



MÁRIO COVAS RODOANEL PROJECT

Northern Section

Brazil

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Cover picture: Overview of Rodoanel Northern Section works (Sources: Evandro Biancarelli, Project Coordination Unit, DERSA, October, 2015. São Paulo, Brazil)

EXECUTIVE SUMMARY

This evaluation applies the Envision™ Rating System on the Northern Section of the Mário Covas Rodoanel Project in Brazil. Envision is a unique system that assesses the sustainability of infrastructure projects, which awards efforts to pursue sustainable values going beyond standards practices. The following assessment demonstrates the achievements of the project and aspects to improve, considering a broad range of criterion. The assessment is organized in 5 categories: Quality of life, Leadership, Resources Allocation, Natural World, Climate and Risk.

Organizing, facilitating, and better integrating the traffic flow for cargo and passengers throughout the most urbanized and economically diverse area of Brazil, the Metropolitan Region of São Paulo (MRSP), is the main goal of the Mário Covas Rodoanel highway. The exponential urban growth of São Paulo, which heavily relies on individual motorized transportation, has warranted such an extensive project: 176.5 km (110 mi) of roads, divided into four sections, circulating around the city of São Paulo. The Northern Section comprises the final 47.4 km (27.3 mi) needed for the completion of the beltway. Developing an infrastructure project as large as the Rodoanel has been challenging and complex, as it traverses an urban fabric of 21 million people in a region that accounts for 30% of national GDP.

Expected to launch at the end of 2017, the Northern Section will complete the linkage between the 10 major highways of Brazil, the main seaport of the country (Santos), and the major International Airport (Guarulhos). Therefore, the project is seen as a key infrastructure component for sustaining transportation frameworks and for the economic development of the State of São Paulo. With regard to design, the Northern Section encompasses similar standards to those of the other sections of the Rodoanel, in that it will be a Class O controlled-access highway with six to eight independent, opposing lanes of traffic, divided by a median, with

a designated speed limit of 100 km/h. However, the other segments of the Rodoanel (some having been in operation since 2002) were built with lesser degrees of social and natural disturbance. This last section sits in a densely populated area and crosses a very sensitive biome that has already undergone significant environmental degradation, the Mata Atlântica rainforest. For these reasons, the development of the Northern Section is undoubtedly the most challenging phase of the entire development of the Rodoanel Mário Covas.

In addition to notable benefits to transport, logistics, and the economy of the MRSP, planning documents have outlined a highly synergistic participatory design and preparation to meet the needs and goals of multiple stakeholders, including those from surrounding communities. These efforts have given a minimal social and environmental footprint to the final layout of the road, reducing the impacts commonly associated with large-scale developments. Additionally, social justice and sustainable development have been enhanced by holistic social assessments conducted by the developer, Desenvolvimento Rodoviário S.A. (DERSA), which directly addressed diverse social programs. These programs covered a wide range of specific needs for compensation, including monetary compensation and the provision of adequate housing with access to basic amenities (water, sewage, electricity, etc.) at no cost for residents displaced by the project. It is important to highlight that the majority of the families who are beneficiaries of the programs were living in informal settlements under poor housing conditions prior to development of the project.

These social programs also had extensions devoted to leveraging skills and capabilities of the most vulnerable portions of the surrounding population. Social services such as accelerated job sourcing have been undertaken by the developer in addition to offering professional training and coaching for the neighboring residents. In the context of maintaining and enhancing the well-being of the neighboring settlers, planning documents outline notable efforts to comply with existing regulations, in addition to proactive monitoring and evaluation of potential nuisances (e.g., odors, traffic jams, vibration, and

noise), over both directly and indirectly affected areas. Furthermore, DERSA has demonstrated notable engagement with environmental authorities prior to construction in the rigorous licensing which was conducted for each of the six construction sites that comprise the Northern Section. Beyond that, specific plans for accessibility and safety were developed in order to thoroughly assist the population of the three municipalities intersected by the final route of the Northern Section.

The development of the Northern Section warrants attention for notable stakeholder engagement throughout each phase of the project. Thanks to the participatory action plan and the assessments carried out by the team, the project managers were able to engage with several areas of the public sector in providing the community with robust social programs and diverse actions in support of environmental compensation and restoration. In terms of compliance with regulations across the three municipalities directly affected, planning documents present a wide range of evidence of leadership in strategic environmental management, licensing, and social engagement (as documented in community meetings), in addition to the implementation of clear administrative policies.

