

Forest Compartment Mapping

Mapping Standards and Procedures
Addendum to OI Manual, Chapter 2

9/24/03

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Forest Compartment Mapping Standards

The compartment mapping process on state forest land is in a period of change. Digital encoding operations are replacing manual drafting techniques in an effort to move to a completely automated geographic information system under the IFMAP (Integrated Forest Mapping and Prescription) initiative. ***The standards and procedures described in this addendum will be used until the transition to IFMAP is complete.***

The current mapping process employs a combination of new and traditional methodologies and involves a cooperative effort by both the Management Units (Unit) and the Lansing Map Service (LMS). The Unit is responsible for compiling and verifying information that appears on the compartment maps, as well as recording map-related data into the Operations Inventory database (OIPC). LMS is responsible for digitizing selected base features, providing source material to the Unit to assist in the map compilation process, providing digitizing and printing services to the Units as needed, and maintaining a central repository for completed data sets.

Base Maps

Digital orthophoto quadrangle (DOQ) image maps developed by the U.S. Geological Survey will serve as the base for compartment mapping activities. DOQs represent aerial images that have been enlarged from photography acquired at the scale of 1:40,000 (1"=3,333'). This imagery has been rectified to control points and elevation models and meets national map accuracy standards at the scale of 1:12,000 (1"=1000'). Map information compiled from other sources (such as DNR aerial photography) will need to be transferred in such a manner as to be compatible with the DOQ.

Copies of the image maps will be provided to the Units when mapping for a particular year-of-entry begins. Generally, this will be no later than September of (YOE minus 3), unless requested earlier by the Unit.

Base Features

For each compartment, LMS will digitize a selection of base features that will be compatible with the DOQ base and will provide this information to the Unit. Transportation features to be provided will include state and federal highways and county roads. Some trails might be digitized if they are visible on the DOQ but the status of these will need to be verified by the Unit. Hydrographic features to be digitized will include rivers, streams, lakes, ponds, reservoirs, and floodings. Only base features within the PLSS (Public Land Survey System) sections that incorporate DNR property will be digitized. Boundaries of DNR forest land will also be digitized.

LMS will compile base features by screen digitizing from an enlarged DOQ image at a scale of approximately 1"=200' (this displays an area of forty acres on a 21" monitor). Roadways and narrow watercourses will be depicted as centerlines. Double lines will be used for watercourses over 50' in width. Lake and pond delineation will follow the line of

open water conditions apparent on the DOQ and will exclude areas of wetland vegetation. Wetlands will be mapped separately as a cover type by the Unit examiner.

Film Overlays

In order to facilitate the encoding or digitizing process by LMS, it will be necessary to have certain features for each compartment delineated separately. LMS will provide the Unit with a set of overlays on drafting film and paper for this purpose. These overlays will be plotted at a scale of 1:15,840. Each overlay will contain section corners from the MIRIS base and property boundaries for reference and registration purposes.

When drafting lines on the overlays, examiners should use a very fine-tip marker that will provide a dense black tone. This consistency is required in order for scanners to capture the line work. Erasing should be avoided as it is likely to damage the matte surface of the film. Corrections can be made by using white-out, or by doing a pencil draft first on a separate sheet of film.

Examples of appropriate pens would be ultra fine point permanent markers that will write on acetate or drafting film. These are “felt-tip” type markers, available under brand names such as Sharpie, Pilot, and others.

The contents and use of the overlays is as follows:

1. Aerial Images:

A mosaic of the DOQs covering the compartment will be provided on a film overlay. Tonal variations between adjacent images will be apparent due to such factors as year of acquisition, seasonal variations, sun angle, and film type.

Copies of the orthorectified high resolution imagery acquired under the IFMAP program will also be provided. This imagery can be used interchangeability with the DOQ as the positional accuracy of the data sets appears to be compatible.

Cover type boundaries and other features will at times be interpreted from secondary sources, such as un-rectified DNR aerial photographs. This information needs to be transferred to the appropriate overlay and be compatible with features shown on the rectified image overlays. Because features drawn from another source will not match exactly, it is suggested that prominent features from the rectified image sources be drafted first. Then use a best-fit process to fill in the remaining areas. This is a difficult procedure and may require use of an intermediate layout step. Lines could be first drafted in pencil on a separate sheet of film that would allow revisions to be made before the final copy is prepared.

When transferring features mapped from the DNR imagery, it is important that relative position be maintained with the features on the rectified imagery. Care must be taken to properly position a stand using the image overlays if it is situated at a certain distance from a road or other prominent feature.

2. Cover Type Polygons (Stands) and Property Boundaries:

Delineate cover type boundaries (only) on this film overlay. Polygon numbers will be indicated on a separate overlay. Adjustments to property boundaries should be indicated here. Cover type outlines should reflect revised property boundaries.

3. Cover Type Polygon Numbers (Stand Numbers):
The number assigned to each cover type polygon is to be indicated on this film overlay with a fine-tip black marker. Cover type codes associated with each polygon will be recorded directly into OIPC and not appear on overlays. Both cover type codes and numbers will appear on digitized maps.

4. Transportation and Utilities:
This film overlay will be used for federal, state and county roads, recreational and logging trails, transmission lines and pipelines, and wellhead locations. Any of these features that have been previously digitized from the DOQ will be displayed on the overlay.

The examiner needs to trace over any or all of these features that are still in existence with a black fine-tip pen, revise alignments if appropriate (based on imagery overlays), and add features where digitized line work is incomplete. If a road on the overlay is not traced over, it will not appear on the final map.

All roads and trails should be drawn with a single solid black line; do not use double or dashed lines (standard line styles will be generated during the digitizing process). Wellhead locations can be shown with a solid black dot or small "x" mark. Classification of roads, trails and wells will be done on a separate overlay.

5. Hydrography:
This film overlay will be used to delineate rivers, streams, lakes, ponds and floodings. Most of these features will be digitized by LMS following DOQ alignment. The examiner should trace over any of these features that are still in existence and make edits or additions as appropriate in a similar manner as the transportation system above.

6. Annotation, Classification:
Use this paper overlay to classify line and point features delineated on the other film overlays:

- Provide names of lakes, rivers, roads, etc.
- Indicate the location and description of other point features such as campgrounds, access sites, etc.
- classify roads, pipelines, powerlines, and other transportation and utility features
- Include notes and information for the cartographer.

