

EXECUTIVE SUMMARY FOR THE PUBLIC (ESP – English)

Project Fact Sheet

Name of Project	Mindanao Railway: Tagum-Davao-Digos (TDD) Segment	
Project Location	<i>Province of Davao Del Norte:</i> Tagum City, Municipality of Carmen, Panabo City <i>Province of Davao del Sur:</i> Davao City, Municipality of Sta. Cruz and Digos City	
Nature of Project	Railway Transport System	
Project Size	100.2 kilometers	
Summary of Major Components	Project Component	Description / Specifications
	Railway	1,435 mm standard gauge UIC60 Rail Type
	Rolling Stock	Approximately 43-m long (2 diesel-electric multiple unit), 3.1m wide and 4.8m high
	Station	Twin tracks at all stations except Davao Station with 3 tracks and station access mostly from eastern side of the railway tracks
	Depot	Approximately 10 hectares for depot in Tagum City and 3 hectares for sub-depot in Davao City
	Viaduct	About 10m wide for single track and 15m wide for twin track along the railway corridor
	Support Facilities	Tagum Depot – Maintenance and Stabling facilities; Davao Sub-depot – Light Maintenance and Stabling Facilities; Administration Buildings and Staff House; Water and Wastewater Treatment Facilities.
Project Cost	Php 81.7 Billion	
Project Duration	2020-2045	
Estimated Operation Date	<i>Early 2022:</i> Tagum City – Davao City (7 trains of 2 car units per train) <i>Mid-2022:</i> Tagum City – Davao City– Digos City (23 trains of 2 car units per train) <i>2045:</i> Tagum City – Davao City– Digos City (23 train of 4 car units per train)	
Proponent Name	Department of Transportation	
Proponent Address and Contact Details	APO Court along Sergio Osmeña Street, Clark Freeport Zone, Pampanga, Tel. No. 726-7128 / 790-8400	
Proponent Authorized Representative	Usec. Timothy John Batan Undersecretary for Railways Department of Transportation	
EIA Preparer (Consultant)	Ove Arup & Partners Hong Kong Ltd (“Arup”) Galerio Environmental Consultancy (GEC)	
Preparer Contact Person	Mr. David Rollinson Arup –Environmental and Social Team Leader	Leonila P. Galerio, EnP GEC – EIA Team Leader
Preparer Address and Contact Details	Ove Arup & Partners Hong Kong Ltd (“Arup”) 4F, Rockwell Business Center, Ortigas Ave., Pasig Metro Manila, 1600 Tel. No.: +632 3485 8200 Galerio Environmental Consultancy (GEC) Door No. 1, Ground Floor, Matina IT Park, Building 2, McArthur Highway, Matina, Davao City, Philippines, 8000 Tel No.: + 63 (082)- 224-3197	

Location

The proposed Mindanao Railway Project (MRP) is one of the major projects of the National Philippine Railway infrastructure program. The 1,544 kilometer Mindanao-wide Railway System will connect cities like Davao, General Santos, Cagayan de Oro, Iligan, Cotabato, Zamboanga, Butuan, Surigao, and Malaybalay.

The first phase of the MRP is the Tagum-Davao-Digos (TDD) segment, which is 100.2 kilometers long and covers six (6) locations in the Provinces of Davao del Norte and Davao del Sur; from north to south, these are: (1) Tagum City, (2) Carmen Municipality, (3) Panabo City, (4) Davao City, (5) Sta. Cruz Municipality and (6) Digos City. Further, the MRP-TDD will have eight (8) stations and two (2) depots/sub-depots spanning its length, the locations of which are summarized in the table below.

Location of MRP-TDD Stations and Depots

	Station/Depot	Location
1	Tagum	Brgy. Maniklam, Tagum City
2	Carmen	Brgy. Ising, Carmen
3	Panabo	Brgy. Datu Abdul Dadia, Panabo City
4	Mudiang	Brgy. Mudiang, Davao City
5	Davao	Brgy. Langub, Davao City
6	Toril	Brgy. Bato, Toril, Davao City
7	Sta. Cruz	Brgy. Zone 4, Sta. Cruz
8	Digos	Brgy. Cogon, Digos City
9	Davao Sub Depot	Brgy. Langub, Davao City
10	Tagum Depot	Brgy. Maniklam, Tagum City

The lists of all the covered barangays along the proposed alignment of the MRP is seen in the table below.