Lessons learned from other sections were incorporated into systems of environmental management (SGA) for achieving sustainable goals during the construction of the project. Furthermore, the holistic stakeholder engagement carried out by planners enhanced the design and boosted connectivity between existing infrastructure components lying in the domain area, such as the main seaport of Santos and the main international airport, Guarulhos. Effective connectivity is one of the keys to advancing sustainable mobility in the region, so the project has shown a high achievement in sustainability in this sense. On the other hand, in order to assure sustainability over the long run and efficacy of plans for environmental compensation and resettlement programs, planning efforts for long-term monitoring and evaluation need to be improved. Moreover, in order to sustain the project's planned longer useful life, the planners should consider providing specific evidence of use

of materials that allow for a superior extended life cycle, to minimize future repairs and refurbishments.

Throughout construction, the project has aimed to reduce energy consumption in extraction, processing, manufacturing, and transport of materials and components. From this perspective, planning efforts evidence a positive synergy in sourcing and in disposing of unwanted materials from nearby construction sites. Project managers outlined a large local availability of primary materials (mainly with regard to soil and rocks), thus decreasing transportation needs. In addition, to divert unwanted materials from landfills, the team was oriented to reuse as many materials as possible at each stage of development. Moreover, all licensed environmental deposits of unwanted materials are located within 50 miles of the project site.

Nevertheless, although the project has been decreasing the need for transport by its outstanding reuse of soils and mulches and other important materials required for earthworks, the project has room for improvement in the use of recycled materials and incorporating the generation of renewable energy throughout all phases of development. Also, project managers should be encouraged to improve their estimations of the percentage of required energy and freshwater, thus boosting effective strategies for the reduction of energy and freshwater consumption, as well as proper recycling. This is a critical key to shifting from "development as usual" toward a smart design, and moreover is crucial to securing concrete sustainable performance.

With regard to energy efficiency in specific, the design and planning of the Northern Section was credited with a high performance, due to the adoption of LED lighting systems on sections of the road that require lighting at night. However, planning efforts still lack a thorough materials life cycle assessment in order to quantify and promote reductions in net embodied energy. In addition, looking beyond Brazilian regulations, the project still has the opportunity to increase its reliance on materials and equipment suppliers that rely on third-party certifications and auditable standards such as ISO, FSC, and Energy Star, among others.

In interfacing with the environment, the development of the Northern Section demonstrated notable concerns and substantial planning efforts to avoid direct and indirect impacts to high-value ecological areas. The project's sustainable design is also a result of participatory planning conducted among neighboring communities and multiple stakeholders. Moreover, the extensive consideration for monitoring and evaluation of land, water, and biodiversity across the area of its domain allowed for the project to develop programs aimed to restore harmony with the surrounding natural ecosystems. Additionally, the design contemplates the development of strategic infrastructure tunnels and viaducts to minimize deforestation. In addition, the eye-catching incorporation of structural underpasses is considered as a tool for preserving local terrestrial fauna. Planning documents also outline good care with regard to biodiversity preservation, in particular with specific programs to preserve howler monkeys, as well as innovations for noise mitigation.

The planning of the project shows efforts to avoid disruptions to existing hydrological systems. Micro and macro drainage ditches and hydraulic staircases were installed along roadsides, thus maintaining floodplain functioning and managing stormwater runoff. In addition, infrastructural retention boxes were developed to safeguard water bodies against pollution. To mitigate the risk of landslides, the design of the Northern Section has given preference to downhill developments, with noteworthy emergency plans to deal effectively with adverse natural occurrences such as landslides, earning the project a high level of performance. Preventive actions were also implemented toward the stabilization of unstable or eroded slopes not directly affected by sections of cut and fill. Also, provisional and permanent drainage systems were made available during every construction task and/or environmental restoration activity to avoid water contamination.

Beyond that, the planning documents outline detailed environmental assessments, allowing for thoroughness in compensation programs. To confirm the goals of the programs for water preservation and land restoration undertaken during construction

in the directly and indirectly affected areas, planning documents have shown diligent actions to continuously monitor and evaluate the surface and groundwater quality in dozens of spots. Proactive engagement also established guidance for future monitoring campaigns in conjunction with the Sao Paulo State environmental authority (CETESB) for the operation of the road. Nevertheless, more efforts could be made in reducing the use of pesticides and eliminating pollutant sources in order to prevent future watershed contamination.

From the perspective of climate and risk, the development of a long-lasting piece of sustainable infrastructure must incorporate refined knowledge about the threats that climate change may potentially pose to the endeavor. In other words, the team should develop a climate-resilient design that is capable of withstanding an uncertain future. In this area, planning efforts did little to outline actions that could enhance the resilience of the project's surrounding natural environment, including enhancing the adaptive capacity of the neighboring communities.

In spite of notable complex modeling and estimations for predicting the amount of greenhouse gas (GHG) emissions during the operations of the Northern Section, actual planning does not present a comprehensive vulnerability assessment to predict the ability of the project to continue operating under conditions of a changing climate. Therefore, a large potential for improvement is evident in relation to climate risk and response assessments. Also, beyond compliance with local regulations, such a large development requires rigorous control of air pollutants, and current planning documents do not include action plans to curb air pollution and follow international standards.