The examiner can use any symbols, line styles, colored pencils or markers that are needed to adequately identify or classify features (use of standard symbols will help communications). Include legends on the overlay as appropriate to describe symbols or color scheme used as well as any other notes or instructions.

Map Phases

As soon as the map overlays are completed by the Unit for a compartment, all layers should be sent to LMS to be digitized. OIPC data should be entered with the exception of acreages (acres will be generated by LMS).

In order to meet review deadlines, maps should be sent in as completed – do not wait until the entire entry year is complete. LMS will work on them as soon as possible, but may prioritize based on compartment review dates.

Each version of a compartment map represents a phase in the land management process as indicated below. These phases are similar to the OIPC stages. The map phase will be indicated in the title block of each compartment map.

The Unit needs to indicate the correct phase on the maps as an item to edit when any map revisions are being sent to LMS each time the Unit reviews a version of the map.

Phase 1 - Draft Map (OIPC “Examining” stage)

As soon as they are ready, the Unit sends the overlay materials to LMS for digitizing. At LMS maps are scanned and features digitized according to standards for line styles, patterns, and symbols.

Acreage figures for compartments/stands being digitized will be generated by LMS and sent to the Unit. These figures will need to be entered by the Unit into OIPC and may need to be revised with revisions to the maps in subsequent phases.

Once digitizing is completed by LMS, the standard maps indicated below will be generated and sent to the Unit for review. Map Phase 1 will be indicated in the title block at this time. All standard maps will include selected base features for referencing purposes such as transportation network, hydrographic features, section corners of the U.S. Public Land Survey System (PLSS), registered land survey (RLS) corners, and ownership boundaries.

- Cover type map (cover type boundaries, cover type codes, stand numbers, cover type colors)
- Forest treatment map (cover types and codes, treatment types, biodiversity stewardship, and natural areas)
- Recreation facilities map (trails, trail symbols, campgrounds, access sites, other recreational features, feature names where appropriate)
- Transportation map (road ownership, road status)
- Oil and gas map (oil and gas wells, pipelines)

This standard set of maps will be designed for printing at a scale of 4 inches to the mile. The majority of compartments will fit on 11 X 17” sheets at this scale. The font size will be 10 point. This font is small, but still readable when printed as small as 8½ X 11”. Units may also need to prepare separate map layouts from the shape files for special uses at different scales and fonts.

When the initial draft digitized maps are received at the Unit from LMS they should be reviewed for cover type, stand density, legend, title, and stand line errors. The Unit should also check for other errors, such as incorrect road type, missing feature names, incorrect section corners, etc.

Copies of maps will be sent between the Unit and LMS until all revisions are approved. OIPC must be examined for errors and updated by the Unit as part of this process. Communication between the Unit and LMS is essential. Both need to be clear and concise in all communications and realize that this is an iterative process that will require back-and-forth interaction.

When revisions are complete, the Unit is to send LMS (cc planner) an e-mail note that the draft compartment map is approved as error free and that the map phase should be changed to Phase 2. Throughout this process, the OI database administrator and LMS add the current OI database information to the maps (see "Data Merging" below).

Phase 2 – Pre-Review (OIPC "Examining" stage)

Once the draft maps are approved, LMS will create and supply standard maps (based on treatments coded into OIPC) in paper and/or digital ArcView shapefiles as needed by the Unit for the pre-review meeting. This meeting involves formal or informal discussion and development of management plans with other divisions at the local level. Revisions generated by this meeting will need to be made to the maps and OIPC. All revisions must be coordinated through LMS. Again, copies of maps will be sent back-and-forth between the Unit and LMS until all revisions are approved by the Unit.

When approved, the Unit is to notify LMS to change the map to Phase 3. These are the maps to be used for open house and review.

Phase 3 – Review (OIPC "Review" stage)

LMS will provide copies of standard maps as well as digital files attributed with OIPC data to the Unit as needed for open house and compartment review. Maps, narratives, and tables will be posted to the Web site at this time by Lansing staff in coordination with the Unit, Statewide Inventory Specialist, Lansing IT personnel, and LMS.

Phase 4 – Post-Review/Approval Phase (OIPC "Post Review" stage)

After the open house and review, revisions generated by the meetings will need to be made to the maps and OIPC. As soon as the review is complete, the Unit should notify LMS to change the maps to Phase 4.

Copies of maps will be sent back-and-forth until all revisions (map and OIPC) are approved by the district Inventory and Planning Specialist.

After the Inventory and Planning Specialist has approved all revisions (OIPC "Approval" stage) LMS will provide Units with copies of all standard maps for Unit files. The Units may request additional copies to use in implementing treatments. After the approval, the Unit should notify LMS to change the map phase to Phase 5.

Phase 5 – Update Phase (OIPC "Update" stage)

The Unit is to update compartment cover type map lines and OIPC **as soon as** forest treatments (timber sales and/or non-commercial treatments) are completed and closed. The updated map information will be sent to LMS for revising the digital map files. Copies of corrected maps will be sent back-and-forth between the Unit and LMS until all revisions are approved. A dated copy of the final map will be sent to the Unit for filing into the compartment folder. Where revisions to digital files are done by the Unit, a copy will be forwarded to LMS for inclusion in the central archive.

Data Merging

One of the benefits of digital data, as developed by the LMS with the Units, is the ability to link database information, such as OIPC data. The entire mapping process is concurrent with development of the information database. In IFMAP, the two will be combined into one GIS process.

There are several points in the current process where selected data (attributes) in OIPC are linked to the compartment maps. Units will use the attributed maps and their shape files to present treatment decisions at open houses and compartment reviews.

