SUMMARY OF EFFECTS MATRIX

TRANSPORTATION

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	Trips would not be diverted from other modes of travel. Congestion and its associated impacts would not be relieved. Freight and Passenger rail traffic would not benefit from Program improvements. Ridership on existing Amtrak service would grow at a slower rate.	For all Build Alternatives: Development of the Program would provide an improved and competitive mode of travel. Railroad crossings would be improved and construction could potentially result in temporary impacts including changes in travel patterns, auto traffic congestion, delay, detours, disrupted access to properties and neighborhood. Impact to local traffic patterns at station locations as traffic volumes and parking demand increase at the station. There may be delays to commercial shipping on navigable waterways during construction (south Branch of Chicago River and Trail Creek).						For all Build Alternatives and all states: 1. Construct flyovers and other grade crossing improvements to improve safety for rail and roadway users and to improve freight and passenger operations. 2. Make signal upgrades and infrastructure improvements to decrease passenger and freight conflicts. 3. Prepare and implement a construction stage traffic control and safety plan. 4. Coordinate with freight and passenger rail operators. 5. Perform construction activities at off-peak times. 6. Obtain appropriate permits from USACE and USCG for construction in wetlands and waterways.
ILLINOIS	Same as above.	For Routes 2, 4, and both Route 5 Options: Construction of new dedicated passenger track will benefit NS Chicago Line operations				For both Route 9 Options: SCAL bridge will increase operating efficiency by decreasing congestion. Construction of new dedicated passenger track will limit future freight growth.		
INDIANA	Same as above.	New dedicated track will benefit NS Chicago Line operations. New track within the NS Chicago Line right of way will limit future freight growth. There may be delays to commercial shipping on the Indiana Harbor Canal during construction.	Same as Route 2, except new track will be constructed within the CSX Barr Subdivision and NICTD rights of way between Buffington Harbor and Burns Harbor, Indiana instead of the NS Chicago Line right of way. New track will limit future freight growth on the CSX Barr Subdivision. Passenger trains may suffer scheduling conflicts, requiring high level of coordination between passenger services and freight operations.	Same as Route 2, except new track will be constructed within the NS Sugar Track and CSX Porter Subdivision rights of way between Buffington Harbor and Porter, Indiana instead of the NS Chicago Line right of way. New track will limit future freight growth on the NS Sugar Track and CSX Porter Subdivision. A new flyover at Willow Creek benefits freight operations on the CSX Barr and Porter Subdivisions.	Same as Route 5 Option 1, except Option 2 wouldn't use the abandoned IHB Dune Branch. Rather, a direct connection to the active CSX Porter Subdivision would be made in Gary resulting in seven additional grade crossings.	New dedicated passenger track within the IHB Main Line and CSX Porter Subdivision rights of way will limit future freight growth. New flyovers at Hammond Diamonds, Ivanhoe, and Willow Creek would provide benefits to crossing freight operations. New dedicated passenger track will reduce passenger rail traffic on the NS Chicago Line, benefiting NS freight operations.	Same as Route 9 Option 1, except Option 2 wouldn't use the abandoned IHB Dune Branch. Rather, a direct connection to the active CSX Porter Subdivision would be made in Gary, resulting in 10 additional grade crossings.	
MICHIGAN	Same as above.	For all Build Alternatives in Michigan: There may be additional conflicts between passenger and freight rail service.						

SUMMARY OF EFFECTS MATRIX

LAND USE

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	No Program - related impacts.	For all Build Alternatives: Direct land use changes are expected only in areas where right of way is acquired. Land would be acquired in strips adjacent to existing railroad. Land use changes and development related to station areas may occur.						For all Build Alternatives and all states: 1. Review future design plans to determine whether direct and indirect changes in land use are compatible with locally adopted comprehensive plans and zoning policies. 2. Minimize the footprint of the selected Preferred Alternative's improvements to existing right of way, maintenance facility, and station areas. 3. When the acquisition of adjacent land cannot be avoided and/or the need for relocations proves to be unavoidable, follow the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended to ensure fairness in the acquisition and relocation process.
ILLINOIS	Same as above.	For all Build Alternatives: No substantial land use changes are expected.						
INDIANA	Same as above.	For Routes 2 and 4, change is expected in areas of right of way acquisition in National Lakeshore, from parkland to transportation.		For Route 5, Options 1 and 2, new railroad facilities, but still in a railroad corridor.		For Route 9, Options 1 and 2, no substantial changes in land use.		
MICHIGAN	Same as above.	For all Build Alternatives: No substantial changes in land use.						

AGRICULTURE

CORRIDOR END -TO -END	No Program - related impacts.	For all Build Alternatives and for all states: Minimal impacts to agriculture.						For all Build Alternatives and all states: 1. Coordinate with NRCS to avoid or minimize adjacent farmland impacts and complete the Farmland Conversion Impact Rating process for each affected County. 2. Abide by the requirements of the Illinois Farmland Preservation Act (IFPA) in Illinois, the requirements of the Indiana Coastal Zone Management Plan in Indiana, and the requirements of the Michigan a Public Act 116 (PA 116) in Michigan. 3. Identify urban agricultural operations and community gardens and avoid or minimize direct impacts.

