

Appendix E

Post Construction for New Development and Redevelopment

1. List of Post-Construction Storm Water Best Management Practices (Pages E.1-1 to E.1-4)
2. Project Water Quality Recommendations (Pages E.2-1 to E.2-11)

Appendix E.1 List of Post-Construction Storm Water Best Management Practices

Control Section	Job Number	County	Route	Job Description	Impact Issues	BMP/Mitigation	Recommended Maintenance
03032		Allegan	US-31, Median, South of Washington Ave. in Holland	Detention Basin			
04031	32335	Alpena	US-23	Detention Basin			
11013	34500	Berrien	US-31 St. Joseph River	Detention pond in Ramp			
11016		Berrien	I-94, over St. Joe River - SE quadrant	Detention Pond			
11016	38208	Berrien	I-94 at Napier Ave.	Detention Basin			Berrien County Drain
11018	38094	Berrien	I-94 @ Mill Race Creek	Drop Structure			
11051		Berrien	Old US-33, Woodlawn and Church Street	Detention Basin			MDOT Maintenance
11054	99282	Berrien	M-63 - NE quadrant of Maple Lane	Detention Basin at Lake Michigan			
11057		Berrien	US-31, Station 354, Niles-Buchanan Road	Detention Basin			
11056		Berrien	US-31, Station 507, NB	Detention Basin			
11056		Berrien	US-31, Station 539, NB	Detention Basin			
11056		Berrien	US-31, Station 616, SB	Detention Basin			Private Property
11057		Berrien	US-31, Station 740, Lake Chapin Rd.	Detention Basin			
11057		Berrien	US- 31, Station 753, NB, South side of Lake Chapin	Detention Basin			
11057		Berrien	US-31, Station 767, NB, North side of Lake Chapin	Detention Basin			
11057		Berrien	US-31, Station 780, NB, South of Snow Rd.	Detention Basin			
11057		Berrien	US-31, Station 789, NB, Snow Rd.	Detention Basin			
11057		Berrien	US-31, Station 862, NB, North of Shawnee Rd.	Two Detention Basins			
11057	29512, 34511	Berrien	US-31 NB Lemon Creek Tributary, Walton and Maths Rd.	Detention/ Sedimentation			
11112	34511	Berrien	US-31 @ Old US-31 (S08 of 11112)	Detention Pond			
13031	99289	Calhoun	M-66 @ B Drive, Battle Creek	Walmart Detention Basin			
13032	39654	Calhoun	M-66 @ Pennifield	Co. Drain to Infiltration Basin			
15071	45002	Charlevoix	M-75, Boyne Industrial Park	Infiltration Trench			
15091	32322	Charlevoix	US-131, BR	Retention Basin, 2 cell			
18032	53307	Clare	US-131BR	Harrison Infiltration System			

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Control Section	Job Number	County	Route	Job Description	Impact Issues	BMP/Mitigation	Recommended Maintenance
20012		Crawford	AuSable River & BL I-75 in city of Grayling	Vegetative Ditch			
23062	12271	Eaton	I-69	Detention Basin			
25032	33289	Genesee	I-75/ US-23 Parker Drive	Stilling Basin			
28012		Grand Traverse	US-31, M-37, Chums Corner	Two cell Detention Basin			
28051	37693	Grand Traverse	US-31/ M-37	Detention Basin			
30062		Hilldale	US-12, Jonesville	Retention Basin			
33084		Ingham	I-96	Detention Basin			
37022		Isabella	M-20,US-127, NE quadrant of Ramp	Pump Station and Retention			
39011		Kalamazoo	US-131, Station 163, SB	Detention Basin			Private Property
39022		Kalamazoo	North of I-94 and west of Lovers Lane in Kalamazoo/Portage	Dry pond detention basin			
39022		Kalamazoo	I-94 WB at Galesburg Rest area	Detention Basin			MDOT Maintenance
39024	86055	Kalamazoo	I-94 NW quadrant of 12th street	Detention Basin			
39024	86055	Kalamazoo	I-94/US-131 SouthwestSouthwest side of Ramp C station 1350+00	Detention Basins			
39024	86055	Kalamazoo	I-94/US-131 NW quadrant of interchange inside ramps G and D	Detention Basin			
39024	86055	Kalamazoo	I-94 WB/northside just east of Oakland Drive station 1455+00	Detention basin			
39024	86055	Kalamazoo	I-94/US-131 Northerly side of interchange in median between NB/SB US-131	Detention Basin			
39024	54230	Kalamazoo	I-94 at Sprinkle Road	Detention Basins			
39041	72683	Kalamazoo	I-94 BL Stadium Drive at Michigan Ave	Infiltration Basin			
39032	28617	Kalamazoo	M-43	Detention Basin			
39081		Kalamazoo	M-43 at 8th St.	Two Detention Basins			
39082		Kalamazoo	M-43	Infiltration Basin			
41031	30147	Kent	M-37, Plaster Creek Tributary, NW of 44th Street	Detention Basin			
41031	34694	Kent	M-37 @ 44th to 60th	Retention Basin			
41051		Kent	M-44	Detention Basin			