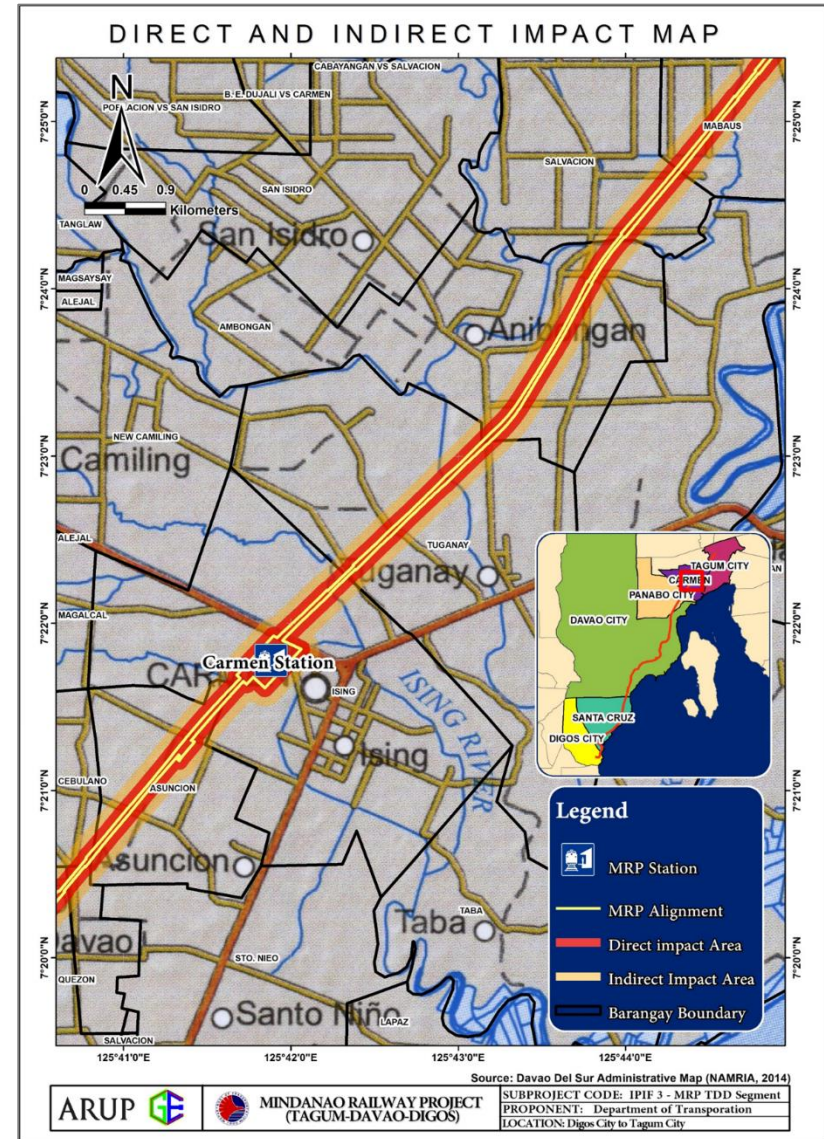
MRP-TDD Covered Barangays

Municipality / City	Covered Barangays
Tagum City	Maniklam, San Miguel
Carmen	Asuncion, Anibongan, Cebulano, Ising, Mabaus, Salvacion, Tuganay
Panabo City	Quezon, Datu Abdul Dadia, Little Panay, New Visayas, San Nicolas, Southern Davao, Tagpore, Maduao
Davao City	Bato, Bago Oshiro, Bago Gallera, Baliok, Bangkas Heights, Binugao, Catalunan Grande, Catalunan Pequeno, Indangan, Langub, Lubogan, Mahayag, Mandug, Magtuod, Marapangi, Mudiang, San Isidro, Sirawan, Tibungco, Tigatto, Waan
Sta. Cruz	Astorga, Bato, Coronon, Darong, Inawayan, Sinoron, Tagabuli, Tuban, Zone 1, Zone 2, Zone 4
Digos City	Cogon, Sinawilan

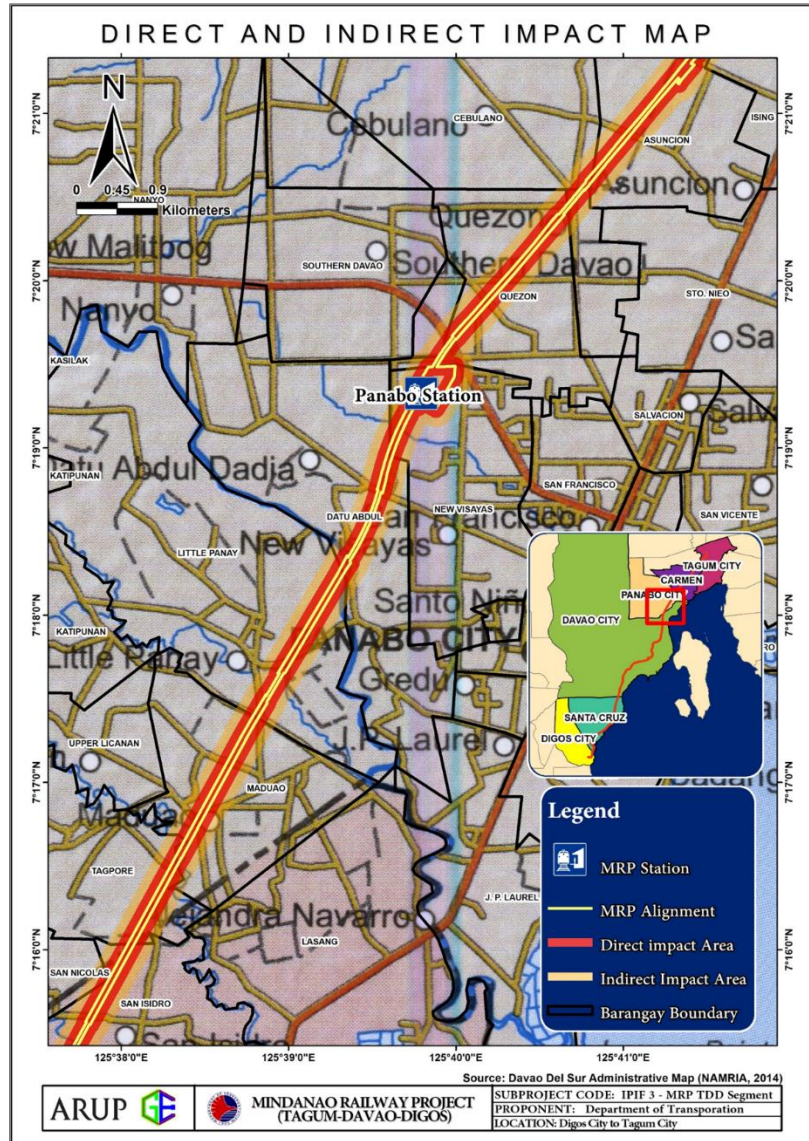
Direct and Indirect Impact Map of Tagum City



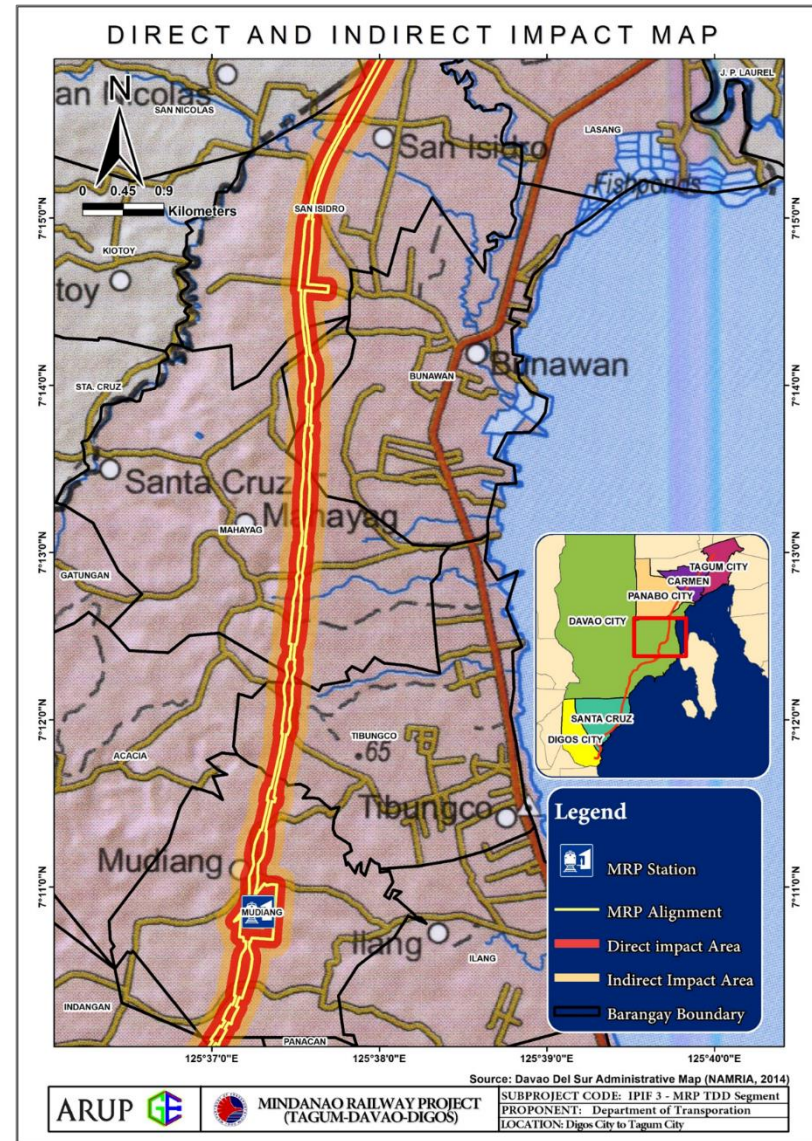
Direct and Indirect Impact Map of Carmen