SUMMARY OF EFFECTS MATRIX

GreatLakesRail.org

SOCIO-ECONOMIC RESOURCES

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	No Program - related impacts. But, does not meet purpose and need.	For all Build Alternatives and all states: Generates construction jobs, new employment opportunities, reduced air and noise pollution, and improved train speeds. Temporary impacts to businesses and community facilities due to vehicle impedance during construction at crossings. Potential displacement of residents and business within areas of right of way acquisitions.						For all Build Alternatives and all states: 1. Specific infrastructure features and locations will be further defined and delineated in Tier 2 NEPA analysis, and potential impacts on socioeconomic conditions will be identified along with strategies to avoid or mitigate these impacts. 2. Public involvement and agency coordination activities may result in identification of potential mitigation needs at a local level. Specific mitigation measures, to the extent required, will be identified and discussed during Tier 2 NEPA analysis after design details are known, recorded in NEPA documents as specific impacts are identified, and implemented. 3. When the acquisition of adjacent land cannot be avoided, the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, and the Civil Rights Act of 1964 will be followed. 4. Grade-crossing upgrades will require working very closely with each community to ensure impacts are minimized when the work is being done. 5. Access to properties will be maintained to the extent possible. Working with the local communities and stakeholders, the duration of grade-crossing upgrades could be minimized using accelerated work force crews, and scheduled at non-peak time to minimize rail, motorized vehicle, pedestrian, and bicycle movement conflicts. 6. The following mitigation measures could be implemented to address temporary construction stage impacts: • minimizing disruption of traffic in the construction area by coordinating with local agencies and the community • placing signs in all of the construction areas notifying motorists and pedestrians • require construction equipment to have mufflers in good working order and portable compressors that meet federal noise-level standards for equipment • require that contractors will be responsible for applying adequate dust-control measures during construction

TITLE VI AND ENVIRONMENTAL JUSTICE

CORRIDOR END -TO -END	No Program - related impacts. Long-term socioeconomic benefits would not be realized for EJ populations.	For All Build Alternatives and all states: Potential displacement of residents and businesses within areas of right of way acquisitions. Temporary impacts by increased traffic in neighborhoods due to detours at crossings during construction. Noise and vibration during construction. Frequency of passenger rail operations will increase in low income and minority areas with addition of passenger rail service. MDOT will continue to work with low income and minority communities to mitigate impacts. Introduces incremental increases of noise (including potentially moderate impacts) and vibration (including potentially a significant increase in events) on existing tracks and where right of way is acquired. Further outreach would help to identify and verify Program impacts and whether they may disproportionately affect environmental justice populations. During Tier 2 NEPA analysis, affected populations would be further identified in impacted areas and specific approaches will be implemented to provide access to services and for additional public involvement. The Program is expected to provide economic and quality of life benefits through improved mobility and access to alternative modes in areas near station stops.						For all Build Alternatives and all states: 1. Specific mitigation measures, to the extent required, would be identified and discussed during Tier 2 NEPA analysis after design details of the selected Preferred Alternative are known and recorded in NEPA documents as specific impacts are identified, and implemented. 2. Further outreach to environmental justice populations will be completed during Tier 2 studies to identify specific needs of affected populations and to work with neighborhoods and individuals to avoid or minimize impacts or relocations. 3. When the acquisition of adjacent land cannot be avoided, the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, and the Civil Rights Act of 1964 would be followed.

SUMMARY OF EFFECTS MATRIX

GreatLakesRail.org

PUBLIC HEALTH AND SAFETY

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	No Program-related impacts. No Program benefit of improvements to grade crossing safety.	For all Build Alternatives and all states: Safety improvements will be made to at-grade crossings and signals. Conflicts could increase due to increased train frequency.						For all Build Alternatives and all states: 1. Install sophisticated traffic control/warning devices at crossings, meeting at a minimum FRA safety standards set forth under the Code of Federal Regulations (49 CFR 236). 2. During design, consider the construction of additional grade separations, road closures, and railroad crossing upgrades to further minimize the potential for collisions. 3. Consolidate public and private grade crossings where practical. Eliminate redundant and/or unsafe crossings. 4. For private crossings that serve industrial developments and cannot be closed, consider providing a locking device for when the crossing is not in use. 5. Maintain existing Centralized Traffic Control (CTC) and install Incremental Train Control System (ITCS) infrastructure throughout the Corridor. 6. Install active warning systems for pedestrians where rail lines cross existing sidewalks, trails, and bikeways.

NOISE

CORRIDOR END -TO -END	No Program-related impacts.	For all Build Alternatives: Noise level changes range from no change in some areas to a 4-decibel increase along one nine-mile section of track in Gary, Indiana. Sources of noise impacts would be from the train equipment and their movement along the track as well as horn noise at crossings. Areas that the model identified with “moderate” or “severe” noise impacts or vibration impacts will be further evaluated during the Tier 2 NEPA analysis.						For all Build Alternatives and all states: 1. Consistent with FRA criteria, develop and apply noise mitigation for areas exposed to a moderate or severe impact.
ILLINOIS	Same as above.	For Routes 2, 4 and both Route 5 Options: Moderate impacts between Chicago Union Station and the 21st Street Bridge and from South Branch of Chicago River to 43rd St.				For both Route 9 Options: Moderate impacts between Chicago Union Station to the 21st St. Bridge and from Clark St. to East Cermak Rd.		
INDIANA	Same as above.	Moderate impacts between Buffington Harbor Drive and the Ind./Mich. Border	Moderate impacts between Buffington Harbor Dr. and Broadway St. and from East Dunes Hwy. to Ind./Mich. Border	For both Options of Routes 5 and 9: Same as Route 4, plus severe impacts between Buffington Harbor Drive and West 9th Avenue in Gary. Moderate impacts to residential area between 9th Ave. and the junction of Routes 2 and 4.				
MICHIGAN	Same as above.	Moderate noise impacts from Ind. /Mich. border to Kalamazoo, along a section from east of Albion to west of Dexter, and from the northwest side of Ann Arbor, to Detroit.						

