DEMOGRAPHICS AND LAND USE

Sandusky County

On February 12, 1820 the Ohio government authorized the creation of Sandusky County. Residents named the county after an Indian term for "at the cold water". Sandusky County was originally part of territory set aside for Ohio's Indian population by the Treaty of Greenville.

The county is located in the northern part of the state and is adjacent to Ottawa County to the north, Erie to the east, Huron to the southeast, Seneca to the south and Wood County to the west. Lake Erie's Sandusky Bay borders the county to the northeast.

Farming is the largest land use in Sandusky County with seventy percent as farm fields. Sandusky County is the fifth largest tomato producer in the state.

The total area of square miles is at 417.1 of which 408.45 square miles is land, leaving 9.25 square miles of water. The 2010 population was estimated at 60,944 which relates to a density at approximately 149.2 square mile.

The county has twelve townships, three cities, seven incorporated villages, and approximately twenty-eight unincorporated communities. Major highways include Interstate 80 and 90 along three U.S. Routes and fifteen State Routes. There are two local airports -- Fremont Airport and the Sandusky County Regional Airport.

Precipitation

Approximately 34 inches fall annually on Sandusky County. The average rainfall is about 2.87 inches per month with February at 1.64 inches as the lowest and 3.76 inches in July which represents the highest totals. Of the 34 inches per year, about 10 inches becomes runoff to surface - water bodies such as creeks, rivers, and eventually to the lake. Two inches are retained at or near the ground and evaporate into the atmosphere. Twenty-six inches enter the soil and twenty inches will go into soil storage and returned back into the atmosphere. The remaining rain will recharge the ground water supply.