Furthermore, the project typology of the Northern Section, which has been designed to facilitate traffic flow and for this reason, it will directly contribute to decrease the concentration of air pollution within the City of São Paulo. However, the project would achieve higher levels of performance by shifting its

emissions scope from purely developing estimates for active controls to include actions to mitigate GHG emissions. In terms of design resilience in the context of climate change, aside from comprehensive short-term risk assessments, the project could include evidence of long-term adaptive capacity in the endeavor itself and its surrounding social and environmental contexts, or responsive actions to cope with future extreme weather events. It is also important to highlight that the nature of the project itself (highway with dark pavement) contributes to heat island effects. Therefore, the project could expand its scope of environmental compensation to introduce innovations for redistributing and enhancing urban green spaces to fight heat island effects; including in informal communities with haphazard layouts, such as the areas neighboring the Northern Section.

Overall, the numerous planning documents presented by DERSA outline a notable planning proficiency, but room for improvement still remains. Beyond the meritorious social programs put in place, DERSA's social assessments have shown that a large number of children and adolescents were assisted by its social and resettlement programs. Therefore, the project could have expanded its social compensations to boost youth competitiveness providing technical training to create new capacities among assisted communities. Since quality of life is enhanced through the provision of public spaces and green areas, planning documents outline the creation of a new geopark (currently in its early phase of development) and a new school both in Guarulhos, resettlement programs await further actions for enhancing or creating new public spaces in new settlements within the communities assisted by the Northern Section, as a form of social compensation. Additionally, while organizing and facilitating traffic flow is of highest importance in this project, the development of intermodality by integrating different types of transportation should be highly encouraged.

Looking further, on the design level the planning documents did little to demonstrate ways in which the project could have contributed to reducing energy and water consumption throughout its supply

chain during each phase of construction. From this perspective, the planners should conduct detailed life cycle energy assessment of materials required for the development, as well precisely estimate water requirements. No recycled materials were described as having been used in the construction, and the managers should be encouraged to employ new green technologies in relation to asphaltic permeability, as well green micro and macro drainage ditches, not to mention the need for decreasing the use of pesticides for vegetation control. Projects of this scale can really drive positive changes toward a sustainable future. Breaking with the status quo of development requires a long-term understanding of adaptive capacity and vulnerabilities. Climate change represents a major threat to local development, and the nature of the project itself (dark-pavement highway) does not contribute to mitigating its negative effects. Thus, an assessment of climate vulnerability is lacking, and if conducted, project managers could assume more responsibility toward enhancing the climate resilience of the endeavor itself, and alleviating the negative impacts of climate change around the Northern Section's natural environments, as well as those of the population of the MRSP.



PROJECT DESCRIPTION AND LOCATION

The Northern Section 1 & 2 of the Mário Covas Rodoanel is a public infrastructure project owned by the State Government of São Paulo. The project has been developed and executed by the state logistics secretariat Secretaria Estadual de Logística e Transportes, through Desenvolvimento Rodoviário S.A. (DERSA), a public-private company. The Northern Section comprises the final 47.4 km. (27.3 mi.) needed for the completion of the Mário

Covas Rodoanel, a beltway totaling 176.5 km (110 mi.) in length. The Rodoanel is primarily designed to better integrate and organize the flow of traffic in the São Paulo Metropolitan Region (MRSP), mostly by diverting commercial trucks.

The total investment for this final section of the Rodoanel Mário Covas is about US\$3 billion. A loan from the Inter-American Development Bank (IDB) covers US\$1.1 billion, with the State Government of São Paulo expected to fund the remaining portion and cover the cost to complete the project. The bidding process for the public works started in September of 2011. Construction began on February 25, 2013, with the mobilization of personnel and equipment, work site preparation, groundbreaking, and other preliminary services. As the resettlement process is completed for residents in the path of the future roadway, domain areas gradually become ready for construction. To date, approximately 76% of the total area has been made available. In September of 2015, work progress was assessed to be about 35% through implementation¹.

The Mário Covas Rodoanel is one of the largest road developments in Brazil. Exponential urban growth in the MRSP over the last few decades, which heavily relies on motorized, individual transportation, has warranted the development of such an extensive project. The immense number of cars and trucks circulating over the cityscape have generated the need for decongestion and better organization of passenger and cargo traffic. This project is seen as a key strategy for transportation development in the state, and it is considered essential for easing logistical flows throughout the country's most diverse industrial region, which accounts for 30% of national GDP².

The construction of such a large infrastructure project is challenging and complex, as it crosses a vast urban fabric comprising about 21 million people (2015 estimate)³. To date, 75% of the complete Rodoanel has been finished; once construction of the Northern Section is concluded, it will thoroughly connect 10 of Brazil's main roads. This linking will be instrumental in connecting the entire MRSP to Santos (where Brazil's main seaport is located), as well as to Guarulhos International Airport. The Northern Section is expected to be launched in the second half of 2017, according to a statement given to the local newspaper Estadão on behalf of DERSA⁴.

