APPENDIX 8A

List of Embedded Mitigation Measures

ID	Components	Project Phase	Mitigation Hierarchy	Applied in	Mitigation Measures/Actions
EMM01	Air Quality	Construction	Embedded	Camp Site Installations	All small combustion facilities (e.g. generators) will comply with the required emissions guidelines set out in the IFC EHS general guidelines
		Operation		Toll, weighting and counting stations	
EMM02	Air Quality	Design	Embedded	Design	Where multiple small combustion facilities are required, the cumulative emissions will be evaluated to ensure compliance with the required emissions guidelines set out in the IFC EHS general guidelines
		Construction		Camp Site Installations	
EMM03	Energy and Natural Resource	Design	Embedded	Design	All Project facilities and main components will be located to avoid or minimise adverse impacts on Natural Habitats, Critical Habitats, Communities and other sensitive receptors. Minimisation of individual facilities footprint, and utilization of the existing unpaved surfaces and modified habitat for placement of temporary facilities is to be prioritized as much as possible.
		Construction		Entire AoI	
EMM04	Design	Design	Embedded	Design	All Project facilities and main components will comply with the relevant Project design standards as set out in the Chapter 2: Project Description and when relevant in Chapter 4: Legal Requirements
	Surface Water	Construction		Entire AoI	
EMM05	Design	Design	Embedded	Design	The proposed road will use the existing N17 route and ROW as far as practicable.
	Surface Water	Construction		Right of Way	
EMM05a	Design Morphology and Topography	Design	Embedded	Entire AoI	Generate a detailed topographic model of the construction areas, to understand the rainwater runoff pathways and include such information in the design so that water runoff does not negatively impact the operation of the road/site installations/ quarry and borrow pits (i.e., flooding), and allow for proper flow the site of stormwater off the road surface, installations areas and the quarry and borrow pits.
EMM05b	Design Morphology and Topography	Design	Embedded	Drainage infrastructures	Minimise the potential instability of permanent deposit areas by means of geotechnical design.

ID	Components	Project Phase	Mitigation Hierarchy	Applied in	Mitigation Measures/Actions
EMM05c	Morphology and Topography	Design Construction	Embedded	Right of Way	Include accessory measures aimed at ensuring both the integrity of the works and the prevention of erosion such as: - Protective riprap will be placed at the inlets and outlets of cross-drainage structures to protect the structure and mitigate erosion risks; - riprap protection will be applied to longitudinal ditches at their discharge points into existing natural drainage channels.
EMM05d	Morphology and Topography	Design Construction	Embedded	ROW Embankments	Where embankments exceed 3 meters in height, as per regulations, curbs will be constructed to prevent wash-out of the slopes. These curbs will channel rainwater into specially designed water downspouts, which will direct the water away from the embankment to the relevant cross-drainage structure. These downspouts will also be protected upstream and downstream using appropriate materials and methods, adhering to best practices.
EMM06	Design Surface Water Morphology and Topography	Design Construction	Embedded	Design Right of Way	The existing road will as much as possible be rehabilitated and surface asphalted instead of constructing new sections on greenfield areas.
EMM07	Design Surface Water	Design Construction	Embedded	Design All construction areas	Site access to all construction sites and camps will be restricted through the use of fencing and a secure check point. Warning signs will be installed.
EMM08	Design Waste and wastewater	Design Construction	Embedded	Design Batching plant	The concrete batching plant will incorporate design features to prevent spills and leakage.
EMM08q	Design	Design Construction	Embedded	Asphalt plant	The tower for the asphalt plant will have a maximum height of 20 m.
EMM09	Design Waste and wastewater	Design Construction	Embedded	Design Offices	All temporary site offices will be converted shipping containers which do not require specific foundation.
EMM09q	Design	Design Construction	Embedded	Quarry and crusher	The stockpiled material will have a maximum height between 7 and 10 m and adequate slope to reduce erosion and potential collapse.
EMM10	Design	Design	Embedded	Design	

ID	Components	Project Phase	Mitigation Hierarchy	Applied in	Mitigation Measures/Actions
	Surface Water	Construction		Drainage structures	Trash screens and silt traps will be provided to prevent rubbish and soils entering water courses and drains
		Operation		Drainage structures	
EMM11	Design	Design	Embedded	Design	Prior to installation of culverts in a watercourse, a coffer dam will be constructed. Coffer dams will typically be of earthen construction using suitable compacted materials (typically a mix of sands gravels and clays).
	Surface Water	Construction		Culverts	
EMM11a	Design	Design	Embedded	Construction	No in-water construction activities will be executed under bridges where water flows continuously. All work for the abutments will be carried out on the riverbanks, at a sufficient distance to avoid interference with the watercourse and its ecosystem. Ensure there is no interactions with the river morphology and water regime. The highest water levels on the river must be considered for locating the foundations and piers. Construction of the bridges in a single span. No in-water piers.
	Surface Water	Construction		Bridges	
EMM11b	Design	Design	Embedded	Bridges Drainage infrastructures Batching plant Precast yard	Preconstructed elements will be prioritised to the use of direct on-site fabrication whenever possible. Precast concrete elements to be used for all the transversal drainage infrastructures (box culverts and pipe culverts), for rectangular longitudinal drainage (in urban areas) and for bridges elements. Prefabricated steel elements will be used for bridges.
	Waste and wastewater Surface Water	Construction			
EMM11c	Design	Design	Embedded	Bridges	To prevent contamination of the riverbed water, temporary sheet piles will be installed around the construction area for bridge foundations and abutments where needed. The sheet piles will create a physical barrier, isolating the work area and minimizing the excavation space needed.
	Design	Design	Embedded	Bridges	Metal formwork will be attached to the bridge steel structure to prevent from any concrete falling during deck pouring. The hydraulic integrity of the formwork will be tested before the deck installation.
EMM11d	Design	Design	Embedded	Design	

ID	Components	Project Phase	Mitigation Hierarchy	Applied in	Mitigation Measures/Actions
	Surface Water	Construction	Embedded	Culverts	Preconstructed elements will be prioritised to the use of direct on-site fabrication whenever possible. Precast concrete elements to be used for all the transversal drainage infrastructures (box culverts and pipe culverts), for rectangular longitudinal drainage (in urban areas) and for bridges elements. Prefabricated steel elements will be used for bridges.
EMM12	Design	Design	Embedded	Design	Following the installation of culverts the dam and bypass installed during construction will be removed and the watercourse reinstated.
	Surface Water	Construction		Culverts	
EMM12a	Design	Design	Embedded	Design	The installation of culverts will consider slightly burying the bottom of the structure to obtain a more naturalised environment, prevent erosion and carving around the structure, and to allow the pass of water even when flow is minimum in the watercourse.
	Surface Water	Construction		Culverts	
EMM13	Design	Design	Embedded	Design	Reinforcement at either end of the culvert to provide protection from erosion and undercutting will be installed using, rip rap, gabions or suitable vegetative mat.
	Surface Water	Operation		Drainage infrastructures	
EMM13b	Design	Design	Embedded	Bridges	Design and construct Bridges avoiding any interactions with the riverbed and river shores. Construct Bridges foundations far from the river, use cranes and prefabricated elements to be placed away from the river shores.
	Surface Water	Construction			
EMM14	Surface Water Groundwater	Design	Embedded	Design	Stormwater flow channels and collection ponds installed as part of the open drainage system will be fitted with oil/water separators at permanent facility locations. Separators will be able to achieve an oil and grease concentration of 10mg/l.
		Operation		Drainage structures	
EMM15	Design	Design	Embedded	Design	The road and associated facilities will be designed to allow for sustainable drainage of the runoff water. Run off from the road will be managed through a series of channels and collected for discharge.
	Surface Water Groundwater	Construction		Entire AoI	

ID	Components	Project Phase	Mitigation Hierarchy	Applied in	Mitigation Measures/Actions
	Surface Water Groundwater	Operation		Right of Way Toll, weighting and counting stations	
EMM16	Design	Design	Embedded	Design	All construction fuel storage areas will be bunded.
	Surface Water Waste and wastewater	Construction		Site Installations Laydown areas Camp	
EMM17	Design	Design	Embedded	Design	All permanent fuel storage areas will be lined and bunded to ensure drainage water flows into the closed drainage system and that uncontrolled surface runoff is avoided.
	Surface Water Waste and wastewater	Construction		Site Installations Laydown areas Camp	
EMM18	Design Waste and wastewater	Design	Embedded	Design Site Installations Laydown areas Camp	Fuel storage tanks will, as a minimum: - Be located away from areas with potential for vehicle collisions and damage; - include installation of a secondary containment systems to prevent the uncontrolled release of fuel (e.g. double wall construction); - include a leak detection systems to detect the presence of liquid or petroleum vapor within the interstitial space; - use corrosion protection in steel tanks and piping (e.g. dielectric coating or cathodic protection); - include automatic shut-off devices and catch basins around fill pipes; - use unjointed polyethylene piping and continuous, flexible composite piping rather than metal pipes; and - include provision of secondary containment for any pressurised piping system.

ID	Components	Project Phase	Mitigation Hierarchy	Applied in	Mitigation Measures/Actions
EMM19	Surface Water	Design Construction	Embedded	Camp Offices Site installations Toll, counting and weighting stations	Rainwater harvesting facilities will be installed to trap and store water for landscape irrigation and horticultural purposes.
	Groundwater	Operation		Toll, counting and weighting stations	
EMM20	Surface Water	Design	Embedded	Camp Offices Site installations Toll, counting and weighting stations	Toilets with water economy flush features will be installed at the permanent operational facilities
	Groundwater	Operation		Toll, counting and weighting stations	
EMM20a	Surface Water Groundwater Waste and wastewater	Design	Embedded	All construction areas Site installations	Oil water separators and grease traps could be applied prior to discharge to avoid potential transportation of contaminants as oil to surface and groundwater. The disposal will comply with the provisions of the Wastewater Management Plan.
EMM22b	Waste Soil and Land use Surface Water Groundwater	Construction	Embedded	Landfill	Landfil bottom will be impermeabilised using one of the following techniques: a. Providing a 15cm thick layer of clay at the bottom of the landfill, or b. Installing a high-density membrane with a thickness of 2-3 mm. Appropriate drainage ditches will be excavated along the landfill outer perimeter to prevent the area from potential flooding
EMM23	Waste and wastewater	Design Construction	Embedded	Entire AoI	Maximise the specification and use of materials with known sustainability credentials (use of recycled content, for example). Most of this material will

ID	Components	Project Phase	Mitigation Hierarchy	Applied in	Mitigation Measures/Actions
		Operation			be recovered for reuse on site, and only be disposed of in the landfill as a last option.
EMM24	All social components	Design Construction Operation	Embedded	Entire AoI	Implement the Grievance Mechanism Procedure and ensure that appropriate resources and budget are dedicated to managing grievances. The Grievance Mechanism will include specific channels for women workers to submit grievances and personnel specialised and trained in addressing cases of GBVH. If useful NGOs working with women and on GBVH will be involved in the grievance mechanism implementation.
EMM25	Soil and Land Use	Construction	Embedded	Entire AoI	All areas affected by work activities will be reinstated. No surface will be left unrehabilitated or unmanaged at the end of the construction phase .
EMM26	Economy and employment	Construction Operation	Embedded	Entire AoI	Ensure compliance with national laws and international standards regarding the employment of minors. The age of all workers will have to be verified through official documentation and suitably recorded.
EMM27	Economy and employment	Construction Operation	Embedded	Entire AoI	Avoid any form of forced labour and any form of practice that can be considered a form of forced labour, such as requiring significant monetary deposits from the workers or retaining workers' identity documents. Perform sample interviews of workers during the recruitment process to verify if they are providing labour involuntarily or have been trafficked in order to be employed for the Project.
EMM28	Economy and employment	Construction Operation	Embedded	Entire AoI	Ensure non-discrimination and equal opportunities to all workers, regardless of colour, gender, religion, social or national origin, political or other opinion, property, birth, or other status such as ethnic origin, disability, age, health status, parental or marital status or sexual orientation.
EMM29	Economy and employment	Construction Operation	Embedded	Entire AoI	Implement a fair and transparent recruitment process that complies with national legislation and IFC PS2 and that ensures non-discrimination and equal opportunities to all potential workers.
EMM30	Economy and employment	Construction Operation	Embedded	Entire AoI	Ensure that workers are free to form and join workers' organisations and to bargain collectively, in compliance with national regulation and IFC PS2.

ID	Components	Project Phase	Mitigation Hierarchy	Applied in	Mitigation Measures/Actions
EMM31	Climate Change Risk	Design	Embedded	Bridges	Include on the bridge a dedicated line for pedestrians to protect and separate them from the vehicles
EMM32	Climate Change Risk	Design	Embedded	Bridges	Make sure that the bridge is longitudinally fitted with barriers, handrails and guards
EMM33	Climate Change Risk	Design	Embedded	Bridges	Make sure that bridges design considers aspects of future heat scenarios.
EMM34	Climate Change Risk	Design	Embedded	Bridges Drainage infrastructures	Make sure that design considers the future climate change scenarios for flooding for all the bridges and drainage systems
EMM35	Climate Change Risk	Design	Embedded	Right of Way	All road sections and hydraulic structures to be designed for drainage of exceeding floods and worst-case scenarios
EMM36	Climate Change Risk	Design Construction	Embedded	Toll, weighting and counting stations	Include in the design of buildings elements that can provide a better adaptation to hot conditions (solar orientation, awnings, overhangs, porticoes, white or lightly coloured external walls and roof, etc.)
EMM37	Climate Change Risk	Design Operation	Embedded	Toll, weighting and counting stations	Include tree landscaping, where possible, which allows the working areas and facilities to be shadowed without losing functionality.
EMM38	Climate Change Risk	Design Operation	Embedded	Toll, weighting and counting stations	Make sure the working areas receive communication from an alert system for forecast and updates regarding hard weather conditions, including severe storms, extreme precipitations and potential flooding.
EMM39	Climate Change Risk	Design Operation	Embedded	Toll, weighting and counting stations	Make sure the location for tolls, counting and weighing stations avoid any potential flooding area and in general low topographic areas.

Signature Page

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