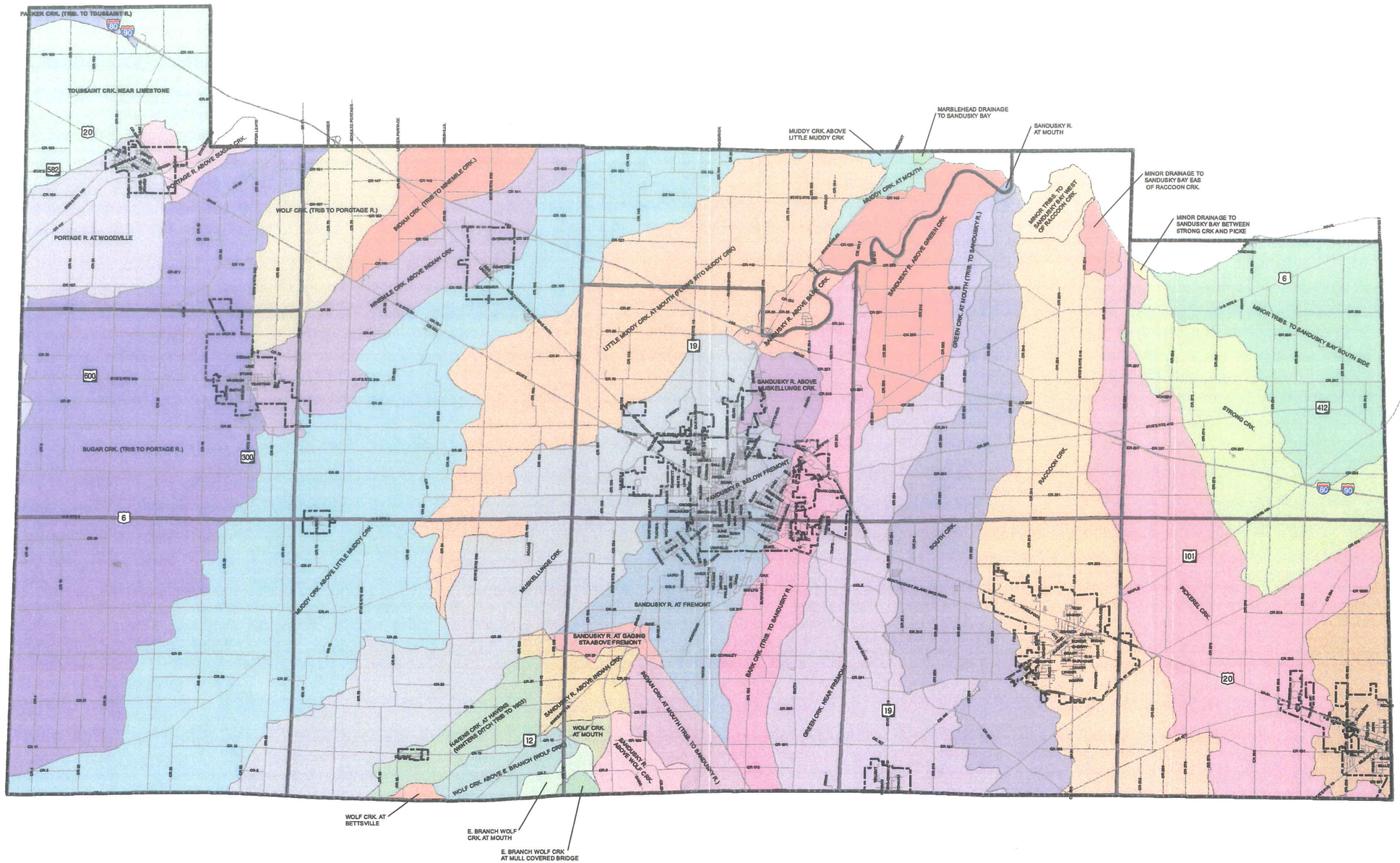
Surface Waters - Watersheds

Sandusky County has two major drainage basins in the county: the Sandusky River and the Portage River Basins. Major streams that drain other parts of the county include: Green Creek, Muddy Creek, Muskellunge Creek, Pickerel Creek, Pike Creek, Sugar Creek, and Toussaint Creek. All of these drainage basins are important because they empty into Lake Erie, which is a major water resource for several Midwestern states and southwestern Ontario.

The Sandusky River Basin has an area of approximately 1,420 square miles and stretches from Sandusky Bay to the northern one-third of Marion County. The Portage River Basin is approximately 602 square miles in area and stretches from Lake Erie to McComb, in Hancock County, Ohio.

Sandusky County contains approximately 261,760 land acres, of which approximately 95 percent is rural. Eleven different soil types are present within the county, the majority of which are poorly drained clays, loams and glacial till deposit. The county has approximately 4,480 water acres, which provide for a bountiful supply of surface water. The county water acreage consists of about 154 acres of lakes and approximately 240 linear miles of streams and rivers.

Another aspect of water quality in Sandusky County is sediment-loading in the streams and rivers. On the average, about 20,000 tons per day are carried by the Sandusky River at Fremont, which amounts to about 7,300,000 tons per year. These sediments are detrimental because they fill in the reservoirs and the channels of the river. The river also carries pollutants from human activities such as lawn and agricultural chemicals, agricultural nutrients, septage and industrial waste. The major challenges for the people of Sandusky County are to reduce soil erosion and the movement of nutrients and pesticides into the water supply.



R. HEYMAN 4/9/2013 PDG JOB# 3185-039 FILE: S:\3185-039\ PLATE2.MXD	WATERSHEDS MAP SANDUSKY CO., OHIO PLATE TWO	SANDUSKY COUNTY COMPREHENSIVE WATER AND SEWER GENERAL PLAN	POGGEMEYER DESIGN GROUP

Ground Water Resources

The primary source of ground water is the carbonate aquifer of limestone and dolomite that serves as an adequate water supply for both individual wells for several county villages, such as Gibsonburg, Green Springs, Lindsey, and Woodville. Limestone mainly consists of calcium carbonate; dolomite is very similar but contains magnesium carbonate, as well as calcium carbonate. Both are commonly referred to as limestone, which is familiar to most Ohioans as a construction material. Regional ground water recharge zones are located to the south and west of the county in Hancock, Wyandot, and Seneca Counties. Ground water underlying the county moves toward Lake Erie, its natural point of discharge.