SUMMARY OF EFFECTS MATRIX

GreatLakesRail.org

VIBRATION

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	No Program-related impacts.	For all Build Alternatives: Vibration levels would range from 70 to 91 VdB. The vibration levels would decrease into the 64 to 85 VdB range at 100 feet away from the track. Proposed passenger rail speeds would create a 1 to 2 VdB increase over the majority of the existing freight lines. Groundborne noise levels will be in the same ranges. Significant increases in events would occur in Michigan from the Ind. /Mich. border to North 48th Street, west of Springfield, MI and from Main Street in Battle Creek to Central Street in Detroit.						For all Build Alternatives and all states: 1. Apply vibration mitigation to minimize adverse effects that the ground-borne vibration may have on sensitive land uses. 2. As recommended in the FRA manual, measure existing rail operations throughout the Preferred Alternative route to refine existing vibration levels, which might also lead to a refinement in the projections and impact determination in the vibration assessment.
ILLINOIS	Same as above.	For Routes 2, 4 and both Route 5 Options: No significant increase in vibration events.				For both Route 9 Options: Significant increase in events from West 116th Street to the Ill. /Ind. border.		
INDIANA	Same as above.	Significant increases in events between Buffington Harbor Dr. to Broadway St. in Gary and from Porter to Ind./Mich. border	Significant increases in events between Buffington Harbor Dr. to Broadway St. in Gary and from the East Dunes Hwy to Ind./Mich. border	For both Route 5 Options: Significant increases in events from Buffington Harbor Dr. to the Ind. /Mich. border.		For both Route 9 Options: Significant increases in events from Ill./Ind. border to the railroad junction southeast of the Gary/Chicago Airport where Route 9 merges with Route 5. Route 9 is the same as Route 5 from the junction east to the Ind. / Mich. border.		

AIR QUALITY

CORRIDOR END -TO -END	No Program-related impacts. Increase in pollutant emissions over time due to potential increases in vehicle congestion.	For all Build Alternatives and all states: There will be a reduction in all types of emissions with the exception of NOx emissions, which would increase slightly due to additional diesel fuel burned by increased passenger train traffic. Additional regional analysis may be conducted as part of Tier 2 NEPA analysis or as part of the Regional Transportation Planning process. Construction-related emissions will be addressed during Tier 2 NEPA analysis.	For all Build Alternatives and all states: 1. General air quality conformity analysis modeling may be required during Tier 2 NEPA analysis to verify that the Program would not have an adverse impact on air quality. Investigate and consider mitigation to reduce NOX emissions.

SUMMARY OF EFFECTS MATRIX

HAZARDOUS WASTE AND WASTE DISPOSAL

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	No Program - related impacts.	For all Build Alternatives and for all states: A number of hazardous materials have been located within the study corridor, such as would be associated with existing rail operations, or nearby facilities such as manufacturing or gas stations, etc. Specific site limits, contamination boundaries and impacts would be performed as part of the Tier 2 NEPA analyses. Impacts would most likely occur only in areas of additional right of way acquisition or where any demolition of existing structures or buildings may be required to construct Program improvements.						For all Build Alternatives and all states: 1. Establish requirements for safety procedures and protection of human health and the environment to help ensure no further contamination of adjacent sites and to provide a safe working environment during construction. 2. Recycle or properly dispose of solid waste materials generated during construction in accordance with the provisions of each state's solid waste management statutes and regulations, and local regulations. 3. Handle, collect, and dispose of hazardous waste materials according to federal, state, and local regulations. 4. Take recyclable construction materials to recycling facilities that are in compliance with federal, state, and local regulations. 5. Dispose of construction debris that cannot be recycled in permitted landfills following proper disposal procedures and in compliance with federal, state, and local regulations. 6. Apply appropriate permanent best management practices (BMPs) to avoid or minimize impacts to water quality for potential hazardous material incident during refueling, maintenance operations, or from a spill during operation of the trains. 7. Handle, collect, and dispose of waste materials found in existing structures or buildings to be demolished according to federal, state, and local regulations, including any waste materials generated by maintenance and layover facilities.

CULTURAL RESOURCES AND SECTION 106

CORRIDOR END - TO - END	No Program - related impacts.	For all Build Alternatives and for all states: A number of recorded historic structures, archaeological sites and districts are located within the study corridors. Impacts to cultural resources would most likely occur only where new right of way and construction occur. This will be investigated further during Tier 2 studies to determine specific impacts to cultural resources.						For all Build Alternatives and all states: 1. Consult with the SHPOs, THPOs and local agencies to identify any additional parties who meet the regulatory criteria of being consulting parties pursuant 36CFR800.2. 2. If necessary, develop mitigation measures in accordance with the terms of a programmatic agreement (PA) between FRA and consulting parties including the ACHP and SHPOs and/or THPOs 3. For all ground-disturbing construction activity, follow an inadvertent discoveries plan developed in consultation with the Illinois, Indiana, and Michigan SHPOs to ensure proper treatment of archaeological materials encountered during construction.