With regard to design, the Northern Section will have the same standards as the other sections of the Rodoanel, in that it will be a Class O⁵ controlled-access highway with six to eight independent, opposing lanes of traffic divided by a median, with a designated speed limit of 100 km/h. This complex road segment also includes 7 underground tunnels that cross 6.1 km in the Cantareira State Park⁶.

¹ DERSA. Executive Summary. Delivered in December 2015 at the IDB event in Washington D.C.

² Vera Lucia Vicentini, et al. "Anexo De Análisis Económico." In Proyecto Rodoanel Mário Covas - Tramo Norte 1, 1-60. Inter-American Development Bank (IDB).

³ IBGE Instituto Brasileiro De Geografia e Estatísticas. "IBGE Divulga as Estimativas Populacionais Dos Municípios Em 2014." Sala De Imprensa. August 28, 2014. Accessed November 16, 2015. <http://saladeimprensa.ibge.gov.br/noticias?view=noticia&id=1&busca=1&idnoticia=2704>.

The other segments of the Rodoanel such as the Western Section (operational since 2002) were built up with lesser degrees of natural disturbance than the Northern Section, as these other regions had already been axes of significant urban expansion. The location of the Northern Section comprises the sensitive Mata Atlântica rainforest biome and a densely populated area. The Mata Atlântica has already undergone significant environmental degradation, due to the growth dynamics of the MRSP. Furthermore, the vast population density of this part of the metropolitan region necessitated the relocation of informally settled communities that lay in the path of the proposed roadway.

The completion of the Northern Section will fully enable the operation of the Rodoanel Program. As time passes, future monitoring and evaluation activities will be able to better inform various indicators to reinterpret performance with regard to costs, impacts, and net benefits. However, primary data collected from the ongoing operations of the existing 93 km of the Rodoanel (the Western, Southern and Eastern Sections) have already shown significant reductions in travel times throughout these parts of the MRSP, following improvements in connections to important highways, and enhanced access to the port of Santos in the Southern Section. Additionally, the flow of heavy trucks in main roads and avenues of the city has decreased by 43%, thus reducing airborne particles by 47% in the area of influence⁷.

According to the planning documents provided by DERSA and IDB, the project was conceived with the intention of incorporating robust social and environmental considerations; these include the creation and management of conservation corridors, forest restoration, and the resettlement of communities in compliance with Brazilian legislation and the safeguard policies and guidelines of the IDB⁸. Besides simply assessing documented mitigations, adaptations, and compensations related to the project, the conceptual challenge embedded in this report is to holistically evaluate whether the Rodoanel Northern Section has effectively reconciled the realization of the development of a colossal infrastructure project with sustainability.

⁴Fabio Leite, "Trecho Leste do Rodoanel é concluído com 15 meses de atraso," *Estadão*, June 26, 2015, accessed November 16, 2015, <http://sao-paulo.estadao.com.br/noticias/geral,trecho-leste-do-rodoanel-e-concluido-com-15-meses-de-atraso,1713755>.

⁵A Class O highway is defined as having no significant connections to local road networks as a tool to prevent the induction of informal urban occupation. Source: Andrea Quintanilha de Castro et al., "Estudo preliminar: Impactos urbanísticos do Trecho Oeste do Rodoanel Mário Covas," Laboratory of Human Housing and Settlement of the Architecture and Urbanism School, University of São Paulo, 2005, 163, accessed October 3, 2015, http://www.usp.br/fau/deprojeto/labhab/biblioteca/produtos/impactos_urb_trechoeste_rodoanel.pdf.

⁶Consórcio JGP—PRIME, *Estudo de impacto ambiental* (São Paulo, 2010), vol. 1, 1-146.

⁷DERSA. Executive Summary. São Paulo, SP: Consórcio Cobrape Appe – São Paulo, 2015:1-25.



Mário Covas Rodoanel Project - Northern Section, Brazil

The Envision™ system is a set of guidelines that aid in optimizing the sustainability of an infrastructure project during the planning and preliminary design phases, as well as a means to quantify the relative sustainability of the project. In this case study, the infrastructure to be assessed is the Mário Covas

Rodoanel Project - Northern Section, Brazil.

Envision consists of 60⁹ credits grouped into five categories: Quality of Life, Leadership, Resource Allocation, Natural World, and Climate and Risk. Each credit pertains to a specific indicator of sustainability such as reducing energy use, preserving natural habitat, or reducing greenhouse gas emissions. Those credits are rated on a five-point scale referred to as a “level of achievement”: “improved,” “enhanced,” “superior,” “conserving,” and “restorative.” Evaluation criteria are provided to determine whether the qualifications for each level of achievement have been met for a particular credit. In each of the five categories there is a special credit called “Innovate or exceed credit requirements.” This is an opportunity to reward exceptional performance that applies innovative methods within the subjects that Envision evaluates.