Well yields of 500 to 1,000 gallons per minute (GPM) may be developed in the extreme eastern end of the county. This yield potential decreases in the westward direction, with almost the entire western half of the county showing yields usually limited to less than 100 GPM. Farm and domestic supplies are usually obtained at depths of 70 to 100 feet. The yield of a well will vary considerably depending on age and depth of the well and its construction, diameter of the casing, pump capacity and age, and more importantly, properties of the geologic formation. Some of the older wells, at shallow depths, produce only a few gallons per minute, while some newer wells drilled to a greater depth may yield several hundred gallons per minute.

As water moves through the fractured limestone underlying Sandusky County, it dissolves and carries in solution minerals contained in the bedrock. Ground water in the western half of the county generally has a low mineral content compared to the generally high mineral contents in the eastern portion of the county. Ground water in the eastern portion of the county tends to be hard with high sulfide, chloride and/or iron content. Sometimes it is undesirable for use. Ground water in the western half of the county has a more appealing smell and taste due to lower dissolved solids.

Human activity has had some influences on the quality of ground water in Sandusky County. In 1987, 183 wells in the county were sampled for nitrate concentration. Three of these wells tested at more than 10 mg/l nitrate-nitrogen, which exceeds the safe drinking water standard. Ten of the wells tested at between 3 mg/l and 10 mg/l, which is considered in the safe range, but indicates the

influence of human activity. Another 10 wells tested in the range of 0.31 mg/l to 3.0 mg/l, indicating the possibility of human activity. The average nitrate level in the county was 0.71 mg/l.

Ground-Water Resources of SANDUSKY COUNTY

by
James J. Schmidt

Site	Depth	Critical Pump Level	Iron	Hardness as CaCO3	Calcium	Dissolved Solids	Specific Conductance	Hydrogen Sulfide	Sulfates
A	260'	170'	.73	345	87	388	662	1.8	71
B	390		1.0	401	109	516	835	-	128
C	180		3.0	1830	469	2380	2640	2	1530
	*340	175	.37	1850	484	2370	2890	1.2	1520
D			14.0	1680		2542			672
E			.07	1620	386	2100	2140		1280
F	125			380		482			
G	280	120	1.2	447	105	497	811	.8	115
H	103	115	1.3	1030	302	1430	1810	.2	675
I	108	66	2.2	1230	374	1570	1580	.3	878

* Cased and grouted to 180 ft

Chemical constituents in milligrams per liter (mg/l)

(A) Chemical Analysis

SH-Shale
G-Gravel
SG-Sand & Gravel

Industrial Well-Municipal
Water Well
Test Well

Depth (ft.)-Water bearing Formation-Yield (gpm)
Depth to Bedrock (ft.)

AREAS IN WHICH YIELDS OF 500 TO 1000 GALLONS PER MINUTE MAY BE DEVELOPED.

Source supply for drilled wells in limestone-dolomite bedrock, the carbonate aquifer. Municipal and industrial supplies are developed from large diameter wells drilled to depths of as much as 250 feet. High degree of hardness dissolved solids, hydrogen sulfide, and sulfates may deter its use.

Areas in which there is a potential concentration of contamination due to the underground disposal of storm wastes from Bellevue.