SUMMARY OF EFFECTS MATRIX

SECTION 4(F) RESOURCES

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	No Program - related impacts.	Most of the potentially affected Section 4(f) resources are adjacent to the tracks and could reasonably be expected to be impacted in places where additional right of way will be acquired for the Program.	Within the Area of Analysis of Route 4 there are 82 park and recreation areas, 14 wildlife refuges and 54 historic sites that may potentially be affected.	Within the Area of Analysis of Route 5 Option 1 and 2 there are 87 park and recreation areas, 16 wildlife refuges and 54 historic sites that may potentially be affected.		Within the Area of Analysis of Route 9 Option 1 and 2 there are 89 park and recreation areas, 19 wildlife refuges and 65 historic sites that may potentially be affected.		For all Build Alternatives and all states: 1. Where the use of Section 4(f) property cannot be avoided, conduct all possible planning to minimize harm. Ways to minimize use of Section 4(f) properties include designing improvements in a way to avoid the acquisition of right of way from Section 4(f) properties. Minimization of harm could also include design that lessens the impact or agreeing on ways to compensate for impacts. 2. Identify specific mitigation measures in consultation with the officials with jurisdiction over the resources. Implement mitigation measures prior to construction.
ILLINOIS	Same as above.	There are 8 park and recreation areas, no wildlife and waterfowl refuges and 12 historic sites that may potentially be affected.	There are 8 park and recreation areas, no wildlife refuges, and 24 historic sites that may potentially be affected.	There are 9 park and recreation areas, no wildlife refuges, and 24 historic sites that may potentially be affected.		There are 17 park and recreation areas, 4 wildlife refuges and 33 historic sites that may potentially be affected.		
INDIANA	Same as above.	There are 12 park and recreation areas, 5 wildlife and waterfowl refuges and 5 historic sites that may potentially be affected.	There are 13 park and recreation areas, 5 wildlife refuges and 5 historic sites that may potentially be affected. Route 4 has the greatest impact on the Indiana Dunes National Lakeshore	For both Route 5 Options, there are 17 park and recreation areas, 7 wildlife refuges and 5 historic sites that may potentially be affected.		For both Route 9 Options, there are 11 park and recreation areas, 6 wildlife refuges and 7 historic sites that may potentially be affected. Option 9 is the only alternative that avoids the need to acquire lands from the Indiana Dunes National Lakeshore.		
MICHIGAN	Same as above.	All alternatives are the same in Michigan where there are 81 park and recreation areas, 14 wildlife and waterfowl refuges and 54 historic properties that may potentially be affected.						

SUMMARY OF EFFECTS MATRIX

SECTION 6 (F) PROPERTIES

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	No Program - related impacts.	For all Build Alternatives: The analysis identified 7 LWCF funded parks in the Area of Analysis.						For all Build Alternatives and all states: 1. Coordinate with the Section 6(f) property agencies to verify if potentially impacted lands were improved using LWCF funding. 2. Avoid Section 6(f) lands to the extent practicable. For LWCF lands that cannot be avoided, provide replacement property that is of at least equal fair market value and of reasonably equivalent usefulness for recreation purposes as the land proposed to be taken.
ILLINOIS	Same as above.	There are no Section 6 (f) properties identified in Illinois within the Area of Analysis.						
INDIANA	Same as above.	This route cuts through five miles of Indiana Dunes National Lakeshore property. Additionally, it directly abuts about 3.5 miles of National Lakeshore lands. Any right of way acquisition from the National Lakeshore would constitute a Section 6(f) impact and require the necessary approvals and mitigation.	This route cuts through about 3.75 miles of Indiana Dunes National Lakeshore property. Additionally, it abuts about another 3.75 miles. Any right of way acquisition from the National Lakeshore would constitute a Section 6(f) impact and require the necessary approvals and mitigation.	For both Route 5 Options and both Route 9 Options: The Indiana Dunes National Lakeshore lies just north of the Route 5 and 9 options for about two miles. The National Lakeshore property is within the 500-foot corridor, but not directly adjacent to the tracks. In addition, a buffer is created by US 20, a two lane US Highway that runs parallel to and between the tracks and the Indiana Dunes' property line. It is expected that no right of way acquisition from the National Lakeshore would be required. The wooded southeast corner of Woodland Park in Porter County, Indiana touches the route tracks at the Willow Creek Road crossing. Any necessary crossing improvements at this location could possibly require acquisition of right of way. This would need to be further analyzed in final design.			
MICHIGAN	Same as above.	For all Build Alternatives: Parks funded with LWCF funds include River Oaks County Park, Fort Custer State Park, Parker Mill County Park, Frog Island Park and the Border to Border Trail/Gallup Park Pathway including Gallup Park, Parker Mill County Park, and Mitchell Field. It is anticipated that the Program would not require acquisition of right of way in these locations, however if right of way would be required, additional coordination would be necessary to determine the impacts and mitigation measures.						

SUMMARY OF EFFECTS MATRIX

VISUAL AND AESTHETIC QUALITY

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	No Program - related impacts.	For all Build Alternatives: In general, new tracks and train traffic will be adjacent to or within existing track corridors and would not create a noticeable visual change except in areas with new structures, such as flyovers or any new buildings associated with station areas and a maintenance facility.						For all Build Alternatives and all states: 1. Continue public involvement to identify residents' concerns about the potential views of the railroad facilities. 2. Consider potential measures such as appropriate re-vegetation of disturbed areas of the scenic resources, visual screening of railroad facilities from adjacent residential areas, and appropriate design of structures with aesthetic features and landscaping that would complement and blend with the context of the surrounding visual environment.
ILLINOIS	Same as above.	For Routes 2, 4 and both Route 5 Options: The proposed reconstruction of the bridge at the Calumet River may create various visual changes depending on design.				For both Route 9 Options: There will be some passenger train traffic where currently there is none. There will be a new structure at Kensington Junction that would alter views.		
INDIANA	Same as above.	For Routes 2 and 4: Views to and from the train in this area will not change, with the addition of new track in some places and a minor increase in frequency of passenger train traffic. A new suburban station will be constructed in northwest Indiana. It is expected that the building would be consistent with surrounding urban landscape. The addition of flyover or bridge structures will create a visual change. This route goes through the National Lakeshore property.		For both Route 5 Options: Impacts will be similar to Route 2. It does not go through the Indiana Dunes National Lakeshore property, but instead travels by 3 nature preserves. This route travels through more residential areas.		For both Route 9 Options: Impacts will be similar to Route 2, with the construction of new track and structures.	
MICHIGAN	Same as above.	For all Build Alternatives: The majority of the work that could include visual changes is anticipated to be in the Dearborn to Pontiac section of the Corridor and possibly minor changes at the proposed station locations. It is expected that most of this work will be within the existing right of way and along current train routes, thus little to no visual changes would be seen along this section. The view from the train along the Corridor in Michigan will follow the existing route and therefore views from the train will be the same as they are currently. The views of the railroad facilities will be similar to existing because most work is anticipated to be within the existing right of way.						

SUMMARY OF EFFECTS MATRIX

WATER BODY CROSSINGS AND FLOODPLAINS

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2
CORRIDOR END -TO -END	No Program - related impacts.	For all Build Alternatives: Waterways may be impacted by construction activities including placement of fill material for additional track and siding, culvert replacement or extensions, and bridge replacement or additions.					
ILLINOIS	Same as above.	For Routes 2, 4 and both Route 5 Options: Crossings include the South Branch of the Chicago River and the Calumet River. There are 8.3 acres of 100-year floodplain within the Area of Analysis.				For both Route 9 Options: Crossings include South Branch of the Chicago River and the Little Calumet River. There are 3.2 acres of lakes and ponds and 9.70 acres of floodplain within the Area of Analysis.	
INDIANA	Same as above.	Crossings include Grand Calumet River, Indiana Harbor Canal, Portage Burns Waterway, East Fork of the Little Calumet River, and Trail Creek. There are a total of 15.16 acres of lakes and ponds and 99.9 acres of 100-year floodplains within Area of Analysis	Crossings include Grand Calumet River, Indiana Harbor Canal, Portage Burns Waterway, East Fork of the Little Calumet River, and Trail Creek. There are a total of 10.18 acres of lakes and ponds and 99.7 acres of 100-year floodplains within Area of Analysis	For both Route 5 Options: Crossings include Grand Calumet River, Indiana Harbor Canal, Portage-Burns Waterway, Salt Creek and Willow Creek, East Fork of the Little Calumet River, and Trail Creek. There are a total of 18.61 acres of lakes and ponds 167.7 acres of 100-year floodplains within Area of Analysis.		Crossings include Portage Burns Waterway, Salt Creek, Willow Creek, East Fork of the Little Calumet River, and Trail Creek. There are a total of 7.99 acres of lakes and ponds and 146.2 acres of 100-year flood-plains within the Area of Analysis.	Same as Route 9 Option 1 except there are a total of 8.95 acres of lakes and ponds within the Area of Analysis.
MICHIGAN	Same as above.	For all Build Alternatives: Proposed improvements are not anticipated to impact streams, rivers, or wetlands beyond the temporary impacts during construction. The proposed work is not anticipated to result in an impact to natural and beneficial floodplain values, specifically, flood attenuation and storage, water quality, groundwater recharge, biological productivity of fish and wildlife, and agricultural and forestry resources. The Program would not increase the risk of flooding and would not result in impacts to human safety, health, and welfare.					

POTENTIAL MITIGATION MEASURES

For all Build Alternatives and all states:

1. Determine where it is possible and practical to avoid or minimize impacts and identify specific mitigation measures, to the extent required. Mitigation measures could include actions such as mitigation banking, in-lieu fees, and on-site or off-site Section 404 permittee responsible mitigation.
2. During the design process, coordinate with the USACE and the appropriate state resource agencies to develop avoidance and mitigation strategies to be implemented prior to construction.
3. Assess impacts on the 100-year floodplains and regulatory floodways of the Preferred Alternative. Include avoidance and minimization measures for impacts on the natural and beneficial floodplain values, substantial changes in flooding risks or damage, and the potential for incompatible floodplain development.
4. Coordinate with the state emergency management agencies, the DNRs of each state, and local floodplain administrators to discuss floodplain development permitting and potential mitigation measures if floodplains cannot be avoided. Mitigation could include restoring natural and beneficial floodplain values by seeding with native vegetation, and proper design of bridges and culverts so as to not restrict flood flows.
5. Implement specific floodplain mitigation measures prior to construction.

SUMMARY OF EFFECTS MATRIX

WATER QUALITY RESOURCES

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	No Program - related impacts.	For all Build Alternatives: Impacts may be seen from soil erosion from stormwater runoff; fill material placed in water resources; and construction of bridges and culverts or culvert extensions at locations noted below for each state and alternative.						For all Build Alternatives and all states: 1. Address potential water quality impacts that may occur during construction activities. Measures typically include the development and implementation of Stormwater Pollution Prevention Plans (SWPPPs) and the use of temporary and permanent stormwater BMPs to avoid or minimize sediment pollution and water quality impacts through reductions in stormwater runoff from the site. BMPs that could be used during construction to control water pollution include the use of temporary measures such as berms, slope drains, sediment basins, straw bales, silt fences, seeding, and mulching. In addition, disturbance to stream banks and riparian zones could be minimized and limited to only that which is necessary to construct the Program improvements. 2. Avoid or minimize disturbance to stream banks and riparian zones. 3. Identify specific mitigation measures for the selected Preferred Alternative. The Tier 2 documents would further address mitigation measures and control of pollutants and sediments in regard to the National Pollutant Discharge Elimination System (NPDES) permitting, SWPPPs, and BMPs. In addition, obtain each state's required Section 401 Water Quality Certifications. 4. Identify the need for mitigation of impacts on mapped or unmapped water wells, including proper abandonment of the wells (such as plugging and sealing) to prevent groundwater pollution from construction and from future operations and maintenance. Implement specific mitigation measures prior to construction.
ILLINOIS	Same as above.	For Routes 2, 4 and both Route 5 Options: South Branch of the Chicago River and the Calumet River				For both Route 9 Options: South Branch of the Chicago River and the Little Calumet River		
INDIANA	Same as above.	For Routes 2 and 4: Grand Calumet River, Indiana Harbor Canal, Portage Burns Waterway, East Fork of the Little Calumet River, and Trail Creek		For both Route 5 Options: Grand Calumet River, Indiana Harbor Canal, Portage Burns Waterway, East Fork of the Little Calumet River, and Trail Creek, Salt Creek and Willow Creek		For both Route 9 Options: Portage Burns Waterway, Salt Creek, Willow Creek, East Fork of the Little Calumet River, and Trail Creek		
MICHIGAN	Same as above.	For all Build Alternatives: Proposed improvements are anticipated to impact any streams, rivers, or wetlands that may be altered during construction. These effects are expected to be minimal.						

WETLANDS

CORRIDOR END -TO -END	No Program - related impacts.	For all Build Alternatives: Wetland impacts may occur during construction as a result of soil disturbance and potential pollutant loading of stormwater runoff from construction sites. Impacts may occur from any placement of fill material for additional track and siding, culvert replacement or extensions and bridge replacements in additions in wetland areas. This will most likely occur only where additional right of way is acquired.						For all Build Alternatives and all states: 1. Determine where it is possible and practical to avoid or minimize impacts to wetlands. 2. Develop detailed mitigation options for unavoidable impacts to jurisdictional wetlands during the Tier 2 NEPA analysis and in conjunction with a Section 404 Permit. Typical mitigation measures include mitigation banking, in-lieu fees, and on-site or off-site permittee-responsible mitigation. Mitigation strategies identified and ultimately selected would take into account that not all mitigation options are available to all states and USACE Districts. 3. During the design process, coordinate with the appropriate USACE Districts and appropriate resource agencies to develop appropriate mitigation strategies for the location of impacts. 4. Implement mitigation measures prior to construction.
ILLINOIS	Same as above.	For Routes 2, 4 and both Route 5 Options: There are 7.1 acres of two wetlands associated with the South Branch of the Chicago River and the Calumet River				For both Route 9 Options: There are a total of 62.4 acres of wetlands, mostly associated with the Little Calumet River and the Beaubien Woods Forest Preserve.		
INDIANA	Same as above.	This alternative contains more wetlands than the other alternatives with 224 acres. There are extensive wetland areas in the Indiana Dunes National Lakeshore where additional right of way is expected to be required.	There are a total of 200 acres of wetlands. Route 4 also travels through the wetlands of Indiana Dunes National Lakeshore where additional right of way is anticipated to be required.	For both Route 5 Options: There are a total of 164 acres of wetlands. However, it is not anticipated that right of way acquisition will occur in these areas. Areas where the Route would most likely impact wetlands is between Buffington Harbor and the Tolleston connection where there are a number of wetlands located in the Clark & Pine Nature Preserve, Clark Junction West Site, the Clark and Pine General Refractories Site, and the Pine Station Nature Preserve.		For both Route 9 Options: There are a total of 109 acres of wetlands. However it is not anticipated that right of way acquisition will occur in these areas. Wetland impacts would be adjacent to the Gibson Woods Nature Preserve and within the Tolleston Ridge Nature Preserves and/or the Ivanhoe South natural area between Gibson Junction and Ivanhoe.		
MICHIGAN	Same as above.	For all Build Alternatives: No wetland impacts from Program improvements are expected in Michigan.						

SUMMARY OF EFFECTS MATRIX

COASTAL ZONE MANAGEMENT AREAS

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	No Program - related impacts.	For all Build Alternatives: Coastal zones could be impacted by construction activities including tree and brush clearing, placement of fill material for additional track and siding, culvert replacement or extensions, and bridge replacement or additions. Such impacts may be expected in locations where right of way will be needed to perform the work. Areas within Coastal Zones are described below by state and alternative.						For all Build Alternatives and all states: 1. Develop and implement Stormwater Pollution Prevention Plans (SWPPPs) and use temporary and permanent BMPs to avoid, minimize, or mitigate sediment pollution could 2. During construction control water pollution through the use of temporary measures, such as berms, slope drains, sediment basins, straw bales, silt fences, seeding, and mulching.
ILLINOIS	Same as above.	For Routes 2, 4 and both Route 5 Options: There are 207 acres of coastal zone within the Area of Analysis.				For both Route 9 Options: There are 472 acres of coastal zone within the Area of Analysis		
INDIANA	Same as above.	For all Build Alternatives: The entire Area of Analysis in Indiana is within a Coastal Zone.						
MICHIGAN	Same as above.	For all Build Alternatives: In Michigan, the Corridor passes through the coastal zone management area along the Lake Michigan shoreline from the Indiana Border into New Buffalo, Michigan.						

NATURAL HABITAT AND WILDLIFE

CORRIDOR END -TO -END	No Program - related impacts.	For all Build Alternatives: Construction activities, including tree and brush clearing, placement of fill material for additional track and sidings, stream relocations, culvert replacement or extensions, and bridge replacement or additions could have the potential to impact terrestrial and aquatic natural habitats of wildlife species present in the Area of Analysis. Since proposed areas where additional right of way would be acquired abut existing right of way, impacts would be relatively minimal and linear, and would not further fragment remaining large parcels of natural habitat areas. Species that are present along the rail corridor have historically been continually exposed to train traffic in varying degrees and changes would be marginal. An increase in train frequency and speed may increase the potential for collisions with mobile animal species. Impacts to habitat, such as waterways, wetlands, and woodlands may impact species.						For all Build Alternatives and all states: 1. Obtain data specific to the selected Preferred Alternative through coordination with USFWS, Illinois DNR, Indiana DNR, and Michigan DNR. 2. Conduct field surveys of the impacted areas of the Preferred Alternative to determine the existence of high quality natural communities and migratory bird habitat. 3. Assess ways to avoid and minimize impacts to habitat in coordination with the USFWS and the state resource agencies. If habitat cannot be avoided, develop and apply mitigation measures to protect species and offset impacts. These measures typically include restrictions on construction activities in specific areas during the breeding/nesting seasons and application of best management practices to minimize run-off and erosion from construction sites.
ILLINOIS	Same as above.	For Routes 2, 4 and both Route 5 Options: 80 acres of the Area of Analysis is within Englewood Conservation Area including stream habitat, and 7 acres of wetland habitat.				For both Route 9 Options: Natural habitats include Burnham Prairie Nature Preserve, Beaubien Woods Forest Preserve, with a total of 59 acres within the Area of Analysis. Area includes stream habitat, 62 acres of wetland less than an acre of lakes and 3 acres of swamps/marshes within the Area of Analysis.		

SUMMARY OF EFFECTS MATRIX

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RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
NATURAL HABITAT AND WILDLIFE (CONTINUED)								
INDIANA	Same as above.	416 acres are within the Area of Analysis. 38 acres are within natural areas of the Indiana Dunes National Lakeshore where some right of way may be acquired The Clarke Junction West Site may also be impacted.	There are 327 acres with 47 acres within the National Lakeshore. The Clark and Pine Nature Preserve and Clarke Junction West Site may also be impacted.	For both Route 5 Options: Does not travel through the National Lakeshore's natural areas. The Clark and Pine Nature Preserve, Clarke Junction West Site and Clarke and Pine General Refractories Addition Site for a total of 29 acres that may be impacted.		54 acres are within the Area of Analysis. None of the route travels through the high quality natural areas of the National Lakeshore. The Tolleston Nature Preserve and the Brunswick Center Savanna Site cover 20 acres within the Area of Analysis.	Same as Route 9 Option 1, except Route 9 Option 2 has only 1 acre of the Brunswick Center Savanna Site within the Area of Analysis.	
MICHIGAN	Same as above.	For all Build Alternatives: The Corridor passes through some ecologically sensitive areas in Michigan. Any improvements in these areas could potentially impact habitat during construction. Program improvements are expected to keep within the existing right of way in Michigan.						
THREATENED AND ENDANGERED SPECIES								
CORRIDOR END -TO -END	Impacts would not occur beyond those that could occur due to other projects and maintenance activities.	For all Build Alternatives: The construction activities of the Build Alternatives including tree and brush clearing, placement of fill material for additional track and sidings, stream relocations, culvert replacement or extensions, and bridge replacement or additions—could have the potential to impact terrestrial and aquatic natural habitats of state and/or federally listed threatened or endangered species, if present in the Area of Analysis. There are potential effects on wildlife and federally-listed species that may be present in the Area of Analysis from the increase in noise and vibration. The presence of listed species would be determined during Tier 2 NEPA analysis.						For all Build Alternatives and all states: 1. Conduct necessary Section 7 consultation with USFWS to determine potential impacts to the federal listed species and its habitat. If it is determined that the Preferred Alternative could have the potential to affect a federally listed species, prepare a biological assessment to determine the Preferred Alternative's potential effect on one or more species, pursuant to Section 7 of the ESA. If a potential impact to a federally listed species is identified, formal consultation is required with USFWS, and USFWS would prepare a biological opinion on whether the proposed activity would adversely affect (jeopardize the continued existence of) a listed species. Modifications to avoid or minimize impacts, or mitigation measures for unavoidable adverse impacts would be determined as part of the formal consultation. 2. Coordinate with the Illinois DNR, Indiana DNR, and Michigan DNR, as appropriate to identify potential impacts on state-listed threatened and endangered species. 3. Use database information regarding species locations and habitat requirements as a basis for conducting field surveys to determine existence of state-listed species in the Area of Analysis. Assess avoidance or minimization of impacts, and to determine potential mitigation measures to be implemented prior to construction. Typical mitigation measures include restoration or management of existing special communities adjacent to the railway section. 4. Show areas requiring protection on design and construction plans with instructions for the installation of protective fencing. This fencing would prohibit all work within these areas to avoid impacts to the species. If work restrictions cannot be used effectively during the design process to eliminate impacts to a species, then employ minimization strategies to reduce impacts to the species and their habitats. This may require design changes or different construction techniques that minimize the overall impact to the species.
ILLINOIS	Same as above.	Same as above.						
INDIANA	Same as above.	Same as above.						
MICHIGAN	Same as above.	For all Build Alternatives: It is not anticipated that any federally listed animal species will be impacted by the Program improvements if avoidance strategies are implemented where species exist adjacent to the railway. The proposed work in Michigan is anticipated to stay within the existing right of way, where currently there is not suitable habitat for the species listed.						

SUMMARY OF EFFECTS MATRIX

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ENERGY USE AND CLIMATE CHANGE

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	No Program-related impacts. Passenger train service would not be as readily available, resulting in the continued reliance on automobiles, buses, and planes.	For all Build Alternatives and all states: Energy use under each of the Build Alternatives would be essentially identical as there is only a two percent difference in length between the shortest route (Route 2 at 305 miles) and the longest route (Route 9 at 310 miles). The Build Alternatives would provide a competitive transportation alternative compared to automobiles, planes, and buses. Energy would be consumed during construction of the Build Alternatives, but reduced energy consumption for transportation would be realized over the long-term. Based on a preliminary passenger rail forecast and an analysis of energy efficiency by mode, the Build Alternatives would provide a net reduction in energy consumption through diverted trips from automobiles, buses, and planes to new passenger rail service. In spite of increased fuel consumption in locomotives (approximately 12.7 million gallons/year), the Build Alternatives are expected to result in reduced fuel consumption of approximately 16.4 million gallons for an annual reduction in fuel use within the Corridor of approximately 3.7 million gallons.					For all Build Alternatives and all states: 1. Mitigation is not expected to be required for energy use and climate change due to the expected reductions in fuel use and CO2 emissions resulting from diverted trips from other modes of transportation within the Corridor.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

CORRIDOR END -TO -END	New commitments of resources would not occur beyond those that could occur related to other projects in the Corridor. Energy resources would continue to be consumed by automobile travelers at a slightly higher rate than with the Build Alternatives.	For all Build Alternatives and for all states: Construction of the Build Alternatives would result in the irreversible and irretrievable commitment of land where additional right of way is needed. Construction materials would be largely irretrievable when used. Several energy resources would be committed to the Program, including petroleum, natural gas, electrical, and manpower expenditures for construction, operation, and maintenance. Federal and state financial resources would be irreversibly and irretrievably committed to the Program for planning and public review, development of Tier 2 documentation, design, construction, operation, and maintenance.						No mitigation measures are proposed at this time. Tier 2 NEPA analyses would assess the extent of irreversible and irretrievable commitments of resources and to determine if mitigation would be required.

SHORT - TERM USE VS. LONG - TERM PRODUCTIVITY OF THE ENVIRONMENT

CORRIDOR END -TO -END	No Program-related impacts. Traffic congestion could increase, and energy resources may continue to be consumed by other modes of transportation between Chicago and Detroit/Pontiac, at a slightly higher rate than with the Build Alternatives. This, in turn, could result in increased pollutant emissions and decreased air quality.	For all Build Alternatives and all states: There will be short-term construction impacts. Short-term employment and use of materials during construction would contribute to short term increase in local economy. Long-term effect is expected to be minimal, but could see a reduction in farmland, increases in noise and vibration impacts. Implementation of the Build Alternatives would result in the short-term impacts and use of resources while increasing the long-term benefits and productivity of passenger rail transportation, land use, and economic systems.						Mitigation measures are discussed in the previous section for each respective resource.

SUMMARY OF EFFECTS MATRIX

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INDIRECT AND CUMULATIVE EFFECTS

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	No new direct, indirect impacts or cumulative effects beyond those that could occur due to other projects and maintenance. There would not be the improved level and quality of passenger rail service between Chicago and Detroit/Pontiac. A negative contribution to cumulative effects of continuing preference of personal automobiles on highways.	For all Build Alternatives and all states: Direct impacts of noise, vibration, visual effects, and air emissions would potentially result in indirect impacts on wildlife and reduced use of nearby parks, recreation areas, and natural areas. Induced passenger rail ridership may indirectly impact the viability of air and bus service in the future. Traffic flow at modified grade crossings could change resulting in additional traffic routed through residential neighborhoods. Land use and economic development could result indirectly from the construction and use of the suburban station in northwest Indiana as well as other potential improvements to existing stations. Passenger rail infrastructure improvements including crossing and signal improvements, track upgrades and construction of a dedicated double track railroad in the SOTL may indirectly benefit existing freight service.						For all Build Alternatives and all states: 1. After design details are prepared for the Preferred Alternative, and required construction activities are known, specific indirect impacts and cumulative effects can be identified. Specific mitigation measures, to the extent required, will be identified and discussed in Tier 2 NEPA analysis documents.

SUMMARY OF EFFECTS MATRIX

CONSTRUCTION IMPACTS

RESOURCE	NO BUILD	ROUTE 2	ROUTE 4	ROUTE 5, OPTION 1	ROUTE 5, OPTION 2	ROUTE 9, OPTION 1	ROUTE 9, OPTION 2	POTENTIAL MITIGATION MEASURES
CORRIDOR END -TO -END	No Program-related impacts.	For all Build Alternatives and all states: Heavy construction equipment may generate noise. Short-term air emissions from on-site heavy equipment as well as fugitive dust and particle debris from demolition and excavation activities. Waste material may be generated from any construction and demolition activities. Construction debris and potential spills may occur that would have the potential to impact water quality from stormwater runoff from the construction site. During construction, access to adjacent properties may be impacted on a temporary basis. Construction activities for corridor improvements would affect rail traffic by reducing operating train speeds through the construction zones, adding to rail travel time and, in turn, cost.						For all Build Alternatives and all states: Coordination with Existing Rail Operations 1. Coordinate with railroad owners to gain permission to work within railroad right of way 2. Adjust schedules for operations and limited temporary shutdowns 3. Stage construction in a way that limits conflicts Noise and Vibration 4. Equip and maintain muffling equipment for trucks and other construction machinery to minimize noise emissions 5. Limit times and duration of construction activities adjacent to sensitive land uses 6. Employ limits and controls on drilling and blasting activities Air Quality 7. Adhere to construction permit conditions and all state and local regulations in regard to emissions and exhaust, fugitive dust, and burning of debris Waste Disposal 8. Recycle construction debris, if possible, at facilities that are in compliance with federal, state, and local regulations 9. Test hazardous waste that may be encountered 10. Handle, collect, and dispose of waste materials in accordance with federal, state, and local regulations Water Quality 11. Manage stormwater runoff through NPDES and all other federal, state, and local permitting processes 12. Implement BMPs for control of soil erosion and other pollutants 13. Properly store hazardous materials away from water bodies and wetlands in a self-contained upland location Access 14. Develop a construction traffic mitigation plan to maintain reasonable access to properties, including special provisions to accommodate emergency vehicles, as well as adjacent populations of elderly and disabled persons. Traffic and Safety 15. Coordinate with IDOT, INDOT, and MDOT as well as local jurisdictions to develop and implement a traffic control and safety plan.