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41057		Kent	M-44	County Drain - Knapps Drain - Infiltration			County will maintain
41131	51903	Kent	US-131	Bridge Reconstruction over Plaster Creek	Scupper Drain Runoff	Bank stablization to correct gully erosion	
43021/43012		Lake	NW Quadrant of M-37/US-10 north JCT	Detention Basins			
43555		Lake	M-37 @ Lake Street, Baldwin	Vortech, outlet weir			
45012		LeeLanau	M-22, Glenn Arbor Pump station	Retention Basin			City jurisdiction
47014	34519	Livingston	M-59	Ramp Reconstruction, Widen Approaches	Extensive groundwater contamination at all 4 quadrants	Minimize utility cuts, Dewatering, non-porous	
50022	28460	Macomb	M-59 @ Elizabeth Rd. / I-94	Detention Basin			
50022	5675	Macomb	M-59	Detention Basin			
50022	28460	Macomb	M-59, Snover Road	Infiltration Basin			
50023		Macomb	M-59,	3 Detention Basins, First flush in Median			
50062		Macomb	I-696, Lake Street	Oli/gas separator			
51011	74005	Manistee	US-31, Manistee	Vortech			MDOT Maintain
53034		Mason	US-131 north and south of the Big Sable River	Bit paved ditches and grated structures			
53022	44413	Mason	US-10	Detention and Leachate Basin			
59045	32341	Montcalm	M-46 East of Edmore	2 ponds			
63012		Oakland	I-696, River Rouge	Pump Station			
63022	51880	Oakland	I-96 @ Beck Road	Pond			
63081		Oakland	US-10 and Northwestern Hwy., McKinley Drain	Detention Basin			
63101	9219	Oakland	I-696, Minnow Pond Drain	Swale retrofit demonstration project			
63102	22140	Oakland	US-10 and Northwestern Hwy.	Detention Basin with Pump Station discaharge into Rouge			
63112		Oakland	M-24, Lake Orion	Retention Study by MSU			
67022	38464	Osceola	US-10 in Evert	Detention Basin			
69022		Otsego	west side of M-32 just south of Johannesburg	Detention Basin			
69000		Otsego	Gaylord	Detention Basin			
70041		Ottawa	M-45, west of Sand Creek	Retention Basin			

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Control Section	Job Number	County	Route	Job Description	Impact Issues	BMP/Mitigation	Recommended Maintenance
77023		St. Clair	M-21	Detention Basin			
80071	48547	Van Buren	M-51 in Decatur	Infiltration Basin			
80071	48547	Van Buren	M-51 in Decatur	Infiltration Basin			
82022	45686	Wayne	I-94 Beech Daly to Pelham Road	Detention Basin			
83031	48538	Wexford	US-131BR, Cadillac, Mackinaw Trail	Detention Basin			
83033		Wexford	US-131	Bog/Fen Bridge Approach	Infiltration	Minimize salt to bog	
83033	43613	Wexford	US-131 at S04 of 83033	Basin - Infiltration and Retention	Litigation		
FR11112	38605		US-31 (Relocation)	Detention Basin			
	74149		I-69	Rest area reconstruction	Parking lot runoff	Oil/water separators	
12033			US-12 and I-69	Detention Basin			MDOT Maintenance
41024		Kent	I-96/36th St.	Rip rap, drop structures, basins, permanent check		Slows water flow	
13074		Calhoun	I-69 southbound, Turkeyville Rest Area	Rain garden		Parking lot runoff	Contractor responsible for weeding in first year.
31012		Houghton	Cemetery Rd, City of Houghton	Storm sewer and detention basin			
31051		Houghton	Mill Rd / US-41, near City of Houghton	Drop structure			