The criteria for the levels of achievement vary from credit to credit, but generally an “improved” level of achievement is awarded for performance that slightly exceeds regulatory requirements. “Enhanced” and “superior” levels indicate additional gradual improvement, while “conserving” often indicates performance that achieves a net-zero or neutral impact. “Restorative” is the highest level and is typically reserved for projects that produce an overall net positive impact. The Envision system weighs the relative value of each credit and level of achievement by assigning points. Credit criteria are documented in the Envision Guidance Manual, which is available to the public on the ISI¹⁰ and Zofnass Program¹¹ websites.

Envision’s first category, Quality of Life, pertains to potential project impacts on surrounding communities and their well-being. More specifically, it distinguishes infrastructure projects that are in line with community goals, clearly established as parts of existing community networks, and consider long-term community benefits and aspirations. Quality of Life incorporates guidance related to community



capacity building and promotes infrastructure users and local members as important stakeholders in the decision-making process. The category is divided into four subcategories: Purpose, Well-being, Community, and Vulnerable Groups.

⁸DERSA, “‘PERI’ Plano Especifico de Reassentamento e Indenização sitio Botuquara, Taipas, Jd. Paraná e Jd. Vista Alegre Município de São Paulo - SP,” In Rodoanel Norte, 1-14, 2013.

⁹Plus 3 new credits of the Vulnerable Groups subcategory

¹⁰www.sustainableinfrastructure.org

¹¹www.zofnass.org

Purpose

The Purpose subcategory evaluates the project's impact on functional aspects of the community such as growth, development, job creation, and general improvements to quality of life. The Rodoanel Northern Section performs highly in most of these aspects; recognizing the efforts made to support better educational infrastructure and provide training programs for the sustainable development of the community that go beyond existing regulations.

Planning documents exhibit a highly synergistic engagement between developers and stakeholders from the public and private sectors as well as civil society, resulting in a minimum footprint in the final route design. Moreover, the strong participation of stakeholders during licensing processes reemphasizes the mission of improving quality of life and contributing to social mitigation and environmental compensation. In this way, the project has already been transforming the livability of affected communities through the provision of new housing units at no cost and access to basic infrastructure in newly developed settlements.

When concluded, the Northern Section will materialize a wide range of benefits to the MRSP that go beyond improving the flow of traffic for freight and passengers. On one hand, the conclusion of the Rodoanel Program opens a way to promote broader sustainable growth and development through benefits such as intermodality and the decentralization of jobs throughout the MRSP. On the other, the participatory planning generated detailed social assessments, with the consequence that noteworthy community assistance programs in employment, microcredit, entrepreneurship, and income generation have been designed and offered.

Furthermore, the documentation provides evidence of holistic efforts to align the communities' needs and goals, as well as outlining the implementation of social programs devoted to supporting community development skills and capabilities. In addition to the workforce created during the road construction, the project is providing professional coaching and training programs to the most vulnerable portions of the surrounding local communities. Examples of actions and partnerships established by the developer include fast job sourcing, e-commerce capacitation, and career development coaching. In addition, DERSA's contractors were encouraged to have former prisoners who have already served their sentences among their workforce.

Well-being

The Well-being subcategory covers prevention and management of risks and effects of the construction on the greater community, as well as improvements in mobility and accessibility. From this perspective, the project demonstrates a high level of performance, providing substantial evidence of thorough efforts to minimize potential disturbances among neighboring communities during construction. There is still room for improvement by better integrating other modes of nonmotorized transportation and public transit, in order to better address community mobility and reduce congestion in the long term.

Regarding nuisances, project managers have evaluated and mitigated side effects related to the construction such as noise and vibration. Several monitoring campaigns have been employed by the project to control both noise and vibration leakage both before and during construction work. In relation to light pollution, planning documents assert the adoption of energy-efficient lighting systems (LED) and the avoidance of unnecessary lighting.

Planning documents show that project managers were concerned to improve public health and safety for workers and for populations living around construction sites. Notable security procedures in terms of fire in tunnels were up-dated and implemented making the operation of tunnels more secure and resilient. Moreover, several assessments outline strict and noteworthy compliance with licensing, laws, and technical standards. Each construction site developed specific accessibility plans, resulting in comprehensive signaling and wayfinding not only for these sites but for all areas directly or indirectly affected by construction work. To a similar extent, diligent efforts have improved walkability, accessibility, and safety of neighboring areas by the implementation of temporary pedestrian pathways, space demarcation and restrictions, evacuation routes, and the avoidance of heavy truck circulation during rush hours.