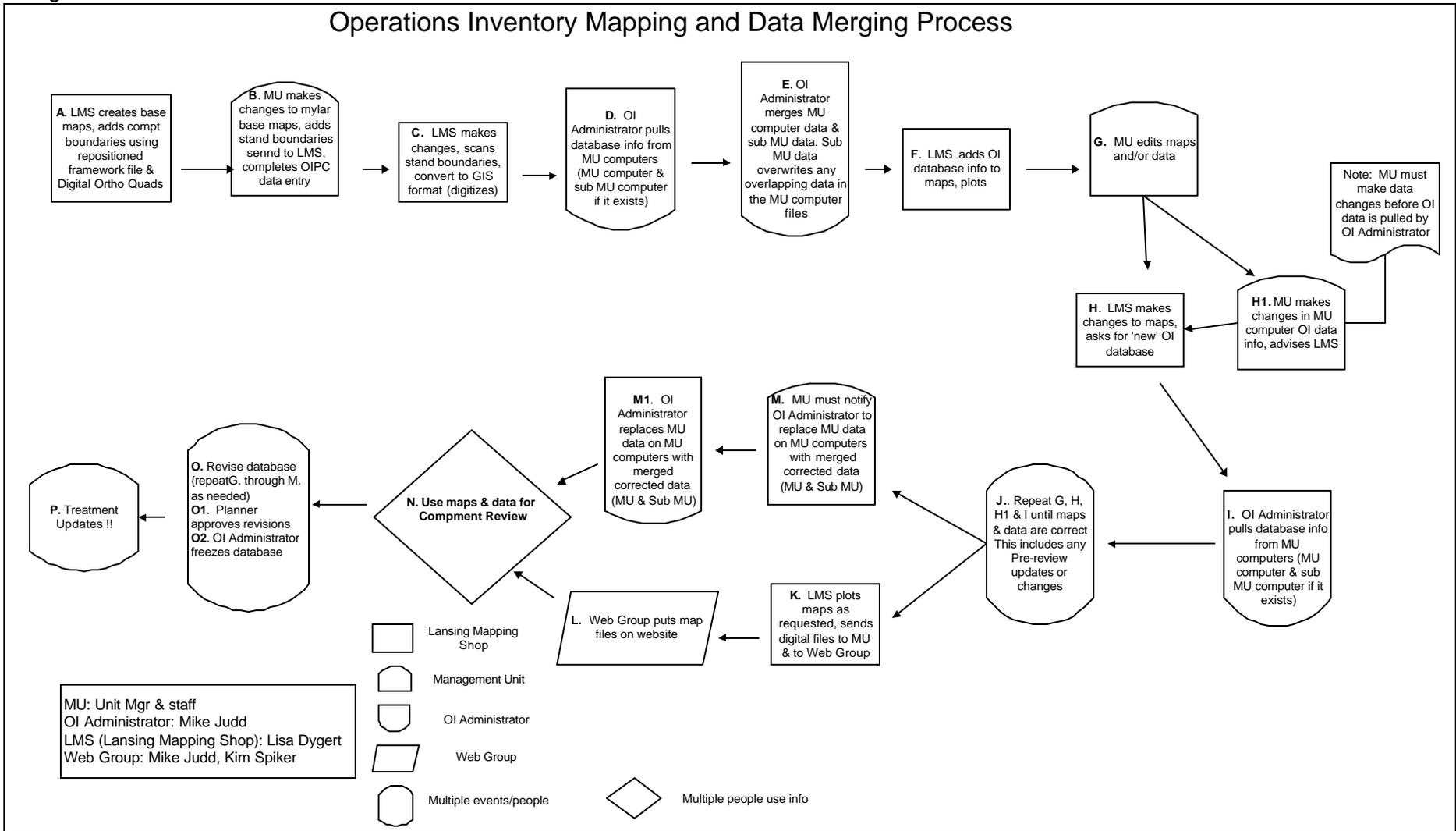
It is especially important to make sure that the final "Approved" map (see Phase 4 above) is attributed with the final "Frozen" database for that YOY. This combination will be used both tactically and strategically – by both the Unit and staff – for the management of State Forest lands, and marks the final stage of the decision making process. These attributed files will also serve as a base of historical information for IFMAP.

It is important that the Unit understand that the linkage between the OIPC database and the maps does not occur automatically, but only upon request of the Unit. When you send a map to LMS, let them also know that there have been changes in the OIPC database (or not) that will require a new linkage.

LMS will maintain a central repository of these completed map/data sets and will make them available to internal users as needed.

For an overview of the entire Mapping and Data Merging Process that all Units should be using, see Figure 1.

Figure 1.



Updating the Mapping Standards

FMFM, with consultation with other divisions, will create a Mapping Standards Committee to making decisions on issues relating to mapping standards. The Committee would meet once per year at a minimum. This annual meeting would determine the necessity for any further work by the committee for the coming year.

The committee chair would initiate the annual meeting by notifying Divisions (FMFM & Wildlife essential) and existing committee members, requesting input on the current mapping standards or mapping issues. This should be done at least two months in advance of the meeting.

The Chair will develop an agenda for the meeting based upon the input received from the Divisions and Committee members. This agenda will be sent to all committee members (with informational copies to ad hoc members). The Committee would discuss items and determine which are mapping standard issues, prioritize issues for resolution and then make recommendations on appropriate resolution. They would then forward these recommended changes to the Division Management Team for approval. The Committee will include a Management Team Liaison to facilitate communications.

The committee would have the following composition:

- Chair – Mapping Unit Supervisor
- Compartment Mapping Project Manager from LMS
- District Recreation Specialist
- District Fire Specialist
- District Timber Management Specialist
- District Forest Inventory and Planning Specialist
- Field Forester
- 2 Representatives from Wildlife Division
- Forest Resource Management Section Inventory Specialist

Additional Ad Hoc Members as needed:

- 1 Geology Specialist*
- 1 Forest Health Specialist*
- 1 Fisheries Representative*
- 1 MNFI Representative*
- 1 Parks Representative*
- 1 Law Representative*

* Invite as option to get their input and inclusion in the process.

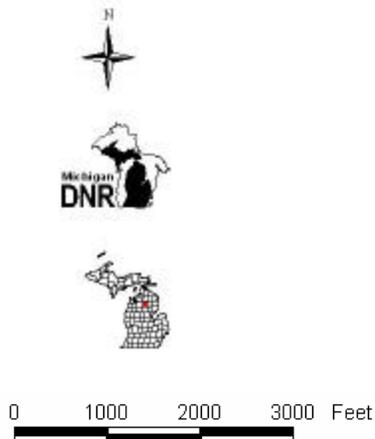
The term of appointment would be for three (3) years with one third changeover per year.