Summary of Project Recommendations for Water Quality Benefit

Reconstruct, widening, drainage work, sewer, water main, utilities, access mgt, turn lanes, sidewalk, GR, detour, ROW, c&g outlets, I-94 BL from M-60 to Washington/Louis Glick, Jackson County, University Region, Grand river

If the project results in increased stormwater volume or rate of discharge, BMPs should be included in the project to mitigate the effects of stormwater on water quality and to comply with MDOT's statewide NPDES stormwater discharge permit. Appropriate procedures should also be followed to locate and contain contaminated groundwater that may be encountered during water main, utility, or sewer work.

Interchange upgrade and bridge work, US-23/Geddes Rd, Washtenaw County, University Region, Huron River

The current scope of work will not have a significant effect on water quality. If the scope of work extends south or if project changes will affect drainage patterns to the Huron River, then BMP's should be included in the project.

M-99 from Hillsdale city limits south to Bacon St, Hillsdale County, University region, St. Joe River

BMPs have been examined and included in the project design. Several alternatives for installing treatment structures have been looked at, but the feasibility of incorporating these practices was diminished by the presence of a high water table and the location of multiple 4(f) properties, fair grounds, and a cemetery. For at least one location, moving the existing outlet back from the river and creating a vegetated swale will be possible.

US-27 BR over the Looking Glass River Bridge Replacement, Clinton County, University Region, Looking Glass River

If the project increases the volume or velocity of stormwater discharged from MDOT ROW, or includes drainage outlets with direct discharges to surface water, then BMPs should be included in the project design. Open drainage through a vegetated swale is the preferred conveyance for storm water runoff. Runoff from bridges and culverts should be discharged as far back as possible from the receiving water body.

US-131 NB between Kalamazoo and Grand rapids, Rest Area, Allegan County, Southwest Region

Construction of the rest area will include two parking lots with a paved surface area of 5.61 acres. Runoff from the lots will be directed to an existing vegetated roadside ditch along NB US-131 which extends approximately 0.75 miles before joining the Gun River. Runoff from the parking areas will be reduced by the processes of infiltration, evaporation, sedimentation, and evapotranspiration. In addition, vegetation within the drainage ditch will facilitate pollution removal through filtration and plant uptake.

Appendix E.2 Project Water Quality Recommendations

M-49 from Indiana NE RR to north Reading city limits, Reconstruct storm sewer and outlet, 9500 ft of new c&g, increase pavement by 2.06 acres, Hillsdale County, University Region, Wetlands/Drain

The 2.06 acre increase in impervious surface area and 9500 ft of new c&g will add drainage from the city into the MDOT storm drain. BMPs for this project include an existing vegetated ditch that flows through a wetland and provides 1000 to 1500 feet of treatment and an existing detention pond for the outlet from Walnut St. Storm water discharge at two other outlets has been removed.

M-49 Bridge over the St. Joseph River, Litchfield

Long term negative impacts on water quality and fisheries are not expected from this project. The following recommendations were made to protect the resources: Stormwater runoff should be outleted as far back from the water's edge as possible, any trees removed within 25 ft of the river channel should be replaced, precautions should be taken to prevent any debris or paint spray from entering the river (bridge is currently painted with lead paint), and if construction activities create soil disturbance then SESC controls must be put in place.

M-49 from Allen to Litchfield, St. Joseph river/Sand Creek

Long term negative impacts on water quality and fisheries are not expected from this project. A limited amount of new c&g is expected to be laid and the basic "footprint" of the road will remain unchanged. The following recommendations were made to protect the resources: Stormwater runoff should be outleted as far back from the water's edge as possible, any trees removed within 25 ft of the river channel should be replaced, and if construction activities create soil disturbance then SESC controls must be put in place.

I-94 BL from MLK Drive to River St. in Benton Harbor, Berrien County, Grand Region, St. Joseph River.

Stormwater BMPs have been examined and alternatives discussed during the project design phase. To the maximum extent practicable, BMP's have been included to mitigate the effects of storm water runoff. The storm water outlet in the NW quadrant of Ox Creek, which is currently a direct discharge point, will be reconstructed at a maximum distance from the water's edge; the outlets velocity will be reduced as much as possible and a vegetated and/or riprap swale will be constructed.