Despite the remarkable performance of the project in improving overall wayfinding, energy efficiency, and its good care to monitor noise and vibration to avoid nuisance, it needs to develop an action plan that includes access and convenience for nonmotorized transportation, encouraging alternative modes of transportation and thus improving mobility among surrounding communities, promoting sustainable mobility, and reducing fuel expenses and GHG emissions.

Community

The core of the Community subcategory is about the preservation of historic and cultural resources through archaeological studies as well as the conservation of local character by preserving natural landscape features and the improvement of public spaces and recreational facilities to enhance community livability. The project has achieved a high level of performance for assessing, preserving, and curating local history and archaeological findings. Planning documents outline awareness of the need to enhance livability and care for the environment. The project has built a new school in Guarulhos¹² as sort of social compensation. However, there is still notable room for improvement in areas such as enhancing public spaces for social coexistence, sports, leisure, and arts manifestations among neighboring communities and mainly over new settlements. Also, preserving local views and appreciation for aesthetics should have played a part during the project's design.

The final route planning of the Northern Section has included notable efforts to identify and preserve valuable historical heritage. Prior to the project's implementation, there had been little in the way of archaeological and historical study of the area it would impact. Fortunately, before construction was begun, the need was recognized for preventive archaeological assessments in collaboration with the National Institute of Historical and Artistic Heritage. By this means, project managers and researchers have helped to rescue and preserve traces of indigenous civilization found in the territory of the Rodoanel. Material and immaterial historic assets are currently being curated in the three municipalities traversed by the Northern Section.

In the same way, project managers made diligent efforts to minimize landscape alterations by protecting green areas and enhancing ecological relevance of habitats and natural landscapes. However, the development of such large-scale infrastructure inevitably transforms the landscape. Community members were engaged during the conduct of social assessments and the elaboration of specific resettlement planning. Documentation provided indicates that neighboring communities have weighed in on decision-making processes, as a result of which public spaces and public equipment were identified that needed to be enhanced or rebuilt in better condition in new settlements. But while environmental restoration and fixing public amenities damaged by the project are addressed in planning documents presented, concerns towards enhancing of public space in new settlements are still discrete. Notable care has been shown toward wildlife with the creation of refuges, but granting public

¹²Named "Escola Municipal Nazira Abbud Zanardi"

access to these areas does not fall within the legal powers of DERSA. Thus, besides the plans of creating a geopark, it remains unclear how local communities will benefit from these restoration efforts.

Vulnerable groups

The Vulnerable Groups subcategory examines the extent to which the project contributes to the quality of life of women and diverse groups in the population. Larger developments can boost growth opportunities in surrounding communities if well planned. Otherwise, side effects can potentially reinforce social inequalities. In the case of the Rodoanel Northern Section, due to impressive efforts to conduct gender-sensitive social assessments, the project achieved high credit for identifying and addressing needs of women and diverse communities and also undertaking concrete actions to promote women's economic empowerment. Nonetheless, there is still room for improvement in relation to enhancing access and mobility of women and diverse communities.

To some extent, the project strived to overcome historic patriarchal standards and the inheritance from Brazil's colonial period that still persist within contemporary Brazilian society. All social assessments carried out by the project intended to give voice to minorities and vulnerable groups, who are often discriminated against and excluded. As positive outcomes, a wide range of gender-sensitive economic and social recovery programs were designed and offered to affected communities in compliance with the duty of advance social justice and with the project's sustainable development goals (SDGs).

Aside from hiring local women (513 working on construction in total, according to the IDB's survey)¹³, DERSA and the São Paulo State Government have offered a wide range of actions on the ground, with a focus on enhancing capabilities and economic empowerment of women. Planning documents have shown DERSA's diligent work to improve the economic resilience of women and vulnerable groups by offering professional training and coaching, continued education, microcredits, and priority of assistance according to the level of vulnerability of every portion of the assisted family.

Nonetheless, beyond meritorious efforts to engage the community, the project could implement actions and strategies to improve access and mobility of women and diverse communities around the project's site. Women may have different patterns of mobility and safety and security needs and concerns than men. Understanding and addressing gender-based disparities is essential to making infrastructure work equitably for men and women. In this sense, the project's team should take the opportunity to provide urban social compensations in order to improve walkability and ameliorate mobility in neighboring cityscapes.

¹³Banco Interamericano De Desenvolvimento. Planilha - No. De Empregados En Trabajos De Ingeniería, Diseño, Presupuesto De Obra.

4 LEADERSHIP CATEGORY

The Leadership category evaluates project team initiatives that establish communication and collaboration strategies early on, with the ultimate objective of achieving sustainable performance. Envision rewards stakeholder engagement as well as encompassing a holistic, long-term view of the project's life cycle. Leadership is distributed into three subcategories: Collaboration, Management, and Planning.