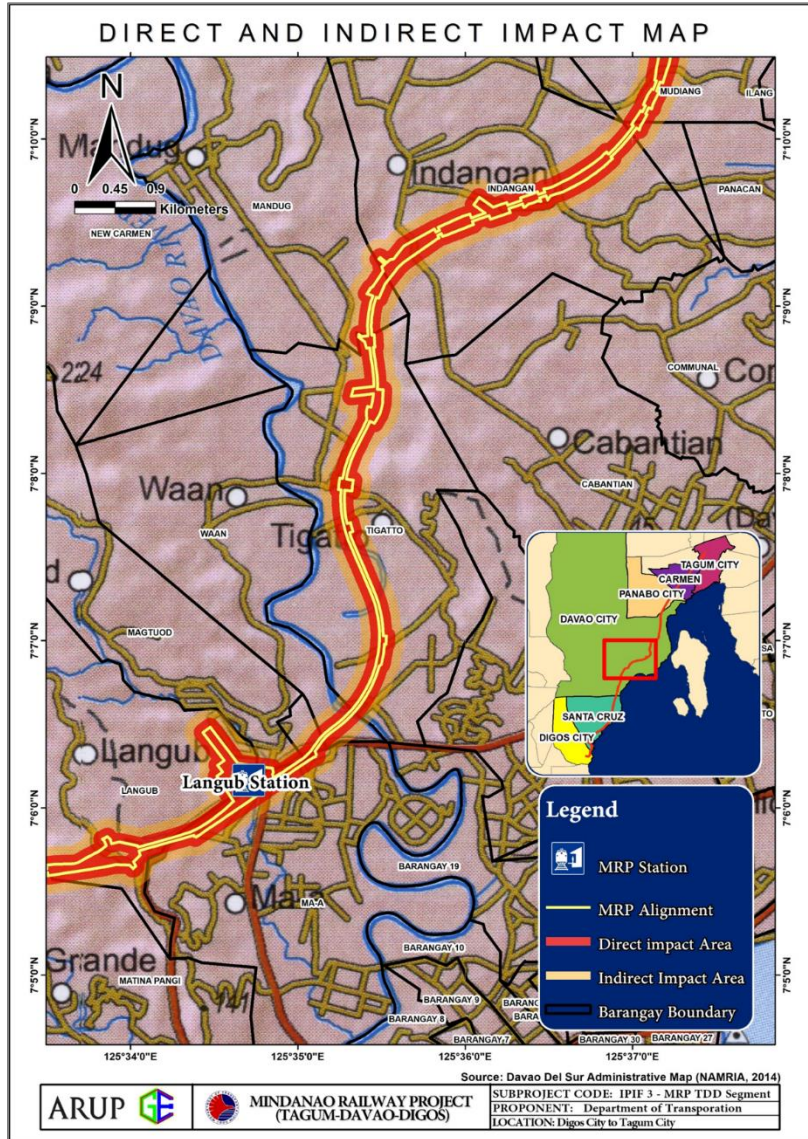
Direct and Indirect Impact Map of Panabo City



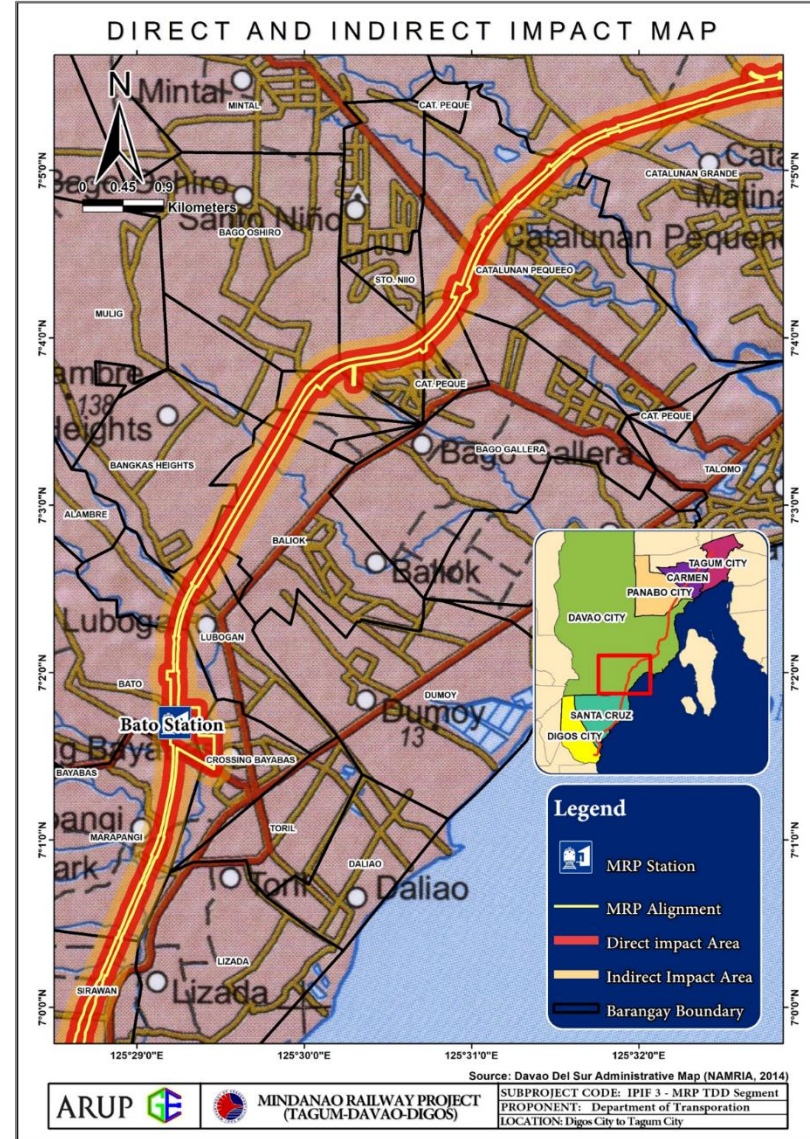
Direct and Indirect Impact Map of Davao City (north)