M-25 from Sebewaing Rd to the Sebewaing River, Huron County, Bay region, Sebewaing River.

If the project scope includes activities that increase the volume or velocity of stormwater discharge from MDOT ROW, and/or include storm sewer outlets with direct discharge into surface water bodies, then BMPs should be included in the project design.

Railway, Livingston and Washtenaw Counties, University Region, Huron River

Storm water runoff from parking areas should be considered during project design. BMP practices should be put into effect to minimize and mitigate the effects of storm water runoff and to comply with MDOTs statewide NPDES stormwater discharge permit.

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M-25 from Canboro Rd to Stein Rd., Tuscola County, Bay Region, Kilmanagh, Gettel drain

If the project includes road or shoulder widening, new drainage enclosures, upsizing storm sewer, direct discharge into water bodies, or installation of extensive new c&g, then stormwater BMPs should be included in the project design to mitigate the effects of stormwater runoff on water quality in order to comply with MDOT's statewide NPDES stormwater discharge permit.

M-25 from Patz Rd to Huron COL, Sanilac County, Bay Region, Mill, Wanke, County Line Creek

If the project includes road or shoulder widening, new drainage enclosures, upsizing storm sewer, direct discharge into water bodies, or installation of extensive new c&g, then stormwater BMPs should be included in the project design to mitigate the effects of stormwater runoff on water quality in order to comply with MDOT's statewide NPDES stormwater discharge permit.

M-115 from SE of S. Harding Rd to NW of Cunningham Ave., Clare county, Bay Region, SB Tobacco River

All streams in this area are listed as designated trout streams by the MDNR. It is likely that no work will be permitted from Oct 1st through March 31 to protect fisheries. Attention will be given to culvert size, placement of riprap and shading and vegetation along the stream bank. If the project includes road or shoulder widening, new drainage enclosures, upsizing storm sewer, direct discharge into water bodies, or installation of extensive new c&g, then stormwater BMPs should be included in the project design to mitigate the effects of stormwater runoff on water quality in order to comply with MDOT's statewide NPDES stormwater discharge permit.

M-25 Bay/Tuscola COL to Tuscola/Huron COL, Tuscola County, Bay Region, Quanicassee River.

If the project includes road or shoulder widening, new drainage enclosures, upsizing storm sewer, direct discharge into water bodies, or installation of extensive new c&g, then stormwater BMPs should be included in the project design to mitigate the effects of stormwater runoff on water quality in order to comply with MDOT's statewide NPDES stormwater discharge permit. Since the bridges over the Quanicassee River and Wiscoggins drain are painted with lead paint, there is a potential for contaminated sediments to be encountered.

M-13, Zilwaukee Bridge to McGraw project 1, bay county, Bay region, Saginaw River.

If the project includes road or shoulder widening, new drainage enclosures, upsizing storm sewer, direct discharge into water bodies, or installation of extensive new c&g, then stormwater BMPs should be included in the project design to mitigate the effects of stormwater runoff on water quality in order to comply with MDOT's statewide NPDES stormwater discharge permit. Polluted sediments in the Saginaw River are located the entire length of the proposed project. If there is any work done on the river channel at Cheboyganing Creek Bridge, then sediments will have to be tested for contamination.

Appendix E.2 Project Water Quality Recommendations

M-13, Zilwaukee Bridge to McGraw project 2, bay county, Bay region, Saginaw River.
If the project includes road or shoulder widening, new drainage enclosures, upsizing storm sewer, direct discharge into water bodies, or installation of extensive new c&g, then stormwater BMPs should be included in the project design to mitigate the effects of stormwater runoff on water quality in order to comply with MDOT's statewide NPDES stormwater discharge permit. Polluted sediments in the Saginaw River are located the entire length of the proposed project.

M-13/M-84 from Euclid to Bascule Bridge, Bay County, Bay Region, Saginaw River
M-13, Zilwaukee Bridge to McGraw project 1, bay county, Bay region, Saginaw River.
If the project includes road or shoulder widening, new drainage enclosures, upsizing storm sewer, direct discharge into water bodies, or installation of extensive new c&g, then stormwater BMPs should be included in the project design to mitigate the effects of stormwater runoff on water quality in order to comply with MDOT's statewide NPDES stormwater discharge permit. Polluted sediments, including heavy metals and PCBs are located in the vicinity of the Bascule Bridge. If there is any work in the river channel, sediments will have to be tested.