Map Features (pages 10A-19A)

Title Block

Compartment.....	Compartment number
TRS.....	PLSS reference (township, range, section)
County.....	County name
Unit.....	Management Unit
YOE.....	Year-of-entry
Acres.....	GIS calculated acreage of all parcels in compartment
Examiner.....	Name of stand examiner
Map Revised.....	Map revision date
Map Phase.....	Stage of review process (draft, pre-review, etc.)

Sheet Elements



Transportation

ROAD OWNERSHIP

	Interstate highway	Solid line size 2, color 9 ESRI Transp.avp
	Other federal highway	Solid line size 2, color 9 ESRI Transp.avp
	State highway	Solid line size 2, color 9 ESRI Transp.avp
	County road	Solid line size 2, color 6 ESRI Default.avp
	Public street	Solid line size 1, color 6 ESRI Default.avp

ROAD SURFACE

	Paved	ESRI Default.avp
	Gravel	ESRI Default.avp
	Dirt	ESRI Default.avp
	Trail	ESRI Default.avp

ROAD CLOSURE

	Closed/abandoned road	ESRI Transp.avp, color 4, size 2
PA	Proposed abandoned road	Text on line
DO	Closed (Director's order)	Text on line
CL	Closed	Text on line
	Closure point (gate)	ESRI Default.avp, color 6
	Closure point (natural material)	ESRI Default.avp, color 53

OTHER TRANSPORTATION

	Bridge	ESRI Forestry.avp, color 6
	Culvert	ESRI Forestry.avp, color 21
	Railroad	ESRI Default.avp
	Abandoned railroad	ESRI Transp.avp
	Airport, landing strip	Solid line size 1, color 40

Hydrography

	River, stream	Solid line size 1, color 27
	Intermittent stream, drain, ditch	ESRI Default.avp size 1, color 27
	Flow direction of watercourse	ESRI USGS.avp, color 27
	Lake, pond, flooding	Solid line size 1, color 21
	Dike, levee, breakwater	Solid line size 1, color 6
	Spring, seep	ESRI Water.avp, color 21
	Waterfall	Minnesota recreation symbols, color 21
	Dam	Minnesota recreation symbols, color 21

Utilities

	Power line	ESRI Carto.avp, color 21
	Pipeline	ESRI Carto.avp, color 9
	Buried cable	ESRI Default.avp, color 9
	Electric substation	ESRI Default.avp, color 6
	Communication tower	ESRI Default.avp, color 21

U.S. Public Land Survey System (PLSS)

	Registered corner (DNR)	Lansing Map Service (LMS) Untitled font rlssymbol.avl
	Registered corner (Private)	LMS Untitled font, rlssymbol_pvt.avl
	Unregistered corner	LMS Untitled font rlssymbol_unregistered.avl
	Section number	Text color 7
	Section line, private claim	Solid line size 1, color 7
	Section corner location	Solid line size 1, color 9

Extractive

	Oil well (active)	ESRI Oilgas.avp, color 17
	Oil well (abandoned)	ESRI Oilgas.avp, color 17
	Natural gas well (active)	ESRI Oilgas.avp, color 9
	Natural gas well (abandoned)	ESRI Oilgas.avp, color 9
	Brine disposal well	ESRI Oilgas.avp, color 21
	Dry hole	ESRI Oilgas.avp, color 6
	Gas processing facility	ESRI Default.avp
	Sand and gravel pit	ESRI Raster.avp, color 6
	Quarry	ESRI Default.avp, color 6
	Mine shaft	ESRI Raster.avp, color 6

Other

	Archeological site	ESRI Colormrk.avp
	Cemetery	ESRI Municipl.avp, color 53
	Seasonal dwelling	ESRI Municipl.avp, color 9

Administrative Offices

	Operations service center	ESRI Muniapl.avp, color 6
	Forest Unit headquarters	ESRI Muniapl.avp, color 17
	Park Unit headquarters	ESRI Muniapl.avp, color 9
	Wildlife Unit headquarters	ESRI Muniapl.avp, color 53
	Other field office	ESRI Muniapl.avp, color 21

Recreation

	Hiking trail	Minnesota recreation symbols
	Bicycle trail	Minnesota recreation symbols
	Horseback riding trail	Minnesota recreation symbols
	Cross country skiing trail	Minnesota recreation symbols
	Snowmobile trail	Minnesota recreation symbols
	ORV trail	Minnesota recreation symbols
	ORV route	Minnesota recreation symbols, color 53
	MCCCT	Minnesota recreation symbols
	Trailhead	ESRI Muniapl.avp
	Parking lot	Minnesota recreation symbols
	Campground	ESRI Muniapl.avp
	Public access site	Minnesota recreation symbols
	Canoe landing	Minnesota recreation symbols
	Marina	Minnesota recreation symbols

Ownership Boundaries

 Forest management system	Solid line size 2, color 17
 Park management system	Solid line size 2, color 45
 Wildlife management system	Solid line size 2, color 55

Cover Type

 Cover type boundary	Solid line size 1, color 15
23 Polygon (stand) number	Text
R6 Cover type code	Text

Management Type

 Treatment	ESRI Default.avp, color 6
 Biodiversity Stewardship	ESRI Default.avp, color 6
 Natural Area	ESRI Default.avp, color 6

Cover Type Categories

OPERATIONS INVENTORY: ALPHABETICAL -(ARCVIEW 3.2 CUSTOM COLORS)

