Detroit Water and Sewerage Department

Wastewater Master Plan

DWSD Project No. CS-1314

Soil Suitability for Onsite Sewage Disposal Systems

Technical Memorandum
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Soil Suitability For Onsite Sewage Disposal Systems

1. Purpose And Scope

The purpose of this technical memorandum is to identify communities in the DWSD study area that:

- Will continue to generate septage based on the use of onsite sewage disposal systems and,
- May need municipal sewers in the future.

The scope of the coverage is the communities identified in the DWSD Wastewater Master Plan Interim Report on Planning Criteria that would have all or part of their communities served by onsite sewage disposal systems (OSDS).

2. Identification Of Components

This Tech Memo is based on a discussion of growth with community representatives, analysis of Soil Classification maps, county health department input and population projections. Community representatives provided input on population projections to the year 2050, community policies, plans and needs for future sewer services.

3. Methods

Phone calls were made to the township supervisor, city manager or mayor to discuss projected growth in their community, population projections and policies, plans and needs for future sewerage disposal. A summary of these conversations is included in Appendix A.

An analysis of the soil suitability for OSDS was reviewed using the Soil Conservation Soil Maps for those communities that plan to grow using OSDS for waste disposal. The soil suitability criteria were reviewed with the Lapeer, Macomb, Oakland and St. Clair County health departments. Adjustments were made in the soil interpretation based on the counties' input to classify soils as suitable for OSDS, marginally suitable for OSDS and unsuitable for OSDS. A fourth category of soils was necessary, as some land areas are not classified. Examples of unclassified soil areas are filled land, landfills and made land. Using the GIS system, each soil type was placed in one of the four categories. The GIS system sorted for each community the soils into the four categories. A percentage was developed for each community of the soils in each category. The GIS system then printed maps showing the soil suitability categories for each community.

Lapeer County did not have soils digitized and so percentage figures for soil suitability could not be readily calculated. Information on Lapeer County came from the Lapeer County Environmental Health Director and Chair of the Lapeer County Board of Commissioners.

4. Findings

Thirty-two communities in four counties that are in the DSWD study area will continue to rely on OSDS. From 2000 to 2050 the population in these communities is expected to grow by about 179,000 people. Some communities in the study area have municipal sewer systems and also rely on OSDS. The list of the thirty-two communities that will have all their growth or partial growth with OSDS is shown in Table 1 in Appendix A. Table 1 uses the population projections provided by SEMCOG for the years 2000 and 2050. The last column in Table 1 is an estimate of the population that is likely to need municipal sewers by 2050. Most communities will be seeking sewers before 2050. The estimated population needing sewers in the Study Area is 143,500.

The comments from communities that indicated that the growth projected by SEMCOG were high or low, were forwarded to SEMCOG for review. Revised population projections were used for Table 1.

4.1 Community Contacts

Phone contact was made with a majority of the communities in Macomb, Oakland and St. Clair Counties that were likely to use OSDS to accommodate growth. These calls verified those communities that would be continuing to use OSDS for sewage disposal. The contacts also revealed other useful information about sewer extensions, sewage systems and water needs. A summary of the comments from community leaders is found in the Attachment 2 in Appendix A.

4.2 Soil Maps

A review was made of the soil maps of each of the counties (Oakland, Macomb, St. Clair and Lapeer) to determine soil suitability for OSDS. Four categories were selected to sort the information. They are: percent of soil in the community suitable for OSDS, percent of soil marginally suitable for OSDS and percent of soil considered unsuitable for OSDS, and unclassified soil.

The Soil Conservation Soil maps for each county were reviewed and each soil type was placed in one of the four categories, i.e., suitable, marginal, unsuitable and unclassified. The list of soil types and categories was sent to each county health department. Three health departments provided comments about the categories. The categories for each county reflect the county sewage regulation and general practice for OSDS in the county. Table 1 summarizes the percent of each the four soil suitability categories for use with OSDS. Attachment 3 in Appendix A provides the details for each county and soil type.