US-127 from south Blanchard Rd to interchange south of Shepherd Rd, Isabella County, Bay Region, Little Salt River
If the project includes road or shoulder widening, new drainage enclosures, upsizing storm sewer, direct discharge into water bodies, or installation of extensive new c&g, then stormwater BMPs should be included in the project design to mitigate the effects of stormwater runoff on water quality in order to comply with MDOT's statewide NPDES stormwater discharge permit. The entire project location is within the Village of Shepherd's Source Water Protection Area, designed to protect the city's water supply.

M-19 from north of Burt Rd to Old M-21, reconstruct c&g, CSO separation, St Clair county, Metro Region, Detroit River
There is a LUST site adjacent to the project area. If cuts for storm or sanitary sewer occur during the project, then appropriate procedures should be followed to locate and contain any contaminated groundwater.

M-119 south of Division Rd, design and construct timber bridge to replace culvert, stream restoration, nm path, roadside park, info center, traffic detour, Emmet County, North Region, unnamed trib.
The unnamed trib is a designated trout stream, however the stream has been observed to be nearly dry in summer months. Per MDOT's statewide NPDES stormwater permit, BMPs should be used for stormwater runoff from the bridge and surrounding roadway. Scupper and bridge deck drains should not be placed over water and techniques such as riprap placement should be utilized under the bridge where scuppers drain.

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I-69 from Lapeer/St Clair COL to west of M-19, reconstruct ramps, c&g, replace/enclose drainage, Clinton County, University region, St. Johns Big Ditch.

There are LUST sites adjacent to project. If cuts for utility or storm sewer work occurs, appropriate procedures should be followed to locate and contain any contaminated groundwater that is encountered.

Cheboygan County, Pavement repair, c&g, culvert ext/hdwalls, ditching, st sewer, tree removal, GR, slope flat/rest., util reloc, North region, Mullet Creek

Mullet Creek is listed by the MDNR as a designated coldwater trout stream. No work shall be performed between Oct. 1 and March 31 for protection of coldwater species. Retain open drainage whenever possible. If changes to project scope effect culvert work on streams or drainage, further review will be necessary.

Kent County, Grand region, Plaster Creek, unnamed. Rehab, coldmill joints & overlay, CB repairs, c&g, sidewalk, GR, slope rest, st sewer replacements, utility work, detour

Plaster Creek and the unnamed trib to the east of Eastern Avenue are considered warmwater fisheries resources. If work on the stream channel is proposed for these locations, fisheries in-stream no-work dates for warmwater sfish species (March 1 through May 31) will apply. There are multiple LUST sites adjacent to the project area. If cuts for storm or sanitary sewer occur during the project, then appropriate procedures should be followed to locate and contain any contaminated groundwater.

Washtenaw County, University region, Huron River

The Huron River is considered a top quality warmwater fisheries resource. If the scope of work includes a full reconstruct, replacement of storm sewers, widening, enclosing of drains, or extensive new c&g, then stormwater BMPs should be considered to mitigate the effects of storm water runoff. There are also multiple LUST sites adjacent to this project as well as two sites with contaminated groundwater. Appropriate measures should be taken to locate and isolate contaminated ground water encountered during construction.

Oakland County, Metro region, Paint Creek/Clinton River, Reconstruct, widen 1-3 ft, GR, driveways, drainage work, sidewalk, intersxn approach wk.

Paint Creek is listed by the MDNR as a designated coldwater trout stream. No work shall be performed between Oct. 1 and March 31 for protection of coldwater species. Early coordination with the MDEQ and a plan to provide treatment for stormwater runoff will be necessary if we increase stormwater discharge or install a new outlet to Paint Creek. Concerns include excessive sedimentation, and potential for elevated stream temperature fro runoff. Practices including detention/retention ponds, infiltration basins, vegetated swales, or rain gardens should be employed.

Monroe County, University Region, Little Sandy creek

Little Sandy creek is a warmwater fisheries resource. If culvert, bridge, riprap or any other work is proposed within the stream channel, fisheries in-stream no-work dates may apply. If the project includes road or shoulder widening, new drainage enclosures, upsizing storm sewer, direct discharge into water bodies, or installation of extensive new c&g, then stormwater BMPs should be included in the project design to mitigate the

Appendix E.2 Project Water Quality Recommendations

effects of stormwater runoff on water quality in order to comply with MDOT's statewide NPDES stormwater discharge permit.