	A	Aspen.....	Hue-40, Saturation-131, Value-254
	B	Paper birch.....	Hue-25, Saturation-61, Value-254
	C	Northern white cedar.....	Hue-226, Saturation-20, Value-252
	D	Treed bog.....	Hue-134, Saturation-255, Value-178
	E	Swamp hardwoods.....	Hue-202, Saturation-79, Value-178
	F	Upland spruce or fir.....	Hue-94, Saturation-68, Value-136
	G	Grass.....	Hue-59, Saturation-70, Value-255
	H	Hemlock.....	Hue-244, Saturation-50, Value-254
	I	Local use.....	Hue-116, Saturation-105, Value-235
	J	Jack pine.....	Hue-77, Saturation-75, Value-249
	K	Rock.....	Hue-15, Saturation-30, Value-170
	L	Lowland brush.....	Hue-138, Saturation-60, Value-227
	M	Northern hardwoods.....	Hue-19, Saturation-110, Value-208
	N	Marsh.....	Hue-130, Saturation-60, Value-255
	O	Oak.....	Hue-18, Saturation-240, Value-199
	P	Balsam poplar, swamp aspen, swamp white birch.....	Hue-190, Saturation-44, Value-239
	Q	Mixed swamp conifers.....	Hue-243, Saturation-80, Value-222
	R	Red pine.....	Hue-81, Saturation-120, Value-209
	S	Black spruce swamp.....	Hue-241, Saturation-125, Value-189
	T	Tamarack.....	Hue-238, Saturation-110, Value-226
	U	Upland brush.....	Hue-60, Saturation-77, Value-222
	V	Bog or muskeg.....	Hue-154, Saturation-90, Value-254
	W	White pine.....	Hue-79, Saturation-120, Value-164
	X	Non-stocked.....	Hue-0, Saturation-0, Value-165
	Y	Sand dunes.....	Hue-39, Saturation-60, Value-255
	Z	Water.....	Hue-130, Saturation-85, Value-251

OPERATIONS INVENTORY: COVER TYPE GROUPS -(ARCVIEW 3.2 CUSTOM COLORS)

Upland Deciduous

	A	Aspen.....	Hue-40, Saturation-131, Value-254
	B	Paper Birch.....	Hue-25, Saturation-61, Value-254
	M	Northern Hardwoods.....	Hue-19, Saturation-110, Value-208
	O	Oak.....	Hue-18, Saturation-240, Value-199

Upland Coniferous

	F	Upland Spruce or Fir.....	Hue-94, Saturation-68, Value-136
	J	Jack Pine.....	Hue-77, Saturation-75, Value-249
	R	Red Pine.....	Hue-81, Saturation-120, Value-209
	W	White Pine.....	Hue-79, Saturation-120, Value-164

Upland Non-forested

	G	Grass.....	Hue-59, Saturation-70, Value-255
	K	Rock.....	Hue-15, Saturation-30, Value-170
	U	Upland Brush.....	Hue-60, Saturation-77, Value-222
	X	Non-stocked.....	Hue-0, Saturation-0, Value-165
	Y	Sand Dunes.....	Hue-39, Saturation-60, Value-255

Local Use

	I	Local Use.....	Hue-116, Saturation-105, Value-235
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Lowland Deciduous

	E	Swamp Hardwoods.....	Hue-202, Saturation-79, Value-178
	P	Balsam Poplar, Swamp Aspen, Swamp White Birch...	Hue-190, Saturation-44, Value-239

Lowland Coniferous

	C	Northern White Cedar.....	Hue-226, Saturation-20, Value-252
	H	Hemlock.....	Hue-244, Saturation-50, Value-254
	T	Tamarack.....	Hue-238, Saturation-110, Value-226
	Q	Mixed Swamp Conifers.....	Hue-243, Saturation-80, Value-222
	S	Black Spruce Swamp.....	Hue-241, Saturation-125, Value-189

Non-forested Wetlands

	D	Treed Bog.....	Hue-134, Saturation-255, Value-178
	L	Lowland Brush.....	Hue-138, Saturation-60, Value-227
	M	Marsh.....	Hue-19, Saturation-110, Value-208
	N	Bog or Muskeg.....	Hue-130, Saturation-60, Value-255
	Z	Water.....	Hue-130, Saturation-85, Value-251

IFMAP (LEVEL 3) -(ARCMAP 8.3 CUSTOM COLORS)

	121	Airports.....	Red-240, Green-240, Blue-240
	122	Road/Parking Lot.....	Red-215, Green-215, Blue-215
	310	Herbaceous Openland.....	Red-231, Green-255, Blue-195
	320	Upland Shrub.....	Red-194, Green-220, Blue-130
	330	Low-density Trees.....	Red-215, Green-237, Blue-53
	411	Northern Hardwoods.....	Red-212, Green-169, Blue-116
	412	Oak Types.....	Red-202, Green-101, Blue-0
	413	Aspen Types.....	Red-245, Green-255, Blue-145
	414	Other Upland Deciduous.....	Red-254, Green-230, Blue-188
	419	Mixed Upland Deciduous.....	Red-220, Green-200, Blue-1
	421	Planted Pines.....	Red-145, Green-225, Blue-145
	422	Natural Pines.....	Red-0, Green-175, Blue-0
	423	Other Upland Conifers.....	Red-118, Green-148, Blue-125
	429	Mixed Upland Conifers.....	Red-140, Green-230, Blue-205
	430	Upland Mixed Forest.....	Red-177, Green-156, Blue-105
	500	Water.....	Red-175, Green-235, Blue-255
	611	Lowland Deciduous Forest.....	Red-185, Green-155, Blue-200
	612	Lowland Coniferous Forest.....	Red-215, Green-150, Blue-165
	613	Lowland Mixed Forest.....	Red-250, Green-200, Blue-215
	621	Floating Aquatic.....	Red-150, Green-195, Blue-255
	622	Lowland Shrub.....	Red-161, Green-199, Blue-213
	623	Emergent Wetland.....	Red-204, Green-255, Blue-255
	629	Mixed Non-forested Wetland.....	Red-46, Green-158, Blue-198
	710	Sand, Soil.....	Red-254, Green-253, Blue-214
	720	Exposed Rock.....	Red-195, Green-195, Blue-165
	730	Mud Flats.....	Red-128, Green-128, Blue-128
	790	Other Bare/Sparsely Vegetated.....	Red-235, Green-240, Blue-215

Treatment Codes

CUTTING METHOD (FIRST DIGIT)

0**	No cut
1**	Final harvest
2**	Seed tree
3**	Shelterwood-seed
4**	Thinning
5**	Removal
6**	Delayed Removal
7**	Shelterwood-prep
8**	Selection
9**	Improvement

CULTURAL NEED (SECOND DIGIT)

0	No cultural need
1	Planting
2	Opening maintenance
3	Direct seeding
4	Natural regeneration
5	Release
6	Cleaning-weeding
7	Thinning
8	Pruning
9	Other (see comments)