Thick clayey till interbedded with lenses of sand and gravel may be as much as 130 feet thick. These glacial deposits, which partially fill the remnant buried channel, may supply farm and domestic needs. Industrial supplies are developed in the underlying carbonate aquifer at depths of less than 200 feet

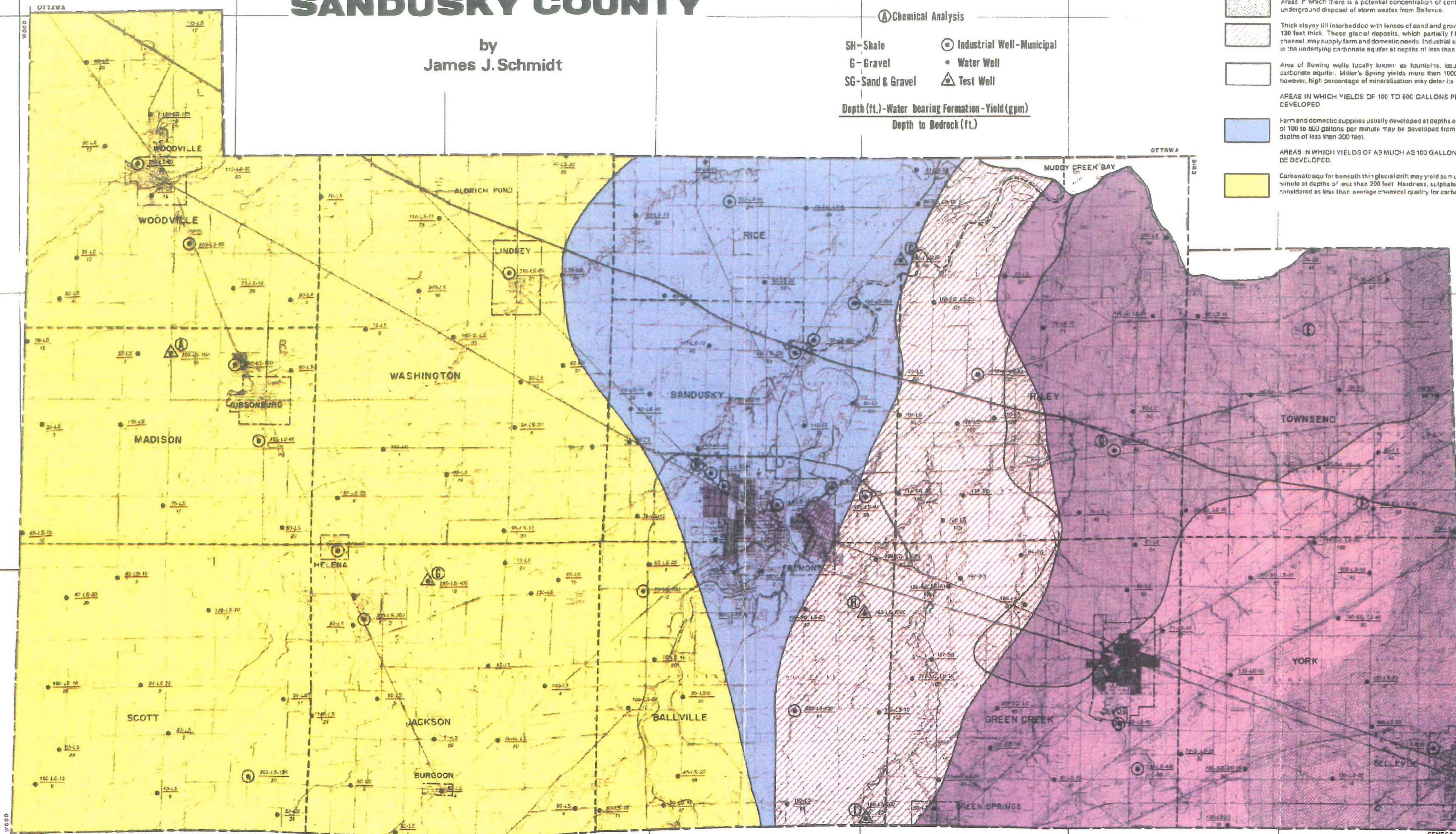
Area of flowing wells locally known as fountains, issuing from underlying carbonate aquifer. Miller's Spring yields more than 1000 gallons per minute, however, high percentage of mineralization may deter its use.