Monroe County, University region, Various Streams

LaBadie Creek, N. Ten Mile Creek, Ottawa lake Drain, Dally creek, Bischoff Drain, Smith Ditch, and Dally Creek are considered warmwater fisheries. If culvert, bridge, riprap, or any other work is proposed within the stream channel, then fisheries in-stream no-work dates apply. If the project includes road or shoulder widening, new drainage enclosures, upsizing storm sewer, direct discharge into water bodies, or installation of extensive new c&g, then stormwater BMPs should be included in the project design to mitigate the effects of stormwater runoff on water quality in order to comply with MDOT's statewide NPDES stormwater discharge permit. There are also multiple LUST sites adjacent to this project as well as two sites with contaminated groundwater. Appropriate measures should be taken to locate and isolate contaminated ground water encountered during construction.

Monroe county, University Region, Raisin River/var. streams

The Raisin River and other streams within the project limits are considered warmwater fisheries resources. If culvert, bridge, riprap, or any other work is proposed within the stream channel, then fisheries in-stream no-work dates apply. If the project includes road or shoulder widening, new drainage enclosures, upsizing storm sewer, direct discharge into water bodies, or installation of extensive new c&g, then stormwater BMPs should be included in the project design to mitigate the effects of stormwater runoff on water quality in order to comply with MDOT's statewide NPDES stormwater discharge permit. There are also multiple LUST sites adjacent to this project as well as two sites with contaminated groundwater. Appropriate measures should be taken to locate and isolate contaminated ground water encountered during construction.

Oakland County, Metro region, Clinton River/var. lakes

Mill/resurf, sidewalk, Driveways, drainage, GR, c&g, ramp work, grading shoulder work.

Most lakes within project limits are listed by the MDNR as designated coldwater lakes. The Clinton River and other streams connecting lakes within the project limits are considered top quality fisheries resources. If culvert, bridge, riprap, or any other work is proposed within the stream channel, then fisheries in-stream no-work dates apply. To manage the effects of stormwater runoff on water quality, stormwater BMPs (e.g. detention/retention ponds, infiltration basins, vegetated swales) should be employed anywhere stormwater discharges into streams or lakes. There are also multiple LUST sites adjacent to this project as well as two sites with contaminated groundwater. Appropriate measures should be taken to locate and isolate contaminated ground water encountered during construction.

Appendix E.2 Project Water Quality Recommendations

M-82 in Fremont at 56th Street, Newaygo County, Grand Region, McDonald Drain, widening center left turn lane, intersection work, culvert ext., enclosing drain, extensive new c&g

McDonald Drain is tributary to Fremont Lake, a designated trout stream. Long-term negative impacts can be avoided by following BMPs for stormwater discharge. Runoff should be directed to flow overland through filtering vegetation for 200 feet or maximum possible distance. Discharge velocities should be reduced as much as possible and protection provided at the outlet for erosion control. Drainage should not directly discharge into the water body.

Two RR lines crossing near US-31 east of Muskegon Hts. Muskegon County, Grand Region, Little black Creek

Little Black Creek is listed by DNR Fisheries as a designated trout stream. Long-term negative impact to water quality are not expected from the acquisition of this property for lease to DNR. If a nm trail is to be constructed, the following recommendations should be considered. Stormwater runoff from nm path should not drain directly into watyer body, runoff should be directed through 200 ft of vegetation to remove sediment and other pollutants, discharge velocities should be reduced as much as possible. Fisheries in-stream no-work dates may apply.

I-94 BL crossing CSX RR, replaces sw outlet discharging to Bunce Creek, St Clair County, Metro region, Bunce Creek

Bunce Creek has a moderate quality, warm water fishery and is listed as not attaining the state water quality standards by the MDEQ. Long-term, negative impacts to water quality are not expected from this project. Stormwater discharge will be allowed to flow overland through filtering vegetation for a maximum possible distance to remove sediment and other pollutants before it enters the receiving water body. Discharge velocities should be reduced as much as possible and protection provided to the outlet to inhibit erosion.

Logging in Lake Superior Region, Baraga, Mackinac, and Ontonagon Counties, 8 locations for either clear-cut or selective logging, possible heavy equipment.