Collaboration

The Collaboration subcategory examines how inputs from a wide range of stakeholders were understood and incorporated into the project, thus boosting synergic actions toward sustainable design and innovations in project management practices. The Northern Section of the Rodoanel achieved a high performance in this subcategory, especially in relation to the efforts made to integrate all stakeholders in every phase of the project's development.

Project managers have asserted their decision to make broader efforts for stakeholder engagement in the project, and this speaks of their wider care and consideration across the complexity of the project. Sets of public meetings were held and their proceedings thoroughly documented. Public meeting minutes in addition to data collected through community centers and social assessments allowed the enhancement of a Sustainability Management System and the creation of a Sustainability Committee, active since February 2015.

In addition, the sustainability management system is supplied with administrative checklists, and procedure reports are in place covering all levels of the developer's hierarchy. Furthermore, policy guides (Manual de Monitoramento e Supervisão Ambiental) define duties and establish procedures for proper environmental management, monitoring, and supervision proposed by the Environmental Impact Assessments. In this sense, the project provides the conditions for the involvement of a variety of stakeholders and has properly considered their inputs.

It is notable that the project possesses a comprehensive management system, which allows multilateral decision-making, involving areas of construction, design, environmental, social and financial, among others. Nevertheless, there is still room for improvement in order to foster collaborative teamwork. Beyond the overview of tasks and management procedures, actions recommended include increasing recognition of the importance of working together as a collaborative team by providing comprehensive documents evidencing the explicit incorporation of reward/risk sharing in the contract between the project owner and contractors.

The solid identification and characterization of stakeholders is one of the major strengths of the project. Planning documents of the Northern Section make clear the importance of affected communities, and outline proactive efforts to establish an active and engaging dialogue among them by identifying key stakeholders and conducting public meetings, establishing community centers and different lines of communication in addition to an ombudsman. Above all, feedback considerations are materialized in the design of the final route, which has been modified to attend to stakeholders' input in order to achieve a minimal footprint.

Management

The Management subcategory seeks to assess the developer's understanding of the project as a whole, foreseeing synergies between systems either within the project or among other larger potentially correlative infrastructure systems. This subcategory assesses how stakeholders embrace the project and how the project management puts its procedures in place, and beyond that, how managers consider and take advantage of existing infrastructure in the project's domain area. For this to happen, an innovative way of understanding and managing the project is required. Potential outcomes include savings, more sustainable outcomes, and the expansion of the infrastructure's useful life by making it resilient against future adversities.

The Northern Section performs well in this area, as a masterpiece of a regional mobility plan that aims at integrating existing infrastructure. Besides the comprehensive design that aims at intermodality and connection to major road networks, to the Santos Seaport, and to the main airport of the country, Cumbica-Guarulhos, planning documents outline diligent efforts to minimize nuisances, restore public utilities infrastructure, and organize and improve mobility in the areas neighboring the construction. Furthermore, the project takes into account other elements related to community physical and nonphysical assets, integrating outstanding action plans to enhance local skills and capabilities aimed at boosting community competitiveness.

Beyond the reuse of earth from the construction site, the project would advance toward higher levels of achievement by adopting a holistic management that seeks opportunities to reuse unwanted materials and by creating an effective information system among stakeholders with focus on by-product synergy. It would advance further still by presenting solid evidence of opportunities to reuse in the project unwanted materials from nearby facilities, and by systematic efforts to inform the whole supply chain and neighboring stakeholders about the availability of unwanted resources, as well as evidencing a more aggressive waste reduction action plan.

Planning

The core of the Planning subcategory is analyzing planning as the main tool for securing sustainable goals for the project in the future. In this regard, DERSA has presented positive evidence of comprehensive planning efforts to predict future trends and thus mitigate in advance potential physical, dynamic, and institutional risks. Notable room for improvements exist in clarifying strategies for long-term maintenance and monitoring as well as addressing potential conflicting regulations and policies in relation to sustainability actions.

In the case of the Northern Section, long-term monitoring and maintenance regards mainly the road's operation. Project charters outline working plans to monitor compliance with all obligations binding on the project's operating license, and the continuous evaluation of environmental performance in operation. The design and development of the Northern Section have shown dense planning frameworks seeking to assure sustainability in the future; but in order to prove long-term efficacy of these plans, a robust future monitoring process is required. In terms of maintenance costs, planning documents have already established fixed percentages of investments. Nonetheless, these percentages do not encompass extraordinary requirements for eventual remediation and preventive measures that could directly or indirectly impact on this estimate.

As concessions are the classic mode of operating highways in the state of São Paulo, planning efforts have shown institutional preparedness for the private concessionaire that will be responsible for implementing monitoring programs under supervision of the State Transport Public Authority. In this regard, broader attention should be paid to identifying possible conflicting institutional issues that might work against the project's sustainability goals. Planners should consider conducting a thorough risk assessment covering potential conflicting policies and regulations that would not support sustainable goals in the long term.