CULTURAL METHOD (THIRD DIGIT)

**0	No cultural method
**1	Hand tools
**2	Aerial application
**3	Ground application
**4	Bulldozer
**5	Mechanical, other
**7	Prescribed burning
**8	Other (see comments)

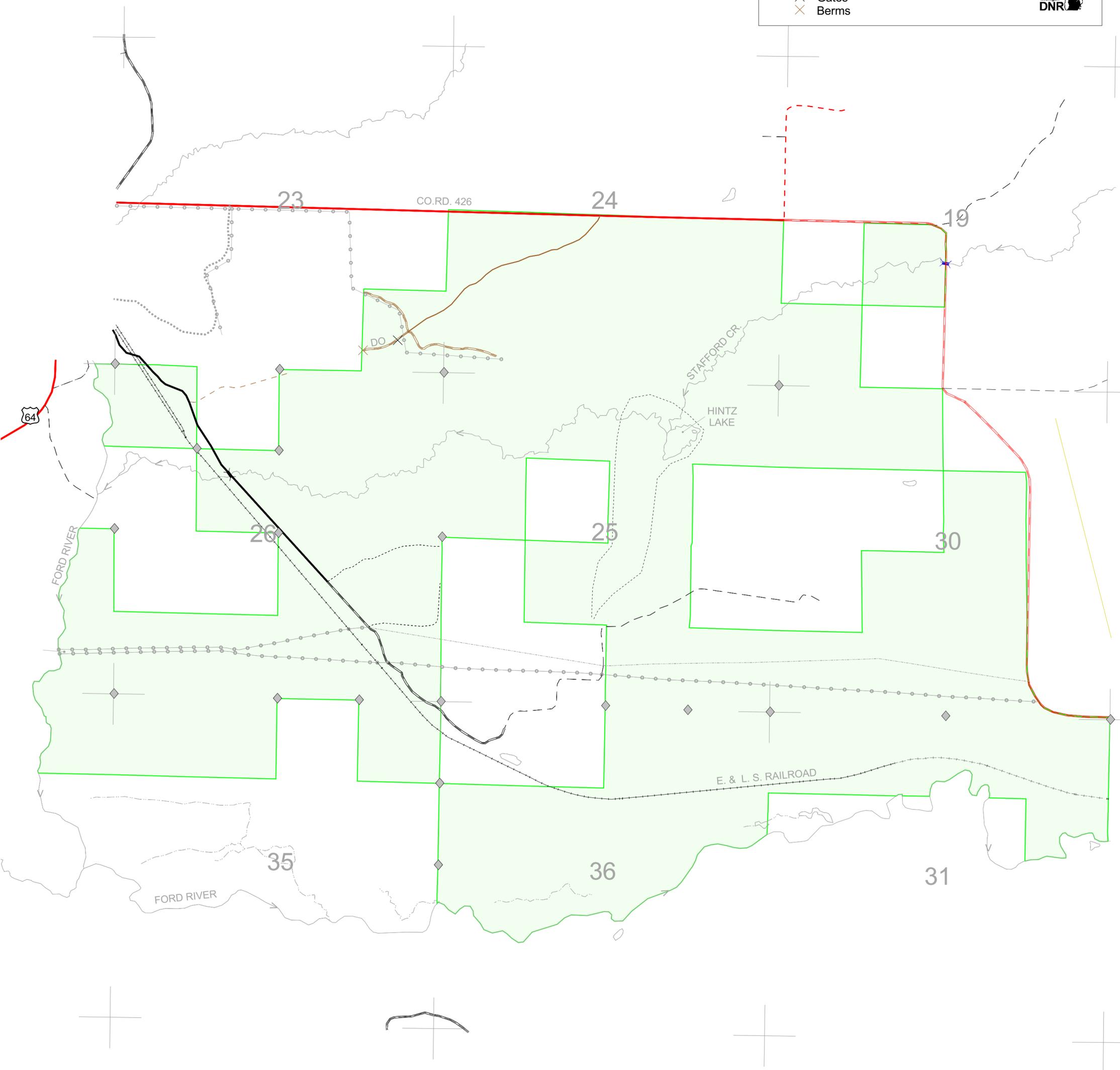
Compartment 29
 T43N, R28W, Sec. 23-27, 34-36
 T43N, R27W, Sec. 19, 30, 31
 County: Dickinson
 Unit: Crystal Falls
 YOE: 2004
 Acres: 2,349 GIS Calculated
 Stand Examiner: Terry Cryderman
 Map Revised: 5/08/2003
 Map Phase: Post Review

Transportation

Legend

-  Highway
-  County Road-Paved
-  County Road-Dirt
-  County Road-Gravel
-  Public Street-Paved
-  Public Street-Dirt
-  Public Street-Gravel
-  Paved Roads
-  Gravel & Good Dirt Roads
-  Poor Dirt Roads
-  Railroads
-  Trails
-  Closed
-  Airport
-  Abandoned Railroad
-  Compartment Boundary
-  Culverts
-  Bridges
-  Gates
-  Berms