Long term, negative impacts from these projects is not expected providing the following recommendations are considered. No clear-cutting of trees without consultation with DNR fisheries, no cutting of trees larger that 4" dbh within 25 ft of waters edge, and selective cutting within the buffer may be permitted. Special considerations are given to the specific projects within the range of the logging project.

Appendix E.2 Project Water Quality Recommendations

US-10 Corridor Project, M-18 to E. midland COL, Midland County, Bay Region, Sanford Lake, Sturgeon Creek. Resurf, shoulder and bridge widen, culverts.

Long term negative impacts from this project are not expected providing that the following recommendations are considered. Runoff from bridges at Sanford lake and Sturgeon Creek should be allowed to flow overland through filtering vegetation for a maximum possible distance. Discharge velocities should be reduced as much as possible and protection provided at outlet to prevent erosion. Where possible, scupper drains should be eliminated.

I-94 Bridge over Norfolk Southern RR and Portage Creek, Kalamazoo county, Southwest Region, Portage Creek, replace steel plates, paint, excavation.

Portage Creek is listed as an impaired water body by the MDEQ and a designated trout stream by the MDNR. Long-term, negative impacts to water quality are not expected from this project providing the following recommendations are met. All appropriate SESC procedures to minimize erosion and sedimentation should be carefully planned and followed closely in the vicinity of this sensitive water body.

I-94 Bridge over Galien River, Berrien County, Southwest region, Galien River. Widening, deck and pier replacement, scour protection, work in water.

The Galien River is listed as a designated trout stream by the MDNR. No work can occur between October 1st and March 31st. The bridge has historically been painted with lead paint so if excavation is planned within the river channel or floodplain, sampling should be conducted for lead. Post construction BMP should be put in place including allowing runoff to flow through a minimum of 200 ft of filtering vegetation prior to entering the water body. Discharge velocities should be reduced to eliminate erosion and SESC procedures should closely followed near this sensitive water body.

M-18, Gladwin County, Bay Region, Cedar River Watershed, widening for center turn lane, new storm sewer, bury ditches.

Increased impervious surface will be mitigated by incorporating perforated storm sewer pipe and a vegetated detention basin/swale. There is a LUST site within the project limits. Do not use perforated storm sewer pipe adjacent to site.

M-3 Bridge over the Clinton River, Restudy

The Clinton River is listed as having sediments contaminated with heavy metals in this area of the project. If any excavation is planned within the river channel or floodplain, the soil should be tested for contamination and contaminated sediments should be disposed of properly. All appropriate SESC procedures should be enacted to minimize erosion and sedimentation. Steps should be taken to prevent concrete, wood, metal debris, and paint from entering the water body. Stormwater BMPs should be in place for runoff from bridge.

Appendix E.2 Project Water Quality Recommendations

M-21 over the Grand River, Kent County, Grand region, Grand River, complete replacement of bridge.

Target for water quality is that drainage from the bridge should be allowed to travel overland through vegetation to facilitate filtration of sediments and pollutants. For this project, deck drains should be eliminated and drainage outlets should be moved as far down the bridge approach as possible.

US-10 from West midland COL east to M-18, Midland County, Bay region, Pine River/Little Salt creek

Stormwater BMPs should be used to minimize any negative effects of stormwater runoff on water quality. Stormwater outlets should be located away from the water's edge, and outlet velocities should be reduced as much as possible. Direct discharge into the stream should be avoided.

US-127 from Washington Rd. north to M-46, Gratiot County, Bay region, Pine River/Little Salt creek

Stormwater BMPs should be used to minimize any negative effects of stormwater runoff on water quality. Stormwater outlets should be located away from the water's edge, and outlet velocities should be reduced as much as possible. Direct discharge into the stream should be avoided. Depending on the scope of the culvert and bridge work, early coordination with MDNR Fisheries may be required.

US-127 from Crawford Rd. to just south of Mt. Pleasant connection, Isabella County, Bay Region, Little Salt River, Potter Creek

Stormwater BMPs should be used to minimize any negative effects of stormwater runoff on water quality. Stormwater outlets should be located away from the water's edge, and outlet velocities should be reduced as much as possible. Direct discharge into the stream should be avoided. Little Salt River and Potter creek contain warm water fish communities, early coordination with MDNR Fisheries may be required. Stream should be assessed to determine if fish passage through the culverts is an issue.

