolf and Squaw Creeks. The largest expanse of floodplain area includes Squaw Creek, extending from Bell Oak Road north to the Township's northern boundary, and extending west into the northwest corner of the Township.

Although Locke Township may be relatively free of any regular threat of flooding, improperly managed land development practices can impact flood conditions both in the Township and in communities downstream.

Groundwater

As runoff flows across land surfaces and travels through drainage courses, a portion of the runoff seeps into the ground and collects in great quantities in the underlying soils and deeper bedrock. These reservoirs of water are referred to as aquifers and serve as the sources of drinking water for nearly all residents of Locke Township.

The water drawn from the Saginaw Formation aquifer is considered to be of very good quality. Isolated areas in the Township's northeast corner have been found to have a comparatively high saline content. Aquifers can be "confined" or "unconfined" systems. Confined systems have an impermeable soil layer (typically clay) above them which acts to confine the aquifer and protect the aquifer from contaminants seeping into the subsurface above the confining soil layer, such as petroleum products, fertilizers, and improperly disposed household liquids. Unconfined systems do not have this protective layer of clay soil and are much more prone to contamination. Data from well logs suggest that while a confining clay or shale layer is present in areas of the Township, this protective cover does not extend across the entire Township. The protection of groundwater quality requires appropriate land use management along a number of fronts. Contamination of ground water resources can originate from a number of sources including, but not necessarily limited to poorly operating septic drain fields, floor drains that discharge to the outdoors, the storage of hazardous and toxic substances without the necessary safeguards, the improper disposal of fuels and oils, excessive use of fertilizers, and improper disposal of wastes by industrial, commercial and residential activities.

Vegetation

Vegetative cover in Locke Township is comprised largely of cropland, accounting for approximately 70% of the Township area. The principal exceptions are those areas characterized by wetlands, woodlands, or residential development and its associated lawn areas.

There are approximately 2,600 acres of wetlands in the Township, comprising 12% of its landscape (see Wetlands and Floodplains Map). The wetlands are dispersed throughout the Township but are most prominent along or near to watercourses including the Red Cedar River and the Wolf and Squaw Creeks. The greatest continuous expanse of wetlands follows the Red Cedar River for approximately 2.5 miles from M-52 west to the

Township's border. Nearly all of the Township's wetlands are comprised of lowland hardwoods such as ash, elm, soft maples, and cottonwoods. The balance is comprised of shrub and emergent wetlands. The Township is nearly void of upland hardwood stands.

The network of wooded and non-wooded wetlands is important because of the vital role these resources play in flood control, runoff purification, groundwater recharge, wildlife habitats, recreational opportunities, and supporting the rural character of the Township. Wetlands are environmentally sensitive resources and can experience degradation and destruction due to changes in water levels, erosion and sedimentation, filling, dredging, and draining. The degradation or pollution of a wetland area can have a destructive impact upon wetlands and related woodland resources distances away due to the frequent physical linkages between these resource areas. In addition to the environmental constraints wetlands pose for development, wetlands present severe physical constraints for land development due to wetness, flooding and instability of soils.

Soils

The U.S. Department of Agriculture, Natural Resources Conservation Service, has prepared a soil survey for Ingham County. According to the Survey, Locke Township exhibits six general soil associations that include muck, loamy and sandy soils (see General Soils Map). "Soil associations" refer to the classification of broad patterns of soils, topography, and drainage. A soil association generally consists of one or more major soils and other minor soils. It is the pattern of these major and minor soils (including topography and drainage) which differentiates one association from another. An association often includes individual soils of varying character. Approximately two-thirds of the Township falls with the Marlette-Capac-Owosso Association, which is described as "nearly level to rolling, well drained to somewhat poorly drained loamy soils." Muck soils are most prevalent along the upper limits of the Squaw Creek corridor and associated floodplain areas, and limited portions of the far southeast and northwest corners of the Township. Muck soils are frequently evident in areas characterized by wetlands.

The soil associations identified by the Natural Resources Conservation Service are very general. The Natural Resources Conservation Service has identified more specific individual soil units throughout the County based upon the characteristics of the upper soil layers (approximately five feet in depth) and this provides a more reliable basis for township planning purposes. The character of soils can have a profound impact upon the suitability of future uses with regard to groundwater contamination, buckling and shifting of foundations and

roads, erosion, on-site sewage disposal, and agricultural productivity.

According to the Natural Resources Conservation Service, the vast majority of the Township presents severe limitations to septic systems due to seasonally high water tables, ponding, and/or soil wetness. A primary concern is the soil's ability to absorb and break down the leachate from the septic drain fields before it reaches underground water supplies. This can be particularly troublesome where soils are characterized by wetness and poor percolation rates. For example, much of the Township is characterized by Capac loams, Aubbeenaubbee-Capac sandy loams, and Colwood-Brookston loams. All of these soils are characterized by water tables that approach within approximately two feet or less of the ground surface during spring and winter. Limitations on septic system by soils can often be overcome with increased lot sizes and/or specially engineered septic systems at additional costs.

The Ingham County Health Department is responsible for issuing permits for on-site sewage disposal. A permit will not be issued unless all county requirements have been met. Under typical conditions, sites approaching one to two acres are generally adequate to meet the Health Department's requirements for effective septic systems, including a back-up area should the initial drain field fail. Even on a two-acre site, a mounded system may be frequently required to minimize soil wetness below. Sites approaching one acre must meet more stringent standards and may not be able to do so due to soil conditions. Development at this density may require a sewer system.

It should be noted that while a site may be classified by the Natural Resources Conservation Service as presenting a limitation to septic systems or building construction, on-site investigation may show the classification to be less than fully accurate and/or show that the deeper soils (more than five feet deep) present different characteristics than the upper layer soils and thus, varying limitations. On-site investigations should be carried out before specific land development projects are initiated.

While the area soils present primarily severe limitations to septic drain fields, more than 90% of the Township is classified by the Natural Resources Conservation Service as *prime farmland* and the majority of the balance is classified as *additional farmland of local importance* (see Farmlands Map). The Natural Resources Conservation Service generally defines *prime farmland* as land that is, under proper management, particularly well suited to food, feed, forage, fiber, and oilseed crops and is capable of producing sustained high yields. *Additional farmland of local importance* is generally defined as land that is nearly prime farmland and that economically produce high yields (under proper management).

Climate

The climate of Locke Township can be classified as mild. Based upon data collected by the Department of Agriculture between 1947 and 1976 in East Lansing, the average daily temperature is 47.4 ° F. By comparison, the average daily temperature in Sault St. Marie in the Upper Peninsula is 39.7° F. The average summer temperature is 68.9° F and the highest recorded temperature of 102° F occurred in July of 1934. The average winter temperature is 24.9° F and the lowest recorded temperature of -33° F occurred in February of 1875. Average yearly precipitation is 29.84 inches and average yearly snowfall is 39.4 inches. June is typically the wettest month with an average rainfall of 3.64 inches.

Because the day-to-day weather is controlled by the movement of pressure systems across the nation, this area seldom experiences prolonged periods of hot, humid weather in the summer or extreme cold during the winter. The lake effect, so noticeable in many areas of Michigan, is limited in the Locke Township regional area. However, the prevailing westerly winds blowing over Lake Michigan often produce cloudiness which extends across Michigan's entire Lower Peninsula, modifying fall and early winter temperatures. Weather conditions change gradually between the seasons. The climate of Ingham County as a whole is favorable for the growth of most farm crops cultivated in Michigan.