Suitable soil for OSDS is generally soil that is well-drained, sandy soil or soil that has a permeability that is less than 60 minutes per inch and has a seasonal high water table two feet or more below the ground surface.

Marginal soil is generally soil that is somewhat poorly drained with a seasonal high water table one to two feet below the ground surface and soil permeability of 60 to 300 minutes per inch.

Unsuitable soil is soil that is poorly to very poorly drained with a seasonal high water table of less then one foot below the ground surface or is soil that is highly impermeable (permeability greater than 300 minutes per inch).

Unclassified soil is soil that was not mapped. It includes landfills, made land, filled land and others.

The soils that would be in each category were plotted on maps for Oakland, Macomb and St. Clair counties. The maps give a visual representation of the suitability of soils in the three counties. Attached are the maps for the three counties. Lapeer County's digitized soil map was not available.

The lowest percentage of suitable soil is in China Township in St. Clair County where only 0.8% suitable soil for OSDS. For development to occur it would result in use of marginally suitable soil or engineered systems. Marginal soil or engineered systems are more costly to use for OSDS.

The community with the highest percentage of suitable soil is Bruce Township is Macomb Co, with 58.1% suitable soil.

The community with the highest percentage of unsuitable soil is Berlin Township in St. Clair County, with 90.5% unsuitable soil.

The community with the lowest percentage of unsuitable soil is Leonard Township in Oakland County, with 19.7 % unsuitable soil.

There are 15 communities that will continue to rely on OSDS that have 75% or more of the soils classified as marginal or unsuitable for OSDS. Development in areas that have marginal or unsuitable soil will require "engineered" or alternative sewage systems. Types of alternative OSDS being used for marginal or unsuitable soil are mound systems, sand filters, aerobic treatment units and others. These systems often cost $10,000 or more for the complete installation. They also require regular maintenance and if not maintained will malfunction resulting in expensive repairs and environmental contamination.

The pressure for development that the population projections indicate, and the soil types that are unsuitable or marginally suitable for OSDS, will increase the demand for public sewer systems. These factors, soil reliability for OSDS and pressure for development, and the communities' desire for municipal sewers were used to project the Potential 2050 Population Needing Sewer Service in the last column of Table 1. Approximately 143, 500 people in the study area will need public sewers to properly dispose of sewage and accommodate the growth expected by 2050.

5. Conclusions

While there are 32 communities that are expected to continue to have OSDS for the future, at least 12 communities would like municipal sewers or are planning to have municipal sewers in the future.

Four of the communities that will continue to rely on OSDS in the future have 50% or more of the soils in the communities as unsuitable for OSDS. Those communities that have a large percentage of soils that are marginally suitable or unsuitable will find construction of OSDS very expensive and this will limit growth. For some of these communities limiting growth is an acceptable policy.

The population at risk, that will need municipal sewer service in the future, is approximately 143,500 people. How this need can be accommodated is unclear at the present time. Sewers that might be used now are at capacity and many sewage treatment plants cannot accommodate additional flows.

If municipal sewers cannot be connected to it is likely that there will be pressure for small wastewater treatment plants or decentralized wastewater treatment systems to serve the growth in these communities.

6. References

1. Soil Survey of Lapeer County, by Guy H. Earle, Jr., United States Department of Agriculture Soil Conservation Service in Cooperation with Michigan Agricultural Experiment Station, January 1972.
2. Soil Survey of Oakland County, by James E. Feenstra, United States Department of Agriculture Soil Conservation Service in Cooperation with Michigan Agricultural Experiment Station, March 1982.
3. Soil Survey of St. Clair County, Michigan, by Gilbert R. Landtiser, United States Department of Agriculture Soil Conservation Service in Cooperation with Michigan Agricultural Experiment Station, May 1974.
4. Soil Survey of Macomb County Michigan, United States Department of Agriculture Soil Conservation Service in Cooperation with Michigan Agricultural Experiment Station, September 1971.