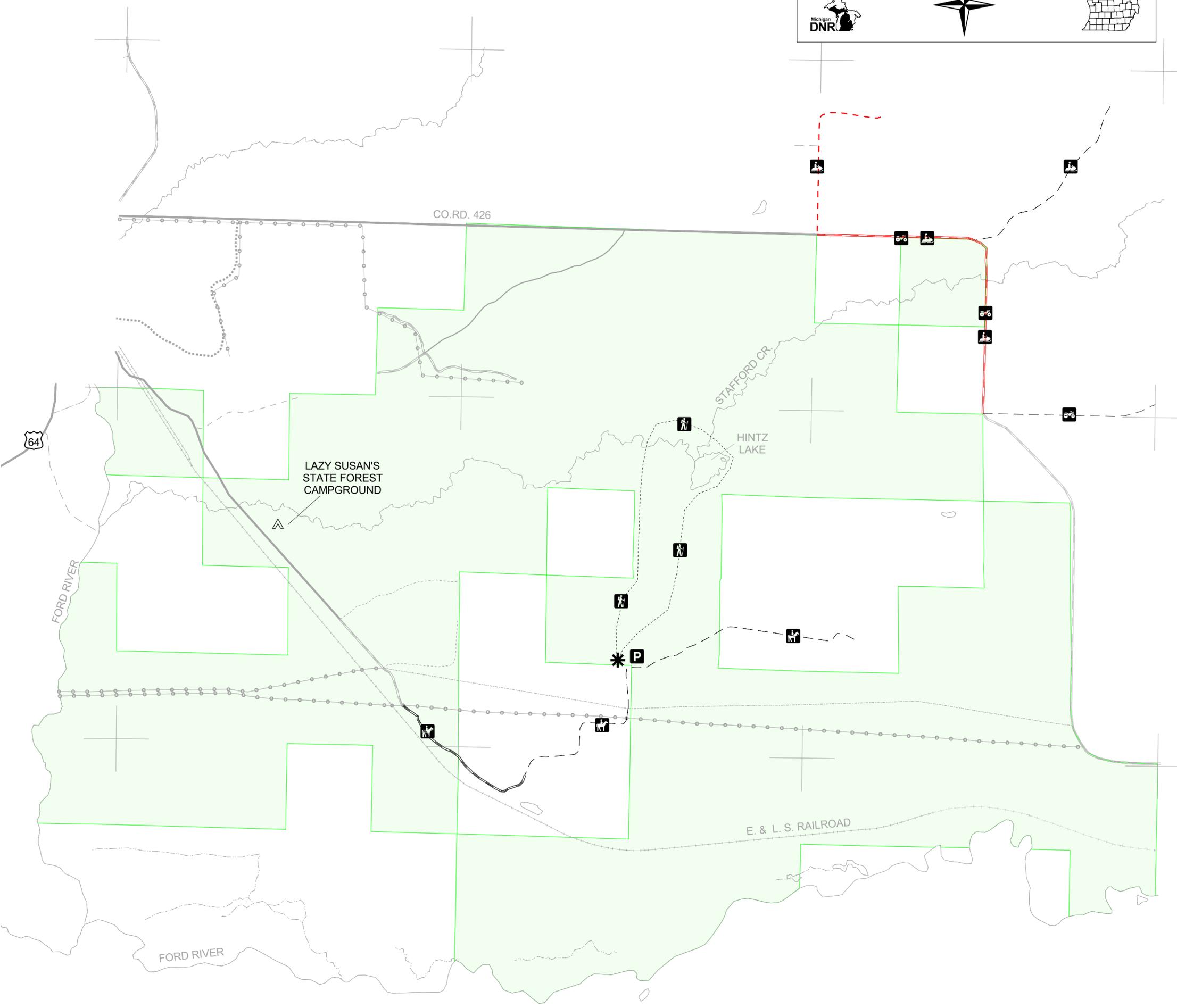



Compartment 29
T43N, R28W, Sec. 23-27, 34-36
T43N, R27W, Sec. 19, 30, 31
County: Dickinson
Unit: Crystal Falls
YOE: 2004
Acres: 2,349 GIS Calculated
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Map Revised: 5/08/2003
Map Phase: Post Review

Recreation

Legend

-  Snowmobile Trails
-  ORV Trails
-  Hiking Trails
-  Horse Trails
-  Trailhead
-  Parking
-  Campground