M-20, Bridge over the Tittabawsee River 1000 ft each side, Midland County, Bay Region, Tittabawsee River

This area of the river is listed by the MDEQ as not meeting state's water quality due to untreated sewage discharges and dioxin contaminated sediments. Sediments in the river channel and floodplain at the M-20 bridge should be tested. Stormwater BMPs should be used to minimize any negative effects of stormwater runoff on water quality. Stormwater outlets should be located away from the water's edge, and outlet velocities should be reduced as much as possible. Direct discharge into the stream, especially deck drains, should be avoided.

Appendix E.2 Project Water Quality Recommendations

NM Path, Grand trunk Western RR corridor from Ionia to Owosso (41.3 miles), Ionia, Clinton, Shiawassee Counties, University Region

Special consideration is required for culvert/bridge work along Prairie Creek, the Maple River, and Stoney Creek including no-work dates for cold water or warm water fisheries, minimizing tree removal and replacing trees that are removed. Stormwater BMPs should be used to minimize any negative effects of stormwater runoff on water quality. Stormwater outlets should be located away from the water's edge, and outlet velocities should be reduced as much as possible. Direct discharge into the stream should be avoided.

US-31 BR from 9th st north to north of Eastern, City of Muskegon, Muskegon County, Grand region, Ryerson Creek, Jurisdiction Transfer

Muskegon Lake and Ryerson Creek are both listed as not attaining the Water Quality Standards set for by MDEQ. The problems in Ryerson creek are possibly due to excess sedimentation from direct inputs and stream bank erosion due to "flashy" stream hydrology. Use of BMPs (e.g. vegetated swales, detention basins, infiltration basins) to manage the effects of stormwater runoff are especially important in these areas. Increase in volume of storm water discharge into Muskegon Lake and Ryerson creek should be avoided; efforts should also focus on the removal of sedimentation from runoff. SESC will be an important consideration for culvert placement in Ryerson creek.

NM path along Great Lakes RR from US 127 BR (McEwen St.) to Industrial St. City of Clare. Clare and Isabella County, Bay Region, Little Tobacco Drain.

Contaminated groundwater site located at the end of East First St. City of Clare Landfill. If bridge work is included as part of project it is preferred that abutments are kept well outside the channel if feasible. Fisheries in stream "no work" dates for warm water species may apply. BMP should be used to manage effects of stormwater runoff for water quality. Direct discharges into lakes or streams should be avoided.

US-23/I-96 interchange to US-23/M-14 interchange (Brighton to Ann Arbor), Livingston/Washtenaw Counties, University Region. Huron River

Under MDOT's statewide NPDES Stormwater Permit, increases in runoff from any project along this corridor will have to be managed using BMP practices to reduce quantity of runoff and facilitate the removal of pollutants. Work within the horseshoe Drain and the Huron River may be subject to fisheries "no work" dates. Any stormwater discharges / culvert work will need to be examined for potential impacts. Other areas of potential impacts are work at culverts carrying No Name Creek under US-23 EB and WB.

Appendix E.2 Project Water Quality Recommendations

Various locations along I-675: bridges and roads/ramps. Saginaw County, bay region, Saginaw River.

The work includes work on the I-675 bridge over the Saginaw River. Long term negative impacts to water quality are not anticipated from this project as existing drainage patterns will remain unchanged. The bridge is located in an old industrial area and no opportunity was determined to be available to outlet the water to a vegetated area.

M-311 from Burlington to the Kalamazoo river, Calhoun County, Southwest Region Kalamazoo River and others.

This project includes guardrail work and culvert extensions, long term negative impacts to water quality are not anticipated. Streams within the project area include designated cold water trout streams and warm water fisheries. As currently planned, the project does not include culvert replacement in any of these streams. Project will need further review if changes in project scope occur including additional culvert work at stream crossings.

US-127 over the Grand River, Jackson County, University region, Grand river

This project includes repairs on the bridge over the Grand River. Long-term negative impacts to water quality are not anticipated. For this project, drainage outlets have been moved as far down the bridge approaches as possible given the current scope of work.

I-75/ Grange Hall Rd. carpool lot. Parcel acquisition, Oakland County, Metro Region

This project will include parcel acquisition and construction of a new carpool lot. No long-term negative impacts to water quality are anticipated. Drainage from the new lot should be allowed to sheet flow off the lot and travel overland through vegetation to facilitate filtration of sediment and pollutants prior to discharge into an adjacent wetland. Further review may be necessary if changes in the project scope occur.