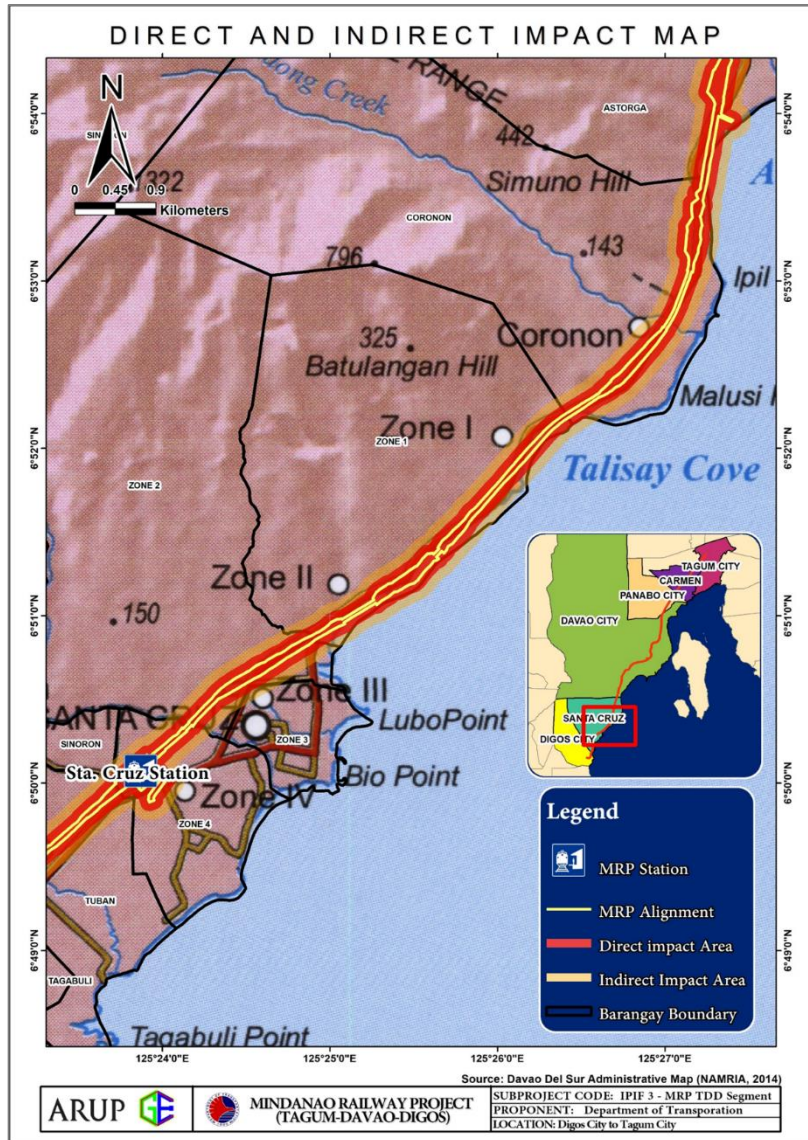
Direct and Indirect Impact Map of Davao City (central)



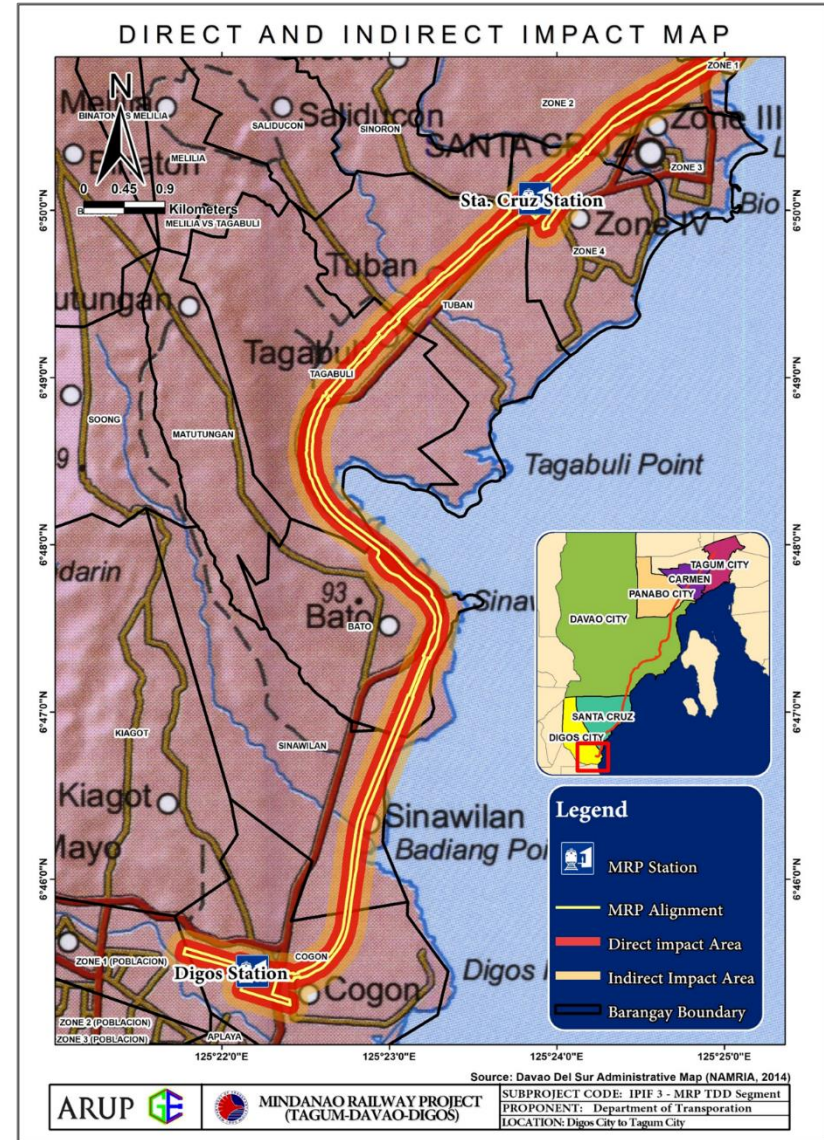
Direct and Indirect Impact Map of Davao City (south)



Direct and Indirect Impact Map of Sta. Cruz



Direct and Indirect Impact Map of Digos City



Design

The length of the railway corridor will have an average Right-Of-Way width of 40m for elevated sections, and this varies depending on the terrain, the design of the works (on embankments or in cut-slopes) and where twin tracks are required for passing loops and sidings. Each station and the sub-depot will cover an area of one (1) hectare while the depot will occupy about thirteen (13) hectares.

Initially, the MRP-TDD was to be developed as an electrified, double-track system. After a review of various factors by NEDA, this was revised into a single-track and diesel-powered railway. The table below summarizes the considerations for every design criteria of the MRP-TDD

MRP-TDD Design Criteria Considerations

Design Criteria	Considerations
Track Gauge	Standard gauge (1435 mm)
Traction System	Diesel
Axle Load	25 tons
Maximum Service Speeds	Commuter – 120 kph Freight (future) – 80 kph
Horizontal Curves	Minimum radius – 850 m Maximum cant – 110 mm for mixed freight passenger service Minimum cant deficiency – 20 mm Distance between curves – (50 meters) standard, 20 m (minimum)
Gradient	Ruling grade – 3.0% (30/1000 m).
Vertical Curves	Recommended vertical curve – 5,000 m (and not be less than 2000m radius) In depot connection track vertical curves – may be reduced to 1000m radius Minimum vertical curve length – not less than 20 m
Distance between tracks	Center to center of two tracks – 4.5 m
Track Formation	Width on cuttings –15 m (single track), 20m (twin track) Width on embankments – 10 m (single track), 15m (twin track) Inclination – 1:20 from center line to the sides
Rails	Type – UIC 60 Standard Gauge- 1,435mm Length – 25 m or shipping length Inclination – 1:20 Shop weld to 150 m (flash-butt welding) In situ welding up to 600 m (aluminothermic welding) Use of anti-corrosive coating for rails in areas along the coastal shoreline
Sleepers	Mono-block pre-stressed concrete Length – 2.5 m Width – 17 cm (top) and 30 cm (bottom) Distance between sleepers – 600 mm
Ballast Bed	Material – crushed rock; sharp-edged cubes Thickness – 300 mm below bottom sleeper
Sub-ballast (for soft formations)	Material – crushed rock Thickness – 200 mm
Lateral Drainage	Surface water – U-shaped or trapezoidal channels
Turnouts or switches	Main Lines Radius – 560 m Inclination – 1:14 Depot entry track Radius – 300 m Inclination 1:10:5 Depot Siding Radius – 140 m Inclination - FA1:7
Bridge superstructure	Span lengths of 20 m and less – reinforced concrete spans Span lengths of more than 20 m – box girder or precast beam/slab structure