7. Appendix A

Attachment 1:
Table 1. Communities in the DWSD Study Area That Will Have Part or All of New Development Served by Onsite Sewage Disposal Systems, Soil Suitability and Population Change and 2050 Population Needing Sewer Service.

Attachment 2:
Memo of Comments from Communities Using Onsite Sewage Systems in DWSD Study Area

Attachment 3: OSDS Soil Categories Maps for Oakland, St. Clair and Macomb Counties

Attachment 1

Table 1. Communities in the DWSD Study Area That Will Have Part or All of New Development Served by Onsite Sewage Disposal Systems, Soil Suitability, Population Change and Potential 2050 Population Needing Sewer Service

Community	All OSDS	Partial OSDS	Percent Suitable for OSDS	Percent Marginally Suitable For OSDS	Percent Unsuitable For OSDS	Percent Unclassified Soil	Population Change 2000-2050	Potential 2050 Population Needing Sewer Service
MACOMB COUNTY								
ARMADA	X		31.4 %	50.4 %	0.4 %	17.8 %	3885	600
BRUCE TWP		X	44	46	8.9	1.1	11397	1100
RAY TWP	X		38	34.8	24.8	2.3	3358	600
RICHMOND TWP*	X		11.6	82	3.5	2.9	4898	5000
OAKLAND COUNTY								
HOLLY TWP (s), *		X	15.4	52.6	30.1	2.0	3764	3764
LAKE ANGELUS	X		35	14.5	50.2	0.3	-55	-55
LEONARD *	X		10.2	70.1	19.7	0	10	120
MILFORD TWP (s)		X	46.6	27.9	20.9	4.6	3134+	3134+
OAKLAND TWP (s)		X	26.2	47.3	25.9	0.9	17813	17,813
ROSE TWP*	X		24.8	43.1	31.8	0.3	3664	3600
GROVELAND	X		43.8	29.7	24.9	1.6	1646	1400
ADDISON TWP *	X		20.0	58.2	21.1	0.7	5463	3600
BRANDON TWP (s)		X	32.3	39.6	27.9	0.1	7450	750
INDEPENDENCE TWP (s)		X	46	25.3	24.3	4.3	6748	7600
LYON TWP s)		X	19.4	51.6	28.2	0.7	43,328	43,328
SPRINGFIELD TWP (s)		X	52.4	20.9	24.2	2.6	10,370	7000
WHITE LAKE TWP (s)		X	52.8	15.6	28	3.6	6952+	6200+
ST. CLAIR COUNTY								
BERLIN TWP*	X		1.6	7.6	90.5	0.2	7962	8,000
CASCO TWP*	X		3.3	46	50.4	0.3	1040	2100
CHINA TOWNSHIP *		X	0.8	58.8	38.5	0.9	1220	1600
COLUMBUS TWP *	X		9.4	66.3	24	0.3	3589	2800

Community	All OSDS	Partial OSDS	Percent Suitable for OSDS	Percent Marginally Suitable For OSDS	Percent Unsuitable For OSDS	Percent Unclassified Soil	Population Change 2000-2050	Potential 2050 Population Needing Sewer Service
RILEY TWP*	X		0.9	13.9	85.2	0	2853	5000
ST. CLAIR TWP *	X		5.6	70.5	23.4	0.5	3335	3600
WALES TWP *	X		7	72.1	20.8	0.2	1860	1600
CLAY TWP		X	5.2	38.8	55.4	0.5	2863	2800
COTTRELLVILLE TWP(s) *		X	1.7	39.1	58.7	0.5	1586	3000
LAPEER COUNTY								
DRYDEN Village	X		N. A.	N.A.	N.A.	N.A.	-13	-13
ALMONT TOWNSHIP	X		N.A.	N.A.	N.A.	N.A.	3694	3000
DRYDEN TOWNSHIP	X		N.A.	N.A.	N.A.	N.A.	5862	1500
HADLEY TOWNSHIP	X		N.A.	N.A.	N.A.	N.A.	2593	1200
METAMORA TOWNSHIP	X		N.A.	N.A.	N.A.	N.A.	6515	1700
METAMORA VILLAGE	X		N.A.	N.A.	N.A.	N.A.	-11	-11
Total							178,773	143,509