AREAS IN WHICH YIELDS OF 100 TO 500 GALLONS PER MINUTE MAY BE DEVELOPED

Farm and domestic supplies usually developed at depths of 70 to 100 feet. Yields of 100 to 500 gallons per minute may be developed from carbonate aquifer at depths of less than 300 feet.

AREAS IN WHICH YIELDS OF AS MUCH AS 100 GALLONS PER MINUTE MAY BE DEVELOPED.

Carbonate aquifer beneath thin glacial drift may yield as much as 100 gallons per minute at depths of less than 200 feet. Hardness, sulphate and dissolved solids considered as less than average chemical quality for carbonate aquifer.



Scale in miles
0 1 2 3 4
Contour Interval: 10 feet
1:62,500

PUBLISHED, 1980

Ohio Department of Natural Resources
DIVISION OF WATER
Fountain Square
Columbus, Ohio 43224

cartography: vk

R. HEYMAN
4/9/2013

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GROUNDWATER RESOURCES MAP
SANDUSKY CO., OHIO

PLATE THREE

SANDUSKY COUNTY
COMPREHENSIVE WATER & SEWER
GENERAL PLAN

POGGEMEYER DESIGN GROUP

Soils

With the exception of a small area in the southeastern part, the county lies within the basin of ancient glacial lakes. These were bordered by three successive ridges, representing the shore deposits, of the receding lakes, Maumee, Whittlesey, and Warren.

The general slope is to the north and northeast. The greater part of the county, within the lake plain, is very level, but there are occasional undulating ridges. The surface in the western part is broken by extrusions of the underlying limestone rock. Some dissection is noticeable along the main drainage channels. The elevation of the county ranges between 580 and 600 feet above sea level.

The county has very poor natural drainage, but this has been in large measure overcome by an extensive system of large open ditches and tile drains.

The soils of Sandusky County have originated from glacial till derived from limestone and shale; glacial till derived from limestone, sandstone, and shale; beach deposits, lacustrine deposits, and alluvium. Fourteen series of soils are recognized.

The soils derived from glaciated limestone, sandstone, and shale are classed in six series. The most important of those are the Miami, Crosby, Milton, and Randolph.

The Miami soils have good natural drainage and are well adapted for grain production.

The Crosby silty clay loam has poor surface and subsurface drainage. It is not very extensive and is considered a poor soil for agriculture.

The Milton series includes one type, the silt loam, having a brownish surface soil and a sticky subsoil, with limestone rock within 3 feet of the surface. It is considered a good wheat soil.

The Randolph series also represents very shallow soils, with grayish-yellow to dull-brown surface soils and a dull-brown subsoil. The stony loam is used largely for pasture, but the loam, if properly drained, can be used for general farming. The drainage, however, is difficult to improve.