Design Criteria	Considerations
Provision for double tracks	In single-track lines, bridges, viaducts, lateral, drainage structures and tunnels should be designed and constructed with provisions for a second parallel tracks
Right-of-way widths	Between stations – 50 m or more At depots – 220 m or more At elevated bridge structures – 40 m
Design loading	Cooper E-80

Summary of Alternatives Considered in Terms of Siting and Design

The next figure shows three (3) options that were assessed and ranked based on: (1) length, (2) accessibility to the city, (3) social and environmental impact, (4) implementation and/or damage to developed areas, (5) constructability, (6) soundness of the alignment, and (7) projected capital requirements, while the next table summarizes the results of the assessment of these alignment options.

The location of the stations, on the other hand, were based on (1) technical considerations, (2) possible source of ridership, (3) proximity to urban centers and (4) Areas for Future Developments/Potential Rise of New Cities.

Designing the entire project has safety in mind for both passengers and the train structure itself. The safety standards followed are from international organizations, including the Chinese Code for design on railway bridge and culvert (GB Code), American Railway Engineering and Maintenance-of-Way Association (AREMA), American Railway Engineers Association (AREA), International Union of Railways (UIC) and the National Structural Code of the Philippines (NSCP).

Considerations for the design criteria for the project includes track and construction gauges, the traction system, axle load, speed, horizontal and vertical curves, momentum and pusher gradients, distance between tracks, measurements for formations (width on cuttings and embankments and inclination), width between rails, sleepers, fastening, joints in ballasted tracks, material for the ballast and sub ballast beds, lateral drainage, proportions for turnouts and/or switches, the bridge super structure, a provision for double tracks, right-of-way widths, and design loading.

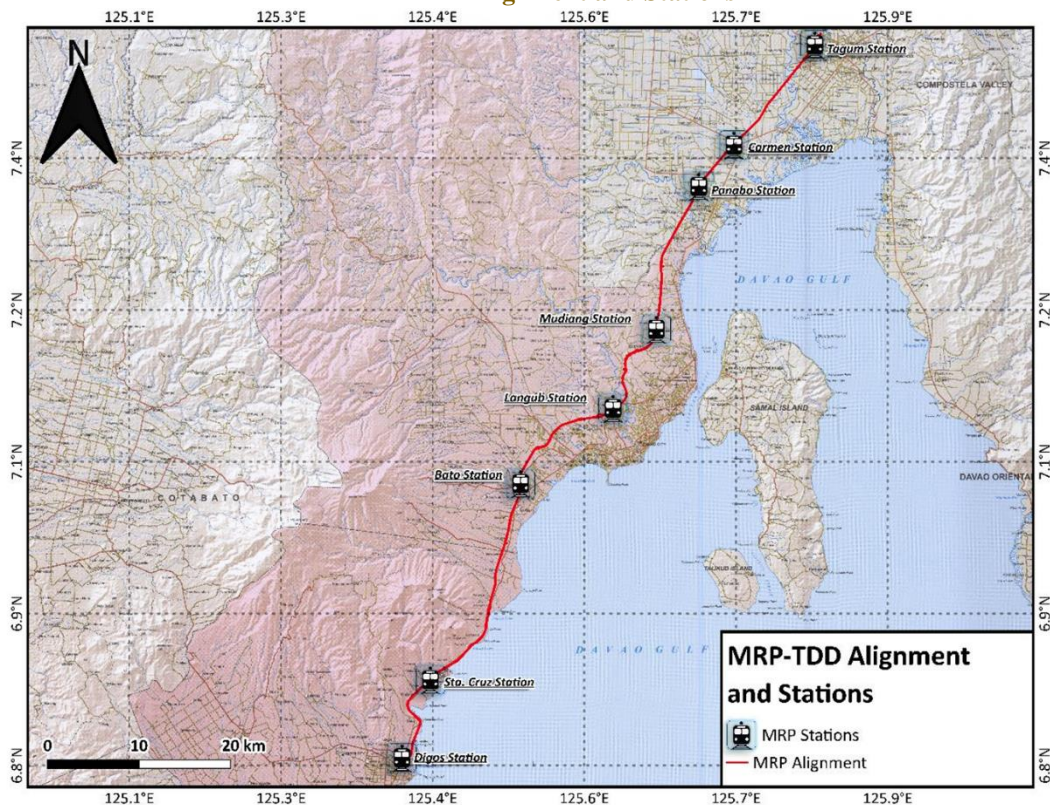
MRP-TDD Alignment Options



Alignment Options Considerations and Criteria

Criteria	Alignment Options		
	Option 1	Option 2	Option 3
Length (km)	Longest	Shorter	Shortest
Accessibility to the city	Far from city center	Average, Between 1 and 3	Nearer to Davao City to facilitate accessibility
Social/ Environmental Impact	Sufficient right-of- way and minimum structures affected, except near the city center of Davao	Sufficient right-of- way except near the city center of Davao	Requires demolition of many residential structures, commercial buildings and factories, highly adverse social impacts
Implementation Aspect/Damage to Developed Areas	The longest alignment and lies out west of Davao City proper; offers least damage to developed areas	Damage to developed areas is much less than alignment 3, considered moderate	Damage to developed areas is high
Constructability	No major issues	No major issues	Extensive land acquisition, including developed prime lands with commercial and residential structures
Soundness of the Alignment	Conforms to established design standards and criteria	Horizontal and vertical alignments are fair, and all curves meet required minimum geometric standards and criteria	Meets the minimum design criteria and standards
Project Capital Requirements	Lowest	Lower	Highest
Rank	2	1	3

MRP-TDD Alignment and Stations



(L-R): Illustration of Rolling Stock, View of Davao Station and Sample Side Platform



Project Schedule

Activities	2018	2019	2020	2021	2022
Pre-Construction					
Securing of the necessary approval/permits from the government and regulatory agencies (i.e. Barangay clearance).					
IEC and FGD, Public scoping, Public Hearing					
Ground Investigation works Report (NORTH)					
Complete Property Appraisal and Parcellary Survey					
Complete Row Acquisition, Design & Build Contract Award					
Issuance of ECC					
Detailed Design					
Project Cost Estimate NEDA Submission ground investigation works report (SOUTH)					
Design & Build contract bid evaluation report complete					
Evaluation of Procurement of General Construction Supervision Consultant					
Detailed Topography Survey					
Detailed Geotechnical Investigation					
Right of Way Validation					
Site Preparation Work					
Site Establishment Work					
Detailed Design					
Construction					
Formation Works					
Structures Construction					
Sub ballast Capping					
Track laying Works					
Electrification Works					
Signalling Works					
Communication Works					
Commissioning					
Operation					
Partial Operation of Trains for revenue operation					
Full Train operations and catering of passengers					

Integrated Summary of the Project Environmental Management Plan (EMP)

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
PRE-CONSTRUCTION			
Employment – Hiring of local workers	The People	Opportunity for employment and livelihood; Competition with local and migrant workers; Reduction of poverty and food poverty.	<ul style="list-style-type: none"> Contractors to adopt strict policy requiring the contractor to source workforce from qualified locals; Contractors to develop scheme of prioritization in local hiring with equal opportunities for men and women, skilled and unskilled, and PWDs; Compliance with RA 6685; and Contractors to provide trainings for hired workers.
Health and Safety – Hiring of local workers	The People	Health and Safety of construction workers.	<ul style="list-style-type: none"> Use of Personal Protective Equipment to all construction workers; DOTr and Contractor to provide emergency and health and safety program for workers; Provide Medical Kit and first aid; Provide potable water and temporary sanitation facilities; Provide trash bins in strategic locations and coordinate with LGUs and host barangays for regular waste collection and disposal; Conduct frequent safety, hygiene, and construction sanitation training for workers; and Training of personnel and staff during emergencies.
Loss of livelihood of residents and business owners	The People	Displacement and loss of livelihood of residents and business owners during ROW land acquisition.	<ul style="list-style-type: none"> Proper compensation and/or relocation of affected residents and landowners; and Coordinate with LGUs for the Resettlement Action Plan (RAP) and compensation.
CONSTRUCTION PHASE			
Terrestrial Ecology and Geology and Geomorphology	The Land	Loss of topsoil due to vegetation clearing may trigger soil erosion and may induce landslides in some areas during clearing, and/ or tree cutting activities, excavation, use of heavy equipment, and other construction works.	<ul style="list-style-type: none"> Prepare and implement site protection plan; Clear areas that are only necessary for site preparation to prevent erosion; Immediate compaction of the all-weather road by means of a road roller to prevent any splash and soil erosion; and Slope protection on the alignment, particularly at Sta Cruz and Davao, to minimize surface runoff and sedimentation.
Terrestrial Ecology	The Land	Loss of vegetation during clearing operation (i.e. fruit bearing trees, agricultural crops and forest trees); Possible change in floral community structure; Possible slash and burn cultivation, illegal logging and	<ul style="list-style-type: none"> Clear areas that are only necessary for site preparation to prevent impact extensive on terrestrial ecology; Secure applicable and relevant permits, including tree cutting permit that should be secured prior to tree cutting activity; Gradual clearing of existing vegetation to give sufficient time for affected fauna to relocate and/or migrate;

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
		poaching due to improved access to forest resources; Cutting of fruit-bearing trees along the alignment	<ul style="list-style-type: none"> • Replacement of cut trees will be based to the DENR Memorandum Order (DMO) 2012-02. Earth balling of big trees (i.e. narra, molave and lauan) or replacement seedlings will be provided by the proponent; • Compensation to owners of non-timber species that will be cut; • Native flora species shall be at least conserved in selected areas to serve as refuge and forage for wildlife species; • Regular inspection of illegal activities near public forest areas; • Coordination with LGUs.
Terrestrial Ecology	The Land	Disturbance or loss of habitat and will affect existing wildlife, including water birds and stopover sites for migratory birds during site preparation, clearing, and/ or tree cutting activities.	<ul style="list-style-type: none"> • Clear areas that are only necessary for site preparation to prevent extensive impact on terrestrial ecology; • Secure applicable and relevant permits, including tree cutting permit that should be secured prior to tree cutting activity; • Replacement of cut trees will be based to the DENR Memorandum Order (DMO) 2012-02. Earth balling of big trees or replacement seedlings will be provided by the proponent; • Gradual conversion of the area to provide sufficient time for wildlife movement; • Development conducted in stages/ phases to allow adaption to noise, personnel and equipment movement in the area; • Identification, development and conservation of an adjacent wetland area for migratory and resident birds; • On-grading of the railway alignment on wetlands to minimize loss of wildlife; and • Coordination with LGUs.
Accumulation of solid wastes	The Land	Accumulation of solid wastes during site preparation, clearing, and/ or tree cutting activities, excavation and other construction and installation works; Devaluation of land value as a result of improper solid waste management	<ul style="list-style-type: none"> • Implement an organized waste storage, collection, and proper waste management system; • Housekeeping measures can also prevent possible contamination in soil and water; • Waste will be collected daily by a 3rd party contractor to ensure cleanliness in the workplace; and • Trainings will be provided to site workers to improve the awareness on proper solid waste management practices.
Geology and geomorphology	The Land	May trigger siltation during site preparation, clearing, and/ or tree cutting activities, excavation, use of heavy equipment and other construction works.	<ul style="list-style-type: none"> • Secure appropriate erosion control measures such as additional pavements, sediment traps and barriers during heavy rain periods; • Stockpiles will be placed away from the water courses and protected against natural elements to prevent the transport of soil and sediment; • Soil debris and other excavated materials should be hauled out from the site;

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
			<ul style="list-style-type: none"> • Regular monitoring to the adjacent water bodies to ensure the continuous conformance to their respective water quality criteria. Water quality monitoring will be conducted on a monthly basis during the construction phase; • Silt traps will be installed for all nearby water bodies; and • The waste soil and other debris will be properly handled and disposed on a regular basis.
Visual aesthetics	The Land	Impairment of visual aesthetics during excavation and other construction works.	<ul style="list-style-type: none"> • Final project design to consider aesthetic impacts.
Traffic	The Land	Traffic congestion during construction works	<ul style="list-style-type: none"> • Follow the Traffic Management Plan to aid in avoiding traffic congestion; • Putting up of clear and appropriate directional signs; • Contractors to provide traffic enforcers in areas where construction is on-going; and • Coordinate with LGUs to provide alternative routes.
Soil contamination; Hazardous materials	The Land and Water	<p>Soil contamination from leaks of lubricants agents and used oil due to excavation, and other construction works.</p> <p>Generation of hazardous materials in land (i.e. disposal of busted lamps, batteries, empty chemical containers, used oil etc. (from casting yard and storage areas); generated from the operation of construction machinery and office facility.</p>	<ul style="list-style-type: none"> • Project shall be equipped with oil-water separator to remove oil from effluents prior to discharge to the water bodies; • Implement an organized waste storage, collection, and management system; • Proper waste management (handling, storage and disposal) and housekeeping measures can also prevent possible contamination in soil and water; • Used oil, spillages and other hazardous waste should be collected, contained and disposed by a 3rd party accredited hauler and treater; • Conduct hydraulic analysis to ensure planned drainage systems; • Training of personnel in proper handling of oil; • Provision of Spill Response Kit available onsite; • The contractor will be required to comply with the Civil Works Guidelines; • Emergency and contingency plan in case of spills (i.e. Health and Safety Management Plan, Spoil Management and Spill Response Management Plan). Maintenance and proper use of construction materials and heavy vehicles; • Disposal of non-recyclable wastes by a licensed contractor; and • Trainings will be provided to site workers to improve the awareness on proper solid waste management practices
Water Quality	The Water	Degradation of water quality due to generation of domestic wastewater during excavation, construction and installation of site facilities – Temporary Facilities (field offices and barracks)	<ul style="list-style-type: none"> • Locate motor-pool area at least 500 meters away from any body of water; • Set up of portable sanitary facilities and collect wastewater to be disposed accordingly; • Apply appropriate siltation control measures such as well-designed silt curtain scheme installed within the buffer of construction areas to prevent any pollution and silt disturbance due to construction activities near water bodies;

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
			<ul style="list-style-type: none"> • Drainage canals that will direct runoff to silt traps and settling ponds will be built around the stockpile to prevent sedimentation of nearby water bodies; • Soil debris and other excavated materials should be hauled out from the site; • Regular monitoring of the affected and adjacent water bodies prior, during and even after the construction phase to monitor the water quality and ensure the continuous conformance to their respective water quality criteria. Water quality monitoring will be conducted on a monthly basis during the construction phase; • The contractor will be required to comply with the Civil Works Guidelines.
Sediment increase	The Water	Increase in suspended sediments in receiving water bodies due to excavation, use of heavy equipment and other construction works.	<ul style="list-style-type: none"> • Secure appropriate erosion control measures such as additional pavements, sediment traps and barriers during heavy rain periods; • Stockpiles will be placed away from the water courses and protected against natural elements to prevent the transport of soil and sediment; • Soil debris and other excavated materials should be hauled out from the site; • Regular monitoring to the adjacent water bodies to ensure the continuous conformance to their respective water quality criteria. Water quality monitoring will be conducted on a monthly basis during the construction phase; • Silt fences will be installed for all nearby water bodies to act as sieves and filters for sediment particles; • Conduct hydraulic analysis to ensure planned drainage systems; • The waste soil and other debris will be properly handled and disposed on a regular basis.
Water Resource Use and Competition	The Water	Water Resource Use and Competition during excavation, use of heavy equipment and other construction works.	<ul style="list-style-type: none"> • Design the water demand of the project; and • Conduct close consultation with the NIA and the various irrigators' associations to come at a mutually agreeable solution.
Flooding	The Water	Increase in flooding susceptibility due to excavation, use of heavy equipment and other construction works.	<ul style="list-style-type: none"> • Conduct detailed hydraulic analysis to ensure that planned drainage systems will be appropriate and capable of minimizing the impact of the project to natural surface flows as well as to mitigate the effects of flooding; • Ensure design will consider sufficient clearance above established flood levels to minimize disruption to water flow and allow efficacy of drainage systems; • Surface drainages and engineering design of structures will consider the span of length of each crossing. • Provide proper drainage canals that consider surface water flows and existing structures in the area; • Control water inflow by placing watershut panels, intercept drainages and pump stations in strategically selected areas; and

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
			<ul style="list-style-type: none"> • Provide overflows to avoid water build-up on bridges when drainage infrastructure is blocked.
Aquatic Ecology	The Water	Changes in channel beds and impacts on fish and aquatic life due to excavation, use of heavy equipment and other construction works.	<ul style="list-style-type: none"> • Strict observance and implementation of Site Protection and Rehabilitation Program and materials handling which provide for soil erosion control measures; • Observe best practices in proper construction procedures that promote care and minimal disturbance to the existing environment; • Habitat loss will be temporary but will be minimized through proper planning and management (e.g. limit the extent of surface disturbance areas, set buffer zones, and progressive rehabilitation); • A comprehensive monitoring plan in accordance with the approved environmental plan in the EIS will be implemented to assess the potential impacts of the project on the aquatic habitat and biota during construction phase; • Monitoring stations will be coincident with the water quality monitoring stations.
Air Quality	The Air	Alteration of air quality from fugitive dust and equipment use, during site preparation, clearing, and/ or tree cutting activities, excavation, other construction works and transport of materials.	<ul style="list-style-type: none"> • Regular and adequate sprinkling of water should be done in the premises to minimize the dust particles generated; • Preventive maintenance of heavy equipment and vehicle; • Regular monitoring of the concentrations of PM2.5, PM10, TSP, SO2 and NO2 shall be done to ensure that the levels of these pollutants will still be within the NAAQS. • Workers will be provided with the appropriate PPEs and will practice standard occupational health and safety pursuant to BWC-DOLE Occupational Safety and Health Standards; • Vehicle emission tests should be passed by the contractor; • Traffic management guidelines will be incorporated in the worker’s and contractors’ seminar. Guidelines such as control of vehicle speed and transport routes should be included; • Fuel efficiency will be maximized through scheduling of vehicle, and equipment movements in order to minimize both idle time and distances travelled and use of low sulfur fuel, where possible.
GHG emission	The Air	GHG emission due to vegetation removal and use of diesel hybrid trains	<ul style="list-style-type: none"> • Wherever feasible, the railway will be designed in to minimize vegetation clearing. If this is unavoidable, easement of the major components should be reduced or limited to maintain considerable amount of vegetation cover; • As part of the Forest Management Bureau (FMB)-Department of Environment and Natural Resources (DENR) statutory requirements, all relevant permits (e.g. Special Tree Cutting Permit) will be secured from concerned agencies prior to any cutting activities;

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
			<ul style="list-style-type: none"> • Fuel and equipment efficiency will be considered prior to construction and operation activities as part of the accounting and reporting that will be undertaken to remove or minimize unnecessary GHG emissions; • Low sulfur fuel will be utilized for use to minimize emissions and maximize equipment efficiency; • Fuel efficiency will be maximized through scheduling of vehicle and equipment movements and minimize both idle time and distances travelled.
Noise Level	The Air	Disturbance in nearby communities due to generation of noise during site preparation, clearing, and/ or tree cutting activities, and other construction works	<ul style="list-style-type: none"> • Use equipment which generates less noise, and/ or will be fitted with muffler or silencers; • The host communities will be kept informed of the duration and timing of any noisy construction; • Usage of PPEs e.g. protective ear devices by project personnel; • Limit the construction time to a given standard hours or limit night work to avoid distraction of nearby establishments like residential areas; • Periodic monitoring and evaluation of noise levels; • Work involving handling of noisy and/or vibrating power tools/ equipment shall be with maximum of 2 hours per day (for 8- hour work, duty cycle should be 1:4) in conformity to the requirements of BWC DOLE DO 1998-13 and the Occupational Safety and Health Standards (As Amended, 1989); • Regular maintenance of all vehicles, machinery, and heavy equipment; • Enclosure and insulation with nonreflecting, sound-absorbent materials of generators, auxiliaries and equipment; and • The project can use hydraulic oscillator to reduce noise and vibration. Pilling rig with acoustic mat will also be used to control noise impacts.
Health and Safety	The People	Potential threat to health and safety of people/communities during Construction works	<ul style="list-style-type: none"> • Ensure site is well-lit, secured and guarded; • Formulate security procedures with local police and LGUs for provision of needed facilities, guard posts. • Provision of Grievance Redress Mechanism for any issues and complaints; and • Coordinate with concerned agencies to ensure safety and reduced negative impacts to the community and environment
Disruption of public services	The People	Temporary disruption of public services, such as water and electric supply during Site preparation, clearing, and/ or tree cutting activities	<ul style="list-style-type: none"> • Relocation and replacement of affected utilities will be paid by the proponent and will be carried out by the relevant utility companies; • Inform affected stakeholders ahead of any temporary disruption during utility relocation; and • Attention will be made on utilities that will be relocated and will be closely monitored during implementation of utility relocation.