N.A. = Not available OSDS = Onsite Sewage Disposal Systems
+ Communities that said the population estimate is low
(s) communities partially sewered * high percentage of marginal and unsuitable soils
4/23/02

ATTACHMENT 2
Comments from Communities Using Onsite Sewage Systems in DWSD Study Area

Calls were placed in February and March 2002 to selected communities in the DWSD service area that utilize onsite sewage systems. The responses from community leaders are summarized below.

Macomb County
Armada, Monica Job, Supervisor, industrial development has its own treatment plant. Township does not want sewers. Infrastructure is very limited. In the future sewers may eventually come. Will use OSDS now.

Bruce Twp. Gary Schocke, Supervisor, Use Romeo sewage treatment plant for southeast part of township. Most of new growth is expected to be with OSDS. Septage haulers now go to Pontiac. A closer septage disposal station would help reduce travel and time and hopefully cost. Their rate of growth in the last decade was about 200 people/ year. This is a higher rate then SEMCOG may be projecting. But who knows? Also suggested contacting Anderson, Eckstein and Westrick, Gordon Wilson.

Ray Twp. Charlie Bohm, master plan does not provide for water or sewer in township. Population projections about right.

Richmond Twp. Mr. Rengert, projections okay

Oakland County
Addison Twp. Sheri, Agree with SEMCOG projections, plan to stay rural. Will use OSDS for future growth.

Brandon, Ron Lapp, manager, sewers will serve Lake Louise, Bald Eagle, and M-15 corridor. Rest of township will be on OSDS (90%).
Groveland, Robert DePalma, Supervisor, all on OSDS, no sewers. 40% of township is preserve. Require 2.5 acre with OSDS. 5000 people increase would require radical change in master plan.

Highland Township, Mike Powell, Powell and Associates, Levy treatment plant large enough for serving the denser area of township with sewers. 2/ 3 of township to be served with sewers. Increase will be with sewers.

Holly Twp. Dale Smith, Adding a 1400 unit mobile home park with its own sewage plant, 700 home subdivision under construction, 50% of growth will be with OSDS. Population projections for next 50 years will be met in 2002.

Independence Twp. Linda Richardson expects new growth to be 40% on sewers and 60% with OSDS. They are connected to DWSD. Waterford has constructed a new septage receiving station.

Lake Angelus George Frisch, Mayor, will remain on OSDS. Area for development limited. Population projections may be high.

Village of Leonard, Eugene Mallia, Jr. Supervisor, they have no plans for water or sewer in the future.

Lyon Twp. Joe Shickley, Supervisor. Future growth will be with municipal sewers. The Park Place Environmental sewer plant has received a groundwater discharge permit to expand from 0.5 mgd to 3.5 mgd. The plant in located on 10 Mile Road in the center of the township. Crandall is the township engineer, 248.852.3100.

Milford Twp. Don Green, negotiating with Wixom for 1.5 mgd. Four square miles will be sewered for industrial and residential use. Expect growth to be 3600 in next 5 years. If don't get capacity with Wixom, will build own sewerage system.

Oakland Twp. Jim Kreech, 248-651-4440, sewers maxed out. Growth will be on sewers if there is sewer capacity.

Ortonville Village, Pete Auger, Village Manager, on sewers, provides Brandon Twp. sewers under contract.

Rose Township, Mr. Koop, Wetlands limit growth. Population projections may be high. Average 50 new builds/ year. In 2001 had 25.