To conclude, for a better understanding of steps undertaken to extend the project's useful life, planners should consider providing specific evidence of using materials embedding superior extended life cycle in order to minimize later repairs and refurbishments. This would also mitigate risks of unforeseen variable costs for maintenance, and above all would support an extended useful life of the endeavor. Moreover, designs should add flexibility to the completed project to enable refurbishment and reconfiguration. For instance, in order to secure and extend the effectiveness of its traffic flow, the Northern Section has embedded in its design a large grassy median strip that will enable the creation of additional lanes and thus increase the life cycle of the road.



The Resource Allocation category deals with material, energy, and water requirements during the construction and operation phases of infrastructure projects. The quantity and source of these elements as well as their impact on overall sustainability are investigated throughout this section of the Envision rating system. Envision guides teams to choose less toxic materials and promotes renewable energy resources. Resource Allocation is divided into three subcategories: Materials, Energy, and Water.

Materials

The Materials subcategory aims to assess efforts of the team to minimize the total amount of primary, natural, and processed materials required for the development. In addition, attention is given in this category to reducing energy required to extract, produce, and transport these materials. In other words, it seeks to understand quantities, sources, and how the supply chain interacts with overall sustainable goals of the project.

It has been possible to note substantial concerns for reducing energy consumption throughout the development of the road. However, in order to measure energy required and to quantify the amount of energy reduction, the project still needs to perform a comprehensive life cycle assessment (LCA). This assessment should include the energy required for materials extraction, transportation, refinement, manufacturing, and other processes until the material is integrated into the construction site. Nonetheless, the project's preference for using local materials has contributed to the task of reducing energy, substantially due to decreasing needs for transport during construction. Planning documents outline that deposits of the excavated material from earthworks (when needed), along with all other environmentally licensed deposits of unwanted materials, were located within 50 miles of construction sites.

A strategy to comply with local regulations has boosted proactive exchange of excess soil and stony materials

between construction lots, resulting in minimal excavated materials being taken off site. Moreover, during the construction of the Northern Section, project managers have worked diligently with the three municipalities affected, checking their needs for excess materials from excavation (mainly soil and rocks) for use in urban structures beyond the immediate area of the project. These procedures have contributed to diverting and reusing 75% of the waste¹⁴ that would otherwise be dumped at landfills.

Notable planning efforts highlight preestablished guidelines for proper inventory, classification, segregation, recycling, temporary storage, transportation, and disposal of waste generated during the road's operation. Planning documents also outline that only licensed and specialized enterprises are likely to be entitled to transport solid waste and select its proper final destination. In order to advance toward higher levels of achievement, project managers should consider increasing the use of recycled materials during construction, expanding the efforts presented that include the reuse of tires for blasting protection and coconut fiber to control landslide. It is recommended that planning efforts be improved by outlining commissioned guidelines for future deconstruction and recycling at the end of the useful life of the project. In addition, DERSA's planners and buyers should make efforts to establish a more sustainable procurement system giving priority to acquiring certified materials to be used in the development of the Northern Section.

Energy

The Energy subcategory awards credits for the reduction of overall energy utilized by the project and the use of renewable sources whenever possible. Expanding and optimizing the use of renewable energy and cutting back on fossil fuels are crucial for the sustainable future of this planet. Besides the scarcity already faced in relation to fossil fuels, the ethics and aesthetic of a sustainable infrastructure urge an embedded design that relies mostly on the use of renewable energy to meet energy needs and the implementation of strategies for the reduction of energy consumption.

From this perspective, the energy-conscious design of the Northern Section performs well in reducing energy consumption. Planning documents outline project managers' meritorious concerns for reviewing the road's design, and their decision to adopt lighting only in sectors where light is a safety condition or crucial for the road's operation. Tunnels, support areas, and highway intersections utilize LED systems. Further still, planners have provided angling instructions to set those LED systems facing downward to avoid light spillage.

There is still noticeable room for improvement in the project with regard to the use of renewable energy and long-term commitments to energy savings. At a country level, the use of renewable energy in Brazil is quite high¹⁵ however, the Northern Section didn't prioritize the use of renewable energies to meet the project's energy needs during its development and after construction is concluded. It is recommended to evaluate the feasibility of using renewable energy, including nontraditional sources, to effectively increase the portion of operational energy that comes from renewable resources. During the highway's operation phase, it is also recommended to commission and monitor energy systems to ensure that the intended level of efficiency is maintained throughout the life of the project. Concessionaires in charge of operations could integrate advanced monitoring equipment that will better allow them to identify energy efficiency loss.

¹⁴DERSA, and Zofnass Program for Sustainable Infrastructure - Harvard University. Rodoanel Northern Section Self Assessment. 2015. 96.

¹⁵45% of primary energy demand in Brazil is met by renewable energy, and large hