

Land Cover/Use Classification System

VERSION II

MIRIS
Michigan Resource Information System
Resource Mapping and Aerial Photography Section
Land and Mineral Services Division
Department of Natural Resources

Introduction

This document presents a revised version of the classification scheme used by the Michigan Resource Information System (MIRIS) for land cover and land use mapping. The scheme was first developed in 1980 following enactment of the Michigan Resource Inventory Act, 1979 PA 204, which is currently embodied in Part 609, Resource Inventory, of the Natural Resource and Environmental Protection Act, Act 451 of the Public Acts of 1994. The system that was adopted is patterned after the nationally standardized scheme, “A Land Use and Land Cover Classification System for Use with Remote Sensor Data” (Anderson et al. 1976, U.S. Geological Survey Professional Paper 964).

The Michigan classification system was established to provide a comprehensive, uniform system applicable on a statewide basis and is intended to support land cover and land use mapping activities at scales in the range of 1:12,000 (1”=1,000’) to 1:24,000 (1”=2,000’). Changes in this second version include a restructuring of the forest and wetland groups, new names for some group headings and categories, the addition of some categories, and new descriptions of feature assignments. These changes were made in order to correct problem areas that existed with the design and application of the first version and are based on the following criteria:

- Describe the major components of each category group within the confines of a three-level hierarchy.
- Assign map codes to categories in the lowest classification levels within each group; higher levels are to be used for statistical aggregation purposes only.
- Create separate categories for those items that may need to be cross-referenced under various user defined aggregation schemes.
- Maintain clear distinction between natural “land cover” types and man-made “land use” activities.
- Maintain clear distinction between “upland” and “wetland” natural cover types.

Land use and land cover categories in this document are arranged in a hierarchical fashion under the seven Level I classes of Urban, Agriculture, Upland Field, Upland Forest, Water, Wetland, and Barren. The initial set of categories on the pages that follow represent the urban group and are arranged under Level II headings. The remaining groups are arranged under Level I headings. The urban and agricultural groups are considered “land use” types that describe the landscape that is totally altered to accommodate human activities. The remaining five groups are considered “land cover” types and primarily describe features of the natural environment, although evidence of modification by man’s activities may be present.

Categories described herein are annotated with the intended map code. Numbers are assigned only to those categories that are to be used in the map compilation process. In situations where categories were

rearranged, new number codes were assigned to avoid confusion with previous applications. The number codes in the classification system are designed to accommodate various levels of aggregation according to the Anderson hierarchy.

Residential

This group of categories consists of land uses that serve as a place of permanent residence. Delineation should include lawns, gardens, garages, parking lots, and recreation areas that are part of the site development. Natural features within a site or development complex, such as lakes, ponds, wetlands, and woodlots with an understory of natural ground cover, are to be placed in the appropriate cover type category.

MULTI-FAMILY: HIGH-RISE (111)

High-rise apartment and condominium buildings that are four or more stories in height.

MULTI-FAMILY: LOW-RISE (112)

Apartments, condominiums, and townhouses that are three or less stories in height.

DUPLEX (114)

Residences designed for occupancy by two separate families.

SINGLE FAMILY (113)

Detached, single family residences of all densities that are occupied permanently or on a seasonal basis. On large platted rural residential properties, the residential designation would apply to the entire parcel or group of parcels unless there is a substantial area under cultivation or a significant natural cover type. In developments where housing units are separated by extensive areas of natural cover, only the house site and maintained lawn area would be delineated.

MOBILE HOME (115)

Includes mobile home parks and mobile home sites on individual platted properties.

Commercial, Services, Institutional

Urbanized areas that encompass retail activities, professional business activity, and institutional services.

CENTRAL BUSINESS DISTRICT (121)

The historic commercial and business center of an incorporated city that usually consists of a high-density mixture of commercial, business, and institutional uses. Single purpose land uses within the district, such as exhibition halls, stadiums, parks, etc., that are larger than the minimum mapping size, are assigned to separate categories.

RETAIL CENTER (122)

Includes shopping centers of all sizes and regional shopping malls. Also includes large discount retail establishments (over 100,000 square feet in size) that are associated with national or regional chain stores. Outlot development associated with any of these complexes would be assigned to another category.

OTHER RETAIL, SERVICES (124)

Individual establishments involved with the sale of consumer goods and services. These activities most commonly occur in strip commercial development along major roads, although not limited to that setting. Includes historic "neighborhood" business districts as well as banks, restaurants, motels, hotels, funeral homes, household storage facilities, and junkyards. Also includes entertainment and indoor recreational facilities that are frequently associated with commercial development, such as indoor or drive-in movie theater, miniature golf, driving range, go-cart racing, tennis club, bowling alley, indoor ice rink, and recreation hall.

OFFICE (128)

Areas where the dominant land use consists of offices for professional business activity. Includes office complexes, office parks, research parks, and high-rise office towers outside of a central business district. Commercial buildings within an office park, such as motels and restaurants, are assigned to the retail category.

PUBLIC ASSEMBLY (125)

Facilities designed for exhibition purposes and for viewing artistic performances and professional sporting events. Activities are carried out in buildings or open air structures and include an auditorium, arena, amphitheater, convention/exhibition hall, baseball or football stadium, and racetrack. Sports facilities associated with schools and colleges are included in the institutional category.

INSTITUTIONAL (126)

Facilities that provide governmental, cultural, educational, religious, and health services. Includes schools, community colleges, universities, churches, indoor community recreation centers, government buildings, fire stations, libraries, museums, art galleries, civic centers, hospitals, convalescent homes, correctional centers, mental health facilities, and military bases. Some land uses within large complexes that are not directly associated with the institutional function would be assigned to separate categories, such as married student housing or faculty housing units on a university campus, or a single-family housing development or golf course on a military base. Landing fields on a military base would be placed in the transportation category.

Industrial

Land uses that deal with the processing and storage of raw materials and the production, storage, and distribution of manufactured goods.

INDUSTRIAL PARK (138)

Platted land developments created exclusively for light industrial manufacturing operations. Streets and utilities are usually constructed with the initial development, similar to a residential subdivision. This category does not include industrial development along major roads or county roads unless it is associated with the park. Research parks, as well as office buildings within an industrial park, are assigned to the office category.

OTHER INDUSTRIAL (139)

All industrial areas not associated with industrial parks. Includes heavy industries, such as steel mills, paper mills, lumber mills, chemical plants, power generation plants, oil refineries, oil storage tank fields, and natural gas processing facilities. Also includes light industrial operations, warehouses, storage yards, and truck terminals.

Transportation, Communication, Utilities

AIR TRANSPORTATION (141)

Facilities associated with the transportation functions at airports, airfields, or landing strips. Includes runways, terminal buildings and adjacent parking areas, hangers, service buildings, car rental facilities, navigational towers, fuel storage tanks, and all mowed areas around these features. It would not include an industrial park located on the airport grounds, even though there may be runway connections to the industrial buildings.

RAIL TRANSPORTATION (142)

Includes the mainline tracks, passenger stations, switching yards, roundhouses, and other repair and maintenance facilities. At certain scales, the rail lines and associated right-of-way may not be of sufficient width to be defined as a separate land use type. Spurs to individual industrial sites would not be included unless they are within the railroad right-of-way.

WATER TRANSPORTATION (143)

Facilities associated with shipping operations such as port terminals, raw material stockpiles, shipyards, ferry landings, locks, lighthouses, and coast guard stations. Also includes port facilities at industrial complexes and quarry operations. It does not include recreational boating facilities.

ROAD TRANSPORTATION (144)

Classification of roadways as a land use type would include both the pavement and right-of-way. Currently, under MIRIS compilation standards, roadways are not to be identified as a separate land use type except for limited-access highways and divided surface roadways. Limited-access highways are to include the right-of-way where defined on aerial photographs. Medians on divided roadways would be delineated using the lane centerlines as boundaries.

COMMUNICATION (145)

Communication facilities such as radio, television, and microwave towers as well as broadcast stations. Also includes central office facility associated with telephone communications. Telephone line easements are not of sufficient width to be defined as a separate land use.

UTILITY LINE (146)

Rights-of-way for electric transmission lines and oil and gas pipelines. This category is defined only where the right-of-way clearing is the dominant land use, such as corridors through wooded areas or heavily urbanized areas; a transmission line across a cultivated field or open water would not be identified under this category. Wetlands within the rights-of-way would be assigned to the appropriate wetland category. Also includes electrical substations not associated with a power plant site.

WASTE DISPOSAL (147)

Waste disposal sites not associated with an enclosed processing facility. Includes landfills, transfer stations, sewage lagoons, industrial waste dump sites and disposal basins, tire farms, confined dredge disposal basins, and tailings basins associated with industrial operations at a mine site. This category may not conform to the legal definitions of waste disposal as used in environmental legislation.

OTHER UTILITY (148)

Includes municipal water and sewage treatment plants, water storage towers, water well sites, and water control structures associated with reservoirs.

Extractive

Land devoted to surface and subsurface mining activity. Includes buildings associated with smelting, concentrating, or crushing operations at the mine site. Port facilities separate from the site would be assigned to the water transportation category. Large tailings basins are to be classified as waste disposal and not included in the extractive category. Pools of water are included in the extractive category if the mining operation is active, and assigned to an open water category if the site is abandoned or there is evidence that the mining activity has significantly diminished. Inactive pits and quarries remain in the extractive category until natural cover is reestablished on the site.

OPEN PIT: SAND AND GRAVEL (171)

Mining operations that involve the removal of sand and gravel material. Includes conveyor apparatus, haul roads, stockpiles and buildings associated with the mining activity.

OPEN PIT: ROCK (174)

Open pit mines associated with the surface removal of rock such as iron ore mines, limestone quarries, and strip mining operations.

UNDERGROUND MINE (172)

Operations involved with the subsurface removal of rock such as copper mines or salt mines.

WELLS (173)

Well sites associated with the extraction of oil and natural gas. Pipeline rights-of-way, storage tanks, and processing facilities that are separate from the well sites are not included in this category. Municipal water wells are assigned to a utility category.

Recreation, Open Use

This category consists of land uses carried out in the context of an outdoor setting. Includes recreational land uses where elements of the natural landscape, such as vegetation or topography, or use of a natural resource, such as water, is an integral part of the activity or setting.

MARINA, BOAT LAUNCH (191)

Facilities for docking, launching, and servicing pleasure craft. Includes marinas, yacht clubs, public access sites, and seasonal storage facilities for boats. Boat manufacturing would be an industrial function.

DAY-USE RECREATION (193)

Land uses that accommodate outdoor day-use and casual recreational activities. Includes park, plaza, golf course, zoo, fairground, amusement park, shooting range, ski area, historical site, botanical garden, and arboretum. Buildings and other man-made facilities may be present as secondary activity areas or to provide necessary amenities. Playing fields for informal or community sports programs are usually an integral component of park developments. Natural areas within park boundaries would be assigned to appropriate land cover types. Ski and golf resorts often contain hotel and convention facilities as well as condominium and single-family housing as part of the site development. These land uses would be separated from the recreational areas and assigned to the appropriate commercial and residential categories.

CAMPGROUND (192)

Campground facilities for recreational vehicles and trailers as well as tent camping. The user provides the overnight shelter and any buildings on the site are for amenities only. Recreational activity areas may be present but are intended primarily for use by camp residents. Campgrounds associated with larger park developments, such as state, federal, regional, and county parks, would be separated from the recreational use areas and included in this category. Seasonal use trailers may occupy campground sites on a temporary or permanent basis.

GROUP CAMP (195)

Includes group camps such as church camps and scout camps as well as conference centers and family resorts. Site development is characterized by clusters of small buildings or structures, often open-air, providing common eating and meeting facilities and housing for camp participants.

CEMETERY (194)

Land used for burial grounds that contain upright or flush-ground markers. Includes office and maintenance areas associated with the cemetery as well as maintained areas intended for future expansion.

Agriculture

Land used for raising livestock or under cultivation for food production purposes. Also includes land devoted to cultivation of ornamental plant material.

CROPLAND (21)

Land under cultivation for row crops, small grains, and hay. May include fallow land in areas of active agriculture that is likely to be included in a crop rotation cycle.

ORCHARD, VINEYARD (22)

Land devoted to the growing of fruit-bearing trees, bushes, and vines for the production of apples, cherries, pears, peaches, strawberries, blueberries, raspberries, and grapes.

ORNAMENTAL (26)

Land used for ornamental horticultural purposes such as sod farms and wholesale nurseries. Florists and retail outlets for nursery stock would be assigned to a commercial category.

CONFINED FEEDING (23)

Land devoted to intensive feeding operations for livestock such as beef and dairy cattle feedlots, hog feedlots, and poultry farms. Barns or other structures associated with the feeding operation would not be included in this category.

PERMANENT PASTURE (24)

Areas of herbaceous vegetative cover that are grazed by livestock on a relatively permanent basis. Small pastures for horses that are part of a rural residence would not be identified here unless associated with a riding or boarding stable.

FARMSTEAD (25)

The complex of structures associated with a farming operation that includes residence, barns, and other outbuildings.

OTHER AGRICULTURAL (29)

Land uses associated with other agricultural activity such as horse training facilities, riding or boarding stables, greenhouse complexes, and barns or outbuildings that are separate from a farmstead. Also includes animal breeding facilities such as mink farms.

Upland Field

Upland areas where grasses or shrubs represent the dominant cover type. Various stages of plant succession from grassland to forest cover may be evident. Many of these open areas represent abandoned farms and the original field lines often persist throughout the plant succession process.

UPLAND GRASS (31)

Includes upland fields and meadows. Also includes old fields that were once under cultivation and are now dominated by a natural herbaceous cover.

UPLAND SHRUB (32)

Upland fields dominated by scattered shrubs and shrub masses. A considerable amount of grass cover may still be present and scattered young tree growth may be evident as plant succession progresses.

SAVANNA

Open fields characterized by a dense grass cover and scattered mature hardwoods or conifers. Savannas are underlain by well-drained sandy soils and occur on various glacial features that include outwash plains, lake plains, and coarse-textured moraines.

HARDWOOD SAVANNA (331)

Mature hardwoods, usually oak, that occur individually, or in open forest canopies, on an herbaceous groundcover that extends uninterrupted beneath the crowns. Oak openings or barrens primarily occur on the sandy plains throughout Muskegon, Oceana, Newaygo, and Mecosta Counties, although not restricted to those areas.

CONIFEROUS SAVANNA (332)

Mature conifers occurring individually or in small clumps on an herbaceous carpet. Coniferous savannas are frequent in the north central Lower Peninsula.

VACANT (34)

Open parcels of land that most frequently occur within urban areas. Includes vacant parcels in platted residential, commercial, and industrial areas. Includes sites that have been cleared of old buildings. Surface cover is usually grass and evidence of soil disturbance from previous use or site-clearing activities may be present. In residential areas, adjacent landowners may use portions of vacant lots for gardens and extended play areas. Also includes residential properties along shorelines where a house has not been constructed but the site is maintained and used by the owner for waterfront access purposes. Vacant lots may be mowed on a regular basis.

Upland Forest

Natural areas dominated by tree cover that is generally over 6 meters, or 20 feet, in height. The forest cover must occur in an upland setting with an understory of natural plant material or ground cover. If the understory has been altered to accommodate an agricultural or urban land use activity, such as a pasture or park, the area would be assigned to the appropriate land use type. Forest cover occurring in wetland environments would be assigned to the forested wetland group.

DECIDUOUS

ASPEN-BIRCH (413)

Forest cover that is dominated by trembling aspen, bigtooth aspen, and white birch. This forest type occurs primarily in the Upper Peninsula and northern Lower Peninsula, although not restricted to those areas.

OTHER UPLAND HARDWOOD (419)

All other upland hardwood types.

CONIFEROUS

PINE (421)

Forest cover dominated by pine species such as white pine, red pine, and jack pine.

CHRISTMAS TREE (429)

Lands managed for the cultivation and harvesting of Christmas trees. When it is evident that the management activity has ceased, these plantations are assigned to one of the other coniferous categories.

OTHER UPLAND CONIFER (422)

All other coniferous types growing on upland sites such as white or Norway spruce, white spruce, hemlock, and Douglas fir. Northern white cedar, which normally grows in wet environments, would be included in this category where it is found growing on limestone uplands, as frequently occurs in the eastern Upper Peninsula and northeastern Lower Peninsula.

MIXED DECIDUOUS-CONIFEROUS (43)

Forested areas where hardwoods are dominant but conifers comprise 25-50% of the stocking. Dense stands of conifers within the "mixed" area that are larger than the minimum mapping size should be placed in the appropriate coniferous category.

CLEARCUT (44)

Areas where the tree cover has been completely removed by recent timber harvesting activity. In older clearcuts where the forest cover is becoming reestablished through natural regeneration or replanting, cover types would be assigned to the appropriate forest and non-forest categories. Clearcuts in forested wetlands would be assigned to appropriate non-forested wetland categories.

Open Water

Identifies natural or man-made basins that usually contain water on a permanent basis. If aquatic vegetation covers the water surface, assignment is made to the wetland group.

RIVER, STREAM, CANAL (51)

This category is used to identify linear watercourses that have sufficient width to be represented as “area” features at the designated mapping scale.

LAKE, POND (52)

Identifies non-flowing, enclosed water bodies of any size that contain water on a permanent basis. Also includes natural lakes with water level control structures, stock ponds, and ponds created for landscaping purposes. Includes water bodies adjacent to Great Lakes waters but separated from them by stretches of beach or man-made levees.

RESERVOIR (53)

Reservoirs represent man-made basins created by some type of containment structure or excavation for of power generation, flood control, or recreation purposes. Includes bodies of water created from a dam across a river or stream as well as excavated basins for storm water retention purposes. The upstream terminus of a reservoir on a river should include all backwater areas that appear to be influenced by the water level of the dam. Impoundments on rivers resulting in no appreciable change in the width of the watercourse remain in the river category. Storm water retention basins may contain water on a seasonal basis only. The water control structures associated with a reservoir are to be assigned to a utility category. Water-filled basins that are being used for waste disposal purposes are not included in this category.

GREAT LAKES (54)

Identifies the waters of the Great Lakes and associated connecting channels including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, Lake St.Clair, St.Marys River connecting channel system, and St.Clair and Detroit Rivers. Bays and estuaries that are contiguous to these waters are included in this designation.

Wetlands

Wetlands are areas of natural vegetation growing in shallow water, hydric soil, or seasonally flooded environments. This category includes such common wetland features as marshes, swamps, and bogs. It also includes areas of mature tree cover commonly associated with, but not restricted to, floodplain environments. Vegetation associated with permanent open water conditions is included such as floating aquatics and submergents. While the appearance of flora is a primary factor, wetland conditions that are temporarily devoid of plant material, such as mud flats, are also included.

FORESTED

LOWLAND HARDWOOD (614)

Forested wetland areas and floodplain forests dominated by deciduous tree cover over six meters in height. Includes such species as elm, ash, willow, cottonwood, silver maple, and red maple.

LOWLAND CONIFER (613)

Forested wetland areas dominated by coniferous tree cover such as white cedar, tamarack, black spruce, and balsam fir. Delineation of the stand may include trees that are less than six meters in height.

MIXED FORESTED WETLAND (615)

Forested wetland areas dominated by lowland hardwoods with lowland conifers comprising 25-50% of the stocking. Dense stands of either type within the mixed area that are larger than the minimum mapping size would be assigned to the Lowland Hardwood or Lowland Conifer categories.

NON-FORESTED

SHRUB/SCRUB (625)

Wetland areas dominated by lowland brush and woody vegetation that is less than six meters in height. Includes open bogs and alder thickets. Common species include leatherleaf, dogwood, alder, and willow. Tree stands within bogs or other wetlands that are larger than the minimum mapping size are assigned to the forested wetland categories.

EMERGENT (622)

Wetlands, commonly known as marshes, characterized by herbaceous plant communities emerging from relatively shallow water that is frequently persistent throughout the growing season. The density of plant material may obscure the water surface or saturated soil. Includes such species as cattail, bulrush, bur-reed, pickerelweed, and arrowhead.

FLATS (623)

Bottomlands of lakes or ponds that are exposed during periods of low water levels and are devoid of vegetation.

OTHER NON-FORESTED WETLAND (629)

Areas of non-forested, natural cover that are subject to seasonal ponding, soil saturation, or flooding and where the wetland vegetation type may not be discernible due to limitations of the aerial photography signature. May include well-defined wet herbaceous cover in old fields.

AQUATIC BED

FLOATING AQUATIC BED (631)

Floating or floating-leaved plant communities, such as water lilies, pondweeds, and duckweeds, that occur in shallow, inland bodies of water. In some cases, the vegetation may cover the entire surface area of the water.

FLOATING AQUATIC BED: GREAT LAKES (632)

Floating aquatic beds in the Great Lakes and associated connecting channels. In compiling land cover aggregation statistics, it may be desirable to be able to exclude this category.

SUBMERGED AQUATIC BED (633)

Vegetation that grows below the surface of shallow inland bodies of water.

SUBMERGED AQUATIC BED: GREAT LAKES (634)

Submerged aquatic beds that occur in the open waters and bays of the Great Lakes and associated connecting channels.

Barren

BEACH, RIVERBANK (72)

Includes sand and gravel deposits along lakeshores, riverbeds, and river mouth deltas.

SAND DUNE, EXPOSED BLUFF (73)

Exposed sand dunes and steep bluffs that occur most frequently along the Great Lakes shoreline, although not limited to that setting. If shrub or tree cover has been reestablished on these features, assignment is made to the appropriate vegetation category. Also includes steep, eroded bluffs along rivers where the river channel cuts into areas of high topographic relief.

ROCK OUTCROP (74)

Exposed bedrock, and associated talus, that occurs most frequently on Isle Royale and in the western Upper Peninsula.

OTHER BARREN (79)

Includes areas of eroded soils or permanently exposed soil that has usually resulted from over grazing or poor cultivation practices. Does not include temporarily exposed soils that are associated with construction activity or normal farming operations.