AaA	Adrian muck, 0 to 1 percent slopes
An	Aquents, nearly level
BaB	Belmore loam, 2 to 6 percent slopes
BeA	Bennington silt loam, 0 to 2 percent slopes
BkB	Bixler loamy fine sand, 2 to 6 percent slopes
BoA	Blount silt loam, 0 to 2 percent slopes
Bt	Bono silty clay
ChB	Castalia very stony loam, 1 to 6 percent slopes
Co	Colwood fine sandy loam
DAM	Dam
DeA	Del Rey silt loam, 0 to 2 percent slopes
DkA	Dixboro-Kibbie complex, 0 to 2 percent slopes
Do	Dumps
DuB	Dunbridge sandy loam, 1 to 4 percent slopes
FuA	Fulton silty clay loam, 0 to 3 percent slopes
Ge	Gilford fine sandy loam
GlB	Glenford silt loam, 2 to 6 percent slopes
GwB	Glynwood silt loam, 2 to 6 percent slopes
Gx	Granby loamy sand
HaB	Haskins sandy loam, 1 to 4 percent slopes
Ht	Hoytville silty clay loam
KbA	Kibbie fine sandy loam, 0 to 2 percent slopes
Le	Lenawee silty clay loam
LuB	Lucas silty clay, 2 to 6 percent slopes
MeB	Mentor silt loam, 1 to 4 percent slopes
MeF	Mentor silt loam, 25 to 50 percent slopes
Mo	Mermill loam
Mp	Mermill Variant sandy loam
Ms	Millsdale silty clay loam
NpA	Nappanee silt loam, 0 to 3 percent slopes
Pe	Pewamo silty clay loam
Pq	Pits, quarry
RoB	Rimer loamy fine sand, 1 to 4 percent slopes
Rs	Rossburg silt loam, occasionally flooded
Sa	Sandusky gravelly coarse sandy loam
SbC2	Saylesville silty clay loam, 6 to 12 percent slopes, eroded
SeB	Seward loamy fine sand, 2 to 6 percent slopes
Sh	Shoals silt loam, frequently flooded
SoB	Spinks fine sand, 2 to 6 percent slopes
TeA	Tedrow loamy fine sand, 0 to 2 percent slopes
TfA	Tedrow-Dixboro complex, 0 to 2 percent slopes
To	Toledo silty clay
Tp	Toledo silty clay loam, ponded
Un	Udorthents, strongly sloping
W	Water
Wa	Weyers coarse sandy loam

WOODVILLE
LINDSEY
GIBSONBURG
FREMONT
HELENA
BURGOON
GREEN SPRINGS
CLYDE
BELLEVUE

R. HEYMAN 4/9/2013	SOILS MAP SANDUSKY CO., OHIO	SANDUSKY COUNTY COMPREHENSIVE WATER AND SEWER GENERAL PLAN	POGGEMEYER DESIGN GROUP
PDG JOB# 3185-039			
FILE: S:\3185-039\ PLATE3.MXD	PLATE FOUR		

Population Trends

The population of Sandusky County, as of the 2010 census, was at 60,944 which is a decrease of 1.4% from 61,792 in 2000. Approximately fifty-five (55%) of the total county population is municipal. The Office of Policy, Research, and Strategic Planning, Ohio Department of Development completed a population estimate to 2040. The 2030 population is estimated at 55,440 and the 2040 is at 52,640.

The profile for the County is listed as follows:

2000 Census Population	61,792
2010 Census Population	60,944
Projected Population 2030	55,440
Projected Population 2040	52,640
Housing Units 2010 Census	26,383
Persons per Square Mile	149.2
Persons per Household	2.31
Median Household Income	$48,056
Low and Moderate Income	37.8%
ODOD projected rate of change	- 09%/20 year

To further update the population trends, the General Plan references the Sandusky County Comprehensive Plan 2013 Update under Chapter Two - Population and Demographics.

The Ohio Department of Development (ODOD), Office of Strategic Research, compiled County-level population projections based on the 1990 and 2000 Census of Population. Their projection for 2010 was for a decrease from 61,790 in 2000 to 59,940. The 2010 Census counted 60,944, or 1,004 more people than projected. The projection continues, with estimated totals of 57,900 in 2020 and 56,420 in 2030. Adjusting proportionately for the higher actual 2010 number, the upward revisions could project 58,870 in 2020 and 57,370 in 2030. These projections take into account assumptions about births, deaths, and natural increase, as well as age-specific births and fertility rates.[1]

2000 Census Population	61,792
2010 Census Population	60,944
ODOD 2010 Population Projection	59,940
Comprehensive Plan Adjusted 2010 population	58,870
Comprehensive Plan Adjusted 2030 population	57,370

Note: The adjusted projected 20 year rate of change is .059%.

Land Use[1]

The 2013 Comprehensive Plan intends to promote a balance between residential and commercial expansion along with employment opportunities while pro-tecting the agricultural land use.

The acreage dedicated for residential, industrial, and commercial has increased significantly during the last three decades and at the same time the population has decreased since 1990.

The primary guide for control of development within political subdivisions, municipalities, and townships is by means of local planning and zoning boards.

The 2013 Comprehensive Plan developed land use goals and objectives. The primary goal is to promote the coexistence of all land use with sensitivity to the needs and impact of each.

The recent development trend for residential growth is occurring outside of incorporated communities, but within close proximity. This type of residential development occurs on large lots that have been split from farms. Water and sewer service is not always available and when not available, the residents would be served by individual wells and septage systems.

Sandusky County is comprised of approximately 214,000 acres of agricultural land use. Of the remaining 46,000 acres, the existing land use is listed as follows:

TABLE 1 SANDUSKY COUNTY EXISTING LAND USE		
Total Acreage	260,000	100%
Agricultural Acreage	214,000	82.3%
Residential Acreage	24,380	9.4%
Public Acreage	10,580	4.1%
Commercial Acreage	6,440	2.5%
Industrial Acreage	4,600	1.7%

Currently, Sandusky County contains 35,552 acres of flood plains; 25,483 acres of wooded areas; and 16,686 acres of wetlands. These areas would be considered environmentally sensitive areas.

Future Land Use[1]

The development of the 2013 Comprehensive Plan allowed for meeting with public and private officials for each township and municipality. Most of the townships noted few or no change in growth patterns since the last plan, but some townships with existing cities and villages such as Woodville, Sandusky, Ballville, Green Creek, and York did express opinions on future land use.

The noted future land use from the 2013 Comprehensive Plan for each of the following municipalities and townships is later illustrated and discussed in the Water and Sewer Service Needs Assessment.

Woodville Township
Village of Woodville
Village of Gibsonburg
Village of Lindsey
Sandusky Township
City of Fremont
Ballville Township
Green Creek Township
City of Clyde
Village of Green Springs
City of Bellevue

Land Use - Housing Development and Projections[1]

The 2013 Comprehensive Plan suggested that 93% of land use was agricultural. The 2013 Comprehensive Plan indicated that rural parcel splits were occurring, but the agricultural land use would continue to dominate.

Residential development trends within the unincorporated areas of Sandusky County are directly related to septage system permits issued by the Sandusky County Health Department. A total of 637 sewage permits were issued over the last ten years since 2012.

The average number of new homes/septage permits issued since 2003 to 2012 is 64 per year.

The following table lists the new permits issued for each year over the ten year period.

TABLE 2
TOTAL ANNUAL NEW PERMITS ISSUED

Year	Number of Permits
2012	10
2011	10
2010	15
2009	36
2008	43
2007	36
2006	178
2005	117
2004	89
2003	103

From 2006 until the present, the township has experienced a significant reduction in housing starts. Very few residential developments and/or individual homes have been constructed. It is expected that this trend will continue until the housing market recovers.

Table 3 lists replacement sewage permits for each year over the ten year period.

TABLE 3 TOTAL ANNUAL SEWAGE PERMIT REPLACEMENT	
Year	Number of Replacement Permits
2012	17
2011	2
2010	4
2009	15
2008	17
2007	23
2006	73
2005	49
2004	40
2003	42

Any land use discussion must also take into consideration land use categories other than residential. The following is a list of land use categories:

TABLE 4 TYPICAL LAND USE CATEGORIES
Residential - low, medium, and high density
Commercial
Industrial - light and heavy
Recreation
Institutional
Agricultural

Anticipating the actual density of each land use category is difficult if not sometimes impossible. Availability of utilities and transportation along with local zoning and development requirements will often dictate density.

Land use within Sandusky County's service area for the most part will remain as agricultural with limited residential and commercial. Areas designated as agricultural would not normally require water and/or sanitary sewer service. Therefore, the primary focus for water and/or sewer would be in residential and commercial land use.