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
OPERATION PHASE			
Accumulation of Solid Waste due to movement of passengers	The Land	Increase in solid waste generation from passengers and operational works	<ul style="list-style-type: none"> • Provision of waste bins that will allow proper waste segregation at both ends of the railway; • Regular waste audits and collection of wastes for recycling or disposal; • Formulation and implementation of policies on reducing solid waste for patrons and staff; • Preparation of a Solid Waste Management Plan; • Provision of Materials to Recovery Facilities; • Disposal of non-recyclable wastes by a licensed contractor
Soil Contamination	The Land	Soil contamination from leaks of lubricants agents and used oil	<ul style="list-style-type: none"> • Implement an organized waste storage, where bulk waste oils and lubricants are placed in impermeable area with appropriate secondary containment; • Implement a proper waste management (handling, storage and disposal) and housekeeping measures to prevent possible • contamination in soil; • Waste oils, oily water and other hazardous wastes will be collected and disposed offsite by an accredited third-party waste hauler and treater; • Emergency and contingency plan in case of spills (health and safety management plan must be in place).
Hazardous materials	The Land	Generation of hazardous materials (i.e. disposal of busted lamps, batteries, used oil etc.) generated from the operation of railway and office facility.	<ul style="list-style-type: none"> • Implement an organized waste storage, collection, and management system; • Proper waste management and housekeeping measures can also prevent possible contamination in soil and water; • Used oil, spillages and other hazardous waste should be collected, contained and disposed by a 3rd party accredited hauler and treater; • Disposal of non-recyclable wastes by a licensed contractor.
Domestic waste to water bodies	The Water	Discharge of domestic wastes into water bodies	<ul style="list-style-type: none"> • Construction of wastewater treatment facility (WTF) at the depot; • Setting up of sanitary facilities at stations and with collected wastewater disposed accordingly; and • Regular monitoring in surface water quality stations.
Oil spills to water bodies	The Water	Accidental oil spills from loading and equipment maintenance into water bodies	<ul style="list-style-type: none"> • Regular monitoring in surface water quality stations • Preparation of emergency and contingency plans, such as Spoil Management and Spill Response Management Plan, for oil spills; • Usage of oil-water separator to remove oil from effluents prior to discharge; • Preparation of Workers' Procedural Manual to help prevent oil spills.
Air Quality	The Air	Alteration of air quality from fugitive dust and equipment use	<ul style="list-style-type: none"> • The use of diesel electric train units will minimize the carbon emission. • Proper preventive maintenance of vehicles and other equipment; • Use of cleaner fuel for vehicles and generator sets;

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
			<ul style="list-style-type: none"> Regular monitoring of the concentrations of PM2.5, PM10, TSP, SO2 and NO2 shall be done to ensure that the levels of these pollutants will still be within the NAAQS.
Noise Level	The Air	Noise from the trains may exceed national standards for noise in general areas	<ul style="list-style-type: none"> Periodic monitoring and evaluation of noise levels; and Regular maintenance of train cars and, machineries.
Employment – Hiring of local workers	The People	Increase in employment opportunities and livelihood	<ul style="list-style-type: none"> Contractors to adopt strict policy requiring the contractor to source workforce from qualified locals; Contractors to develop scheme of prioritization in local hiring with equal opportunities for men and women, skilled and unskilled, and PWDs; Compliance to RA 6685; and Contractors to provide trainings for hired workers.
Health and Safety of workers	The People	Health and Safety of personnel	<ul style="list-style-type: none"> Use of Personal Protective Equipment to all site workers; DOTr and Contractor to provide emergency and health and safety program for workers; Provide Medical Kit and first aid; Conduct frequent safety, hygiene, and sanitation training for staff; and Training of personnel and staff during emergencies.
Health and Safety to nearby communities	The People	Potential threat to health and safety of people/communities	<ul style="list-style-type: none"> Ensure site is well-lit, secured and guarded; Formulate security procedures with local police and LGUs for provision of needed facilities, guard posts; and Implementation of Emergency Response Team for accidents and other emergency cases.
Health and Safety to users	The People	Health and Safety of end-users (e.g. passengers)	<ul style="list-style-type: none"> Regular inspection of railways and trains; and Training of personnel and staff during emergencies
ABANDONEMENT PHASE			
Soil and Land Value	The Land	Land	<ul style="list-style-type: none"> Complete soil/land evaluation to determine residual impacts and appropriate corrective actions, if applicable
Water Quality	The Water	Water	<ul style="list-style-type: none"> Assess groundwater capacity and monitoring of surface water quality to evaluate impacts during operation of project and provide possible mitigation measures.
Air Quality	The Air	Unlikely air impacts due to dispersion of mobile source emissions to the atmosphere and dilution of pollutants released when bridge was in operation	<ul style="list-style-type: none"> Assess temporary impacts during demolition; and Assess unlikely impacts due to dispersion to the atmosphere and dilution of pollutants released when railway was in operation

Commitments/Guarantees

The guarantees of the Proponent DoTr through its Contractors which is under its responsibility are spelled-out in the EIS document are made or executed in order to ensure proper monitoring of the proposed project and to see to it that the environment is well protected, to wit:

1. Formation of a Multi-Partite Monitoring Team (MMT) which shall be composed by members coming from different sectors with the purpose of monitoring the project and its ECC conditionalities
2. Provision of support to the MMT by way of providing an Environmental Monitoring Fund to be used by the MMT in its monitoring activities
3. Provision of an Environmental Guarantee Fund (EGF) to cover damages that may be caused by the project
4. Proper utilization of the EGF by the MMT in accordance with the guidelines set in DENR DAO 03-30;
5. Implementation of the Environmental Monitoring Plan (EMoP)
6. Implementation of the Social Development Plan
7. Others guarantees, as the need arises

Copies of the full Environmental Impact Statement (EIS) for this project may be downloaded at the EMB website: <https://emb.gov.ph/environmental-impact-assessment/> . Copies are also available at the following:

1. Environmental Management Bureau Region XI
2. Provincial Planning and Development Office, Davao del Sur
3. Provincial Planning and Development Office, Davao del Norte
4. City Planning and Development Office, Tagum City
5. Municipal Planning and Development Office, Carmen Municipality
6. City Planning and Development Office, Panabo City
7. City Planning and Development Office, Davao City
8. Municipal Planning and Development Office, Sta. Cruz Municipality
9. City Planning and Development Office, Digos City