Springfield Twp. Collin Walls, Supervisor, there is no capacity in sewer system. Would like sewers in selected areas of township. There is one POTW in Township. The township discourages sewers. The township has mandated OSDS maintenance on an annual basis. Money is in escrow to replace OSDS. Users can be special assessed.

White Lake Township, Sewers from Commerce Twp should handle growth. Will continue to have OSDS. Sewer extensions up to developers.

Wolverine Lake, Mike Powell and Associates, 2/ 3 of Wolverine Lake will be on sewers under contract with Commerce Twp. They are negotiating with Novi and

Walled Lake for sewers for the rest of the township. Growth will be with sewers.

St. Clair County

Berlin Twp. Martin Smith, Supervisor, growth estimates might be right. Sewage treatment needed for two small more densely populated areas. Considering a lagoon for wastewater treatment for these two areas. There is no stream nearby for discharge from a lagoon.

Casco Twp. Karen Holk, Supervisor, master plan has no sewer areas in it. Plan to stay rural for at least the next 10 years.

China Twp. Linda Schweihofer, Supervisor, sewers along King Road tied into

East China. No plans for expansion of sewer areas. Soil all clay and requires engineered systems. If someone would pay for sewers would take them.

Clay Twp., Joseph McKoan Supervisor, unable to reach him

Columbus Twp., Rod McCue, unable to reach him.

Cottrellville Twp. The township is finalizing their master plan. They area considering designating areas in the township that will not have public water and sewer. The area of the township now served by sewer from Marine City is limited in growing due to lack of capacity in the Marine City sewerage system. The projections for growth are "grossly under". They expect to double in next 20 years. The current thinking is that there will not be any millage for water and sewer. There is a serious problem with lack of safe drinking water. Some areas can not obtain water from wells. Deep wells have salt. Would welcome water and sewers tomorrow.

Kimball Twp. Referred to Wayne at 810-985-3599. There is limited capacity in sewers that are connected to the Port Huron sewer system in the northern part of the township. The southern end has capacity for growth with sewers. Kimball is under orders to extend sewers to airport and road commission area. Must be under way by June 15, 2002. Ready to go for bids. Will build 5.5 miles of sewer. Population projections thought to be low.

Riley Twp., Gerald Hannon, Supervisor, unable to reach him.

St. Clair Twp. Sandra Kilby, Supervisor. Negotiating for additional sewer capacity with St. Clair City. Also looking to enlarge retention basin to handle more sewage flow. She expects 80% of new growth to be on sewers. Area west of Wadhams Road will be served by OSDS. City of St. Clair is also looking into enlarging their retention facilities.

Wales Twp. Judith Duncan, Supervisor. No plans for city water or sewer in next 10 years. Septage hauler dumping waste on ground resulted in complaints and sewage seeping into ditch.

Lapeer County
Howard Gray, Lapeer County Environmental Health Director. Individual communities were not called.

Arsenic in well water will limit growth. Looking into methods to have safe drinking water for county.

Almont Soils are heavy limiting growth. Running out of suitable soil. Using mound systems in difficult soils. Experiencing pressure for development.

Dryden, Hadley and Metamora Less pressure for development. Soils are a mixture of suitable and marginal for use with OSDS. About 1/ 3 of soils are marginal and mound systems are being used for these locations.

Recommended talking with David Taylor, county commissioner about development.

ATTACHMENT 3
Soil Codes Related to On Site Sewage Systems for Lapeer, St. Clair, Oakland and Macomb Counties

The list below identifies soil categories based on suitability for on-site sewage disposal systems. The categories were developed with input from the county health departments. The criteria for the categories are based on soil permeability and drainage as identified in the U. S. Department of Agriculture Soil Conservation Service, Soil Survey for each of the counties.

Category A is well drained to moderately well drained sandy soils that are generally suitable for on site sewage disposal. The seasonal high water table is generally 2-4 feet below ground surface.

Category B is marginal soils for onsite sewage disposal. They are somewhat poorly drained soils that have a seasonal high water table of 1-2 feet below the ground surface. A mound system is sometimes used to overcome the seasonal high water table problems.

Category C is unsuitable soil for onsite sewage disposal. They are poorly to very poorly drained soil that have a seasonal high water table of 0-1 foot below the ground surface or are highly impermeable. Although classified as unsuitable, these soils might be used if an engineered sewage system can meet county requirements or through the health department appeals process.

Lapeer County

The list below identifies Soil Conservation Soil Survey soil classifications based on suitability for on-site sewage disposal systems and based on review by the Lapeer County Health Department.

Category A	Category B	Category C
	Al	Mp
	Mn	Ad
Ab	Mo	Ba
Br	Dy	Bh
Bs	Mt	Bl
Ch		Bu
	Rc	Bv
Fo	Te	Bw
La	Ws	Cc
Me	Be	Cm
Mf	Bf	Co
Mk	Ab	Dr
Ml	Ca	Ed
Mm	Ce	Mu

The soils that would be in each category from the soil survey of Lapeer County are; Cont:

Category A	Category B	Category C
Mr	Cf	Ge
Os	Fa	Gm
Ow	Kb	Gn
	Lo	Ho
Sp	Ma	Ht
	Mh	Le
Ub	Au	Lm
	An	Lu
	Ao	Mv
	As	Mw
	Be	Na
	Bt	Np
	Io	Pa
	Tu	Pe
	Cv	Pm
	Sf	Pn
	Tu	Ro
	Bu	Sc
	Bv	Se
	Ge	Sn
	Gm	So
	Mv	Ta
	Mw	To
		Wb
		Wt
		Gd
		Hy
		Greenwood

St. Clair County

The list below identifies Soil Conservation Soil Survey soil classifications based on suitability for on-site sewage disposal systems and based on review by the St Clair County Health Department.

Category A	Category B	Category C
Br	Ae	Bc
Cc	Ah	Bl
Cy	Al	Cx
Ea	At	De
Ml	Av	Gd
Mm	Wd	Au
Mn	Cv	Ha
Mt	Cw	Ja
Ru	Lo	
	Lp	Ld
Sp	Me	Le
Ss	Mh	Lh
	Wn	Ll
	Mo	Lm
	Mr	Ln
	Ms	Pa
	Nh	Pc
	Oa	Pd
	Pe	Pn
	Pl	Sm
	Sa	To
	Wa	Th
	Wp	
	Ws	
	Wo	

Oakland County

The list below identifies Soil Conservation Soil Survey soil classifications based on suitability for on-site sewage disposal systems and review by the Oakland County Health Department.

Category A	Category B	Category C
13	10	12
14	11	19
15	17	20
18	23	26
31	25	27
45	35	33
47	36	38
	44	39
51	46	41
	52	42
62	53	43
67	54	48
	61	49
	63	56
	34	32
		60
		68
		69

No category - 40, 50, 59.

Macomb County

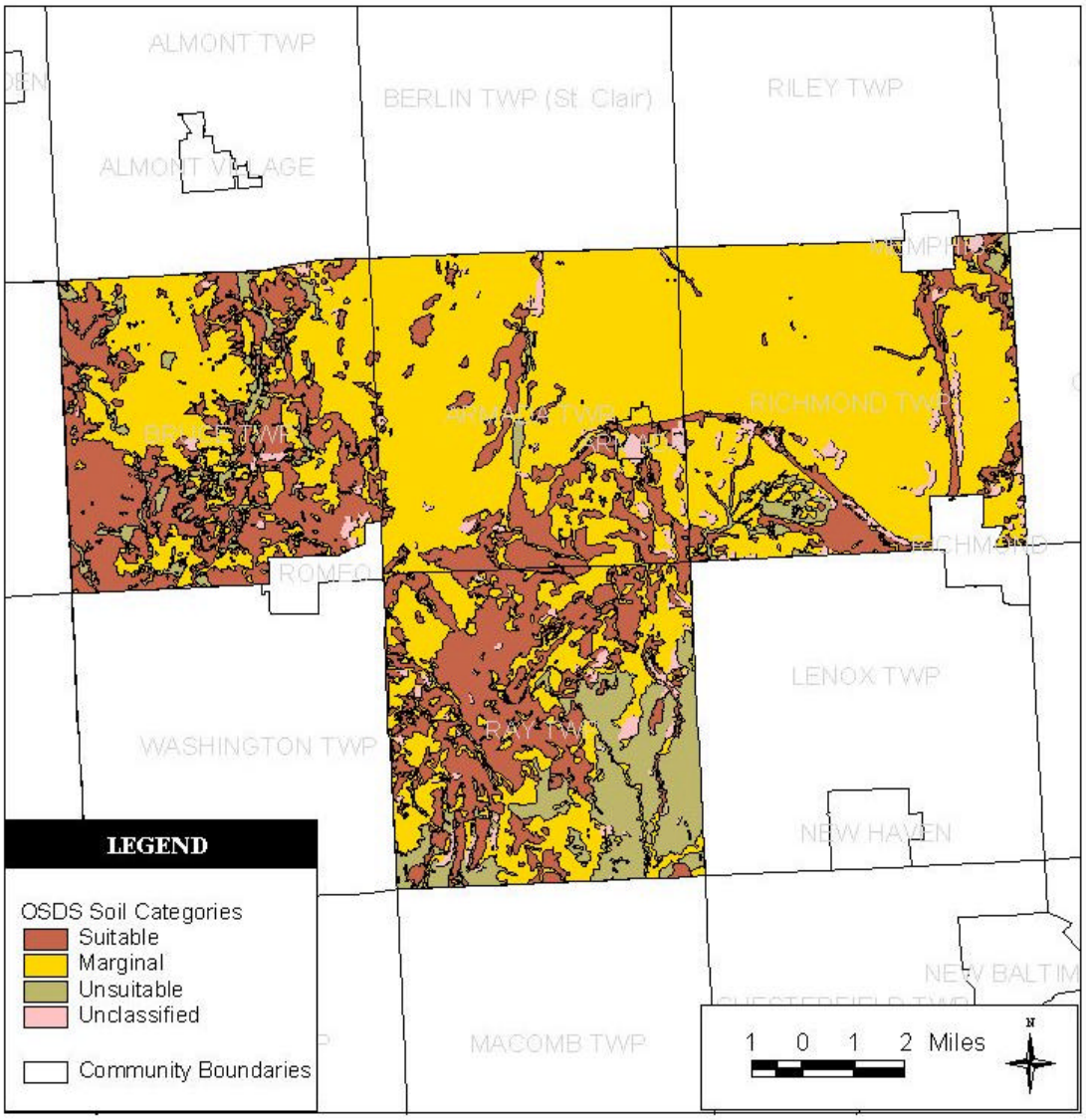
The list below identifies Soil Conservation Soil Survey soil classifications based on suitability for on-site sewage disposal systems and review by the Macomb County Health Department.

Category A	Category B	Category C
Br	Bl	Ta
Bs	Bx	Ts
Bv	Pa	Tt
Dr	Ce	
Le	Cw	Wx
Ls	Cv	
Lo	Dm	
Oa	Dl	Ed
Ok	Ep	
Sp	Sd	Ft
Ms	Se	Fu
As	Sf	

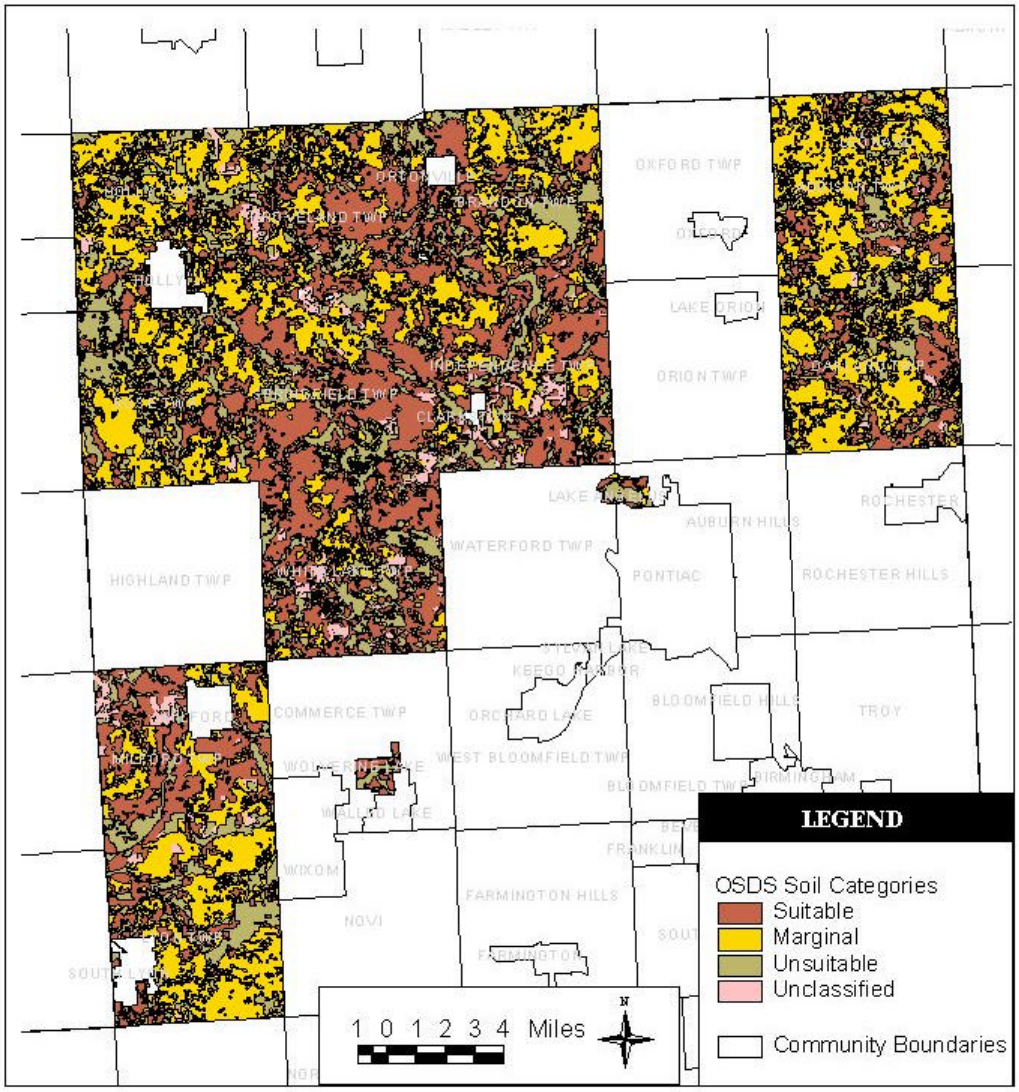
The soils that would be in each category from the soil survey of Macomb County are; Cont:

Category A	Category B	Category C
Au	Sm	
Cf	Gm	
Ws	Mc	Hy
Wv	Mn	
Wu	Mo	
Wt	Lh	
	Lk	
	Cm	Lm
	Gd	Lu
	Gf	Na
	La	Nc
	Pa	Pc
	Sc	
	Sh	
	Sl	
	Sn	

OSDS Communities within Macomb County



OSDS Communities within Oakland County



OSDS Communities within St. Clair County