LAZY SUSAN'S
STATE FOREST
CAMPGROUND

E. & L. S. RAILROAD

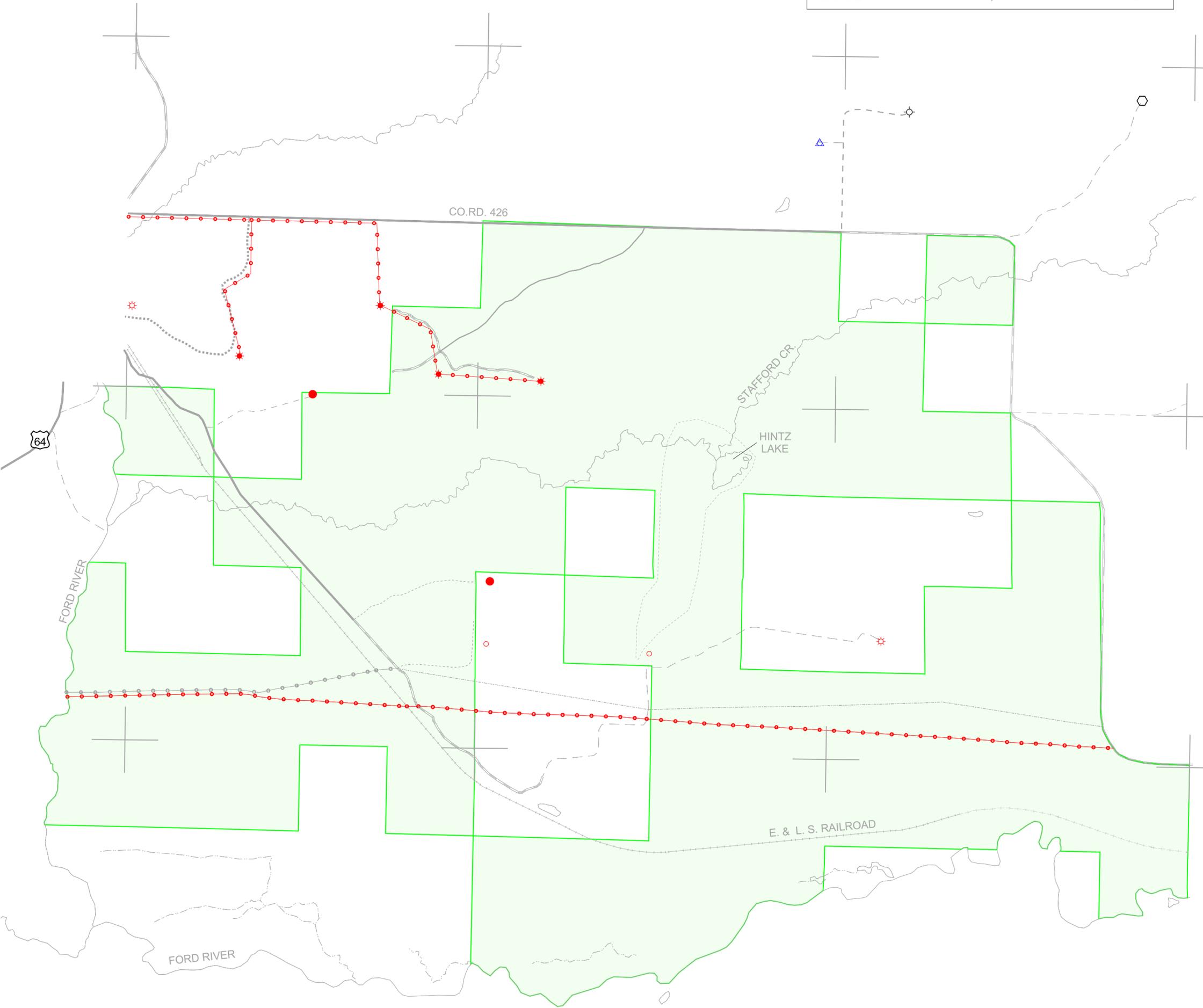


Compartment 29
T43N, R28W, Sec. 23-27, 34-36
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Oil & Gas

Legend

- Pipeline
- Active Oil Well
- Abandoned Oil Well
- Active Natural Gas Well
- Abandoned Natural Gas Well
- Brine Disposal Well
- Dry Hole
- Gas Processing Facility

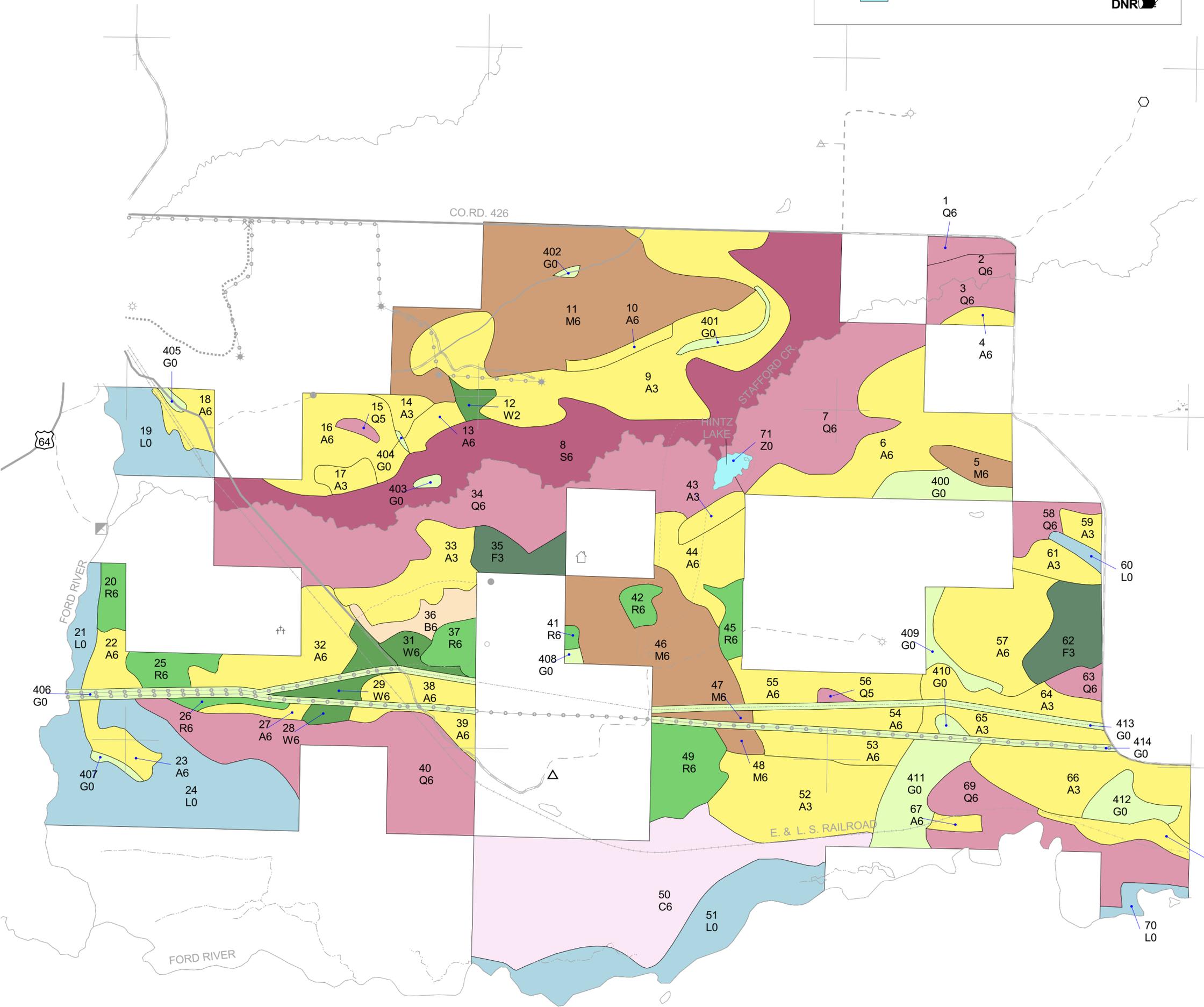
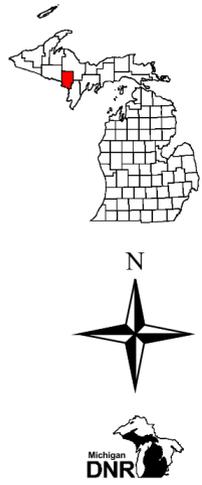


Compartment 29
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Cover Type

Legend

-  Stand Boundary
-  A - Aspen
-  B - Paper Birch
-  C - Northern White Cedar
-  F - Upland Spruce or Fir
-  G - Grass
-  L - Lowland Brush
-  M - Northern Hardwoods
-  Q - Mixed Swamp Conifers
-  R - Red Pine
-  S - Black Spruce Swamp
-  W - White Pine
-  Z - Water



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Treatment

Legend

-  Stand Boundary
-  Treatment
-  Natural Area
-  Biodiversity Stewardship
- 100 Final Harvest
- 400 Thinning
- 800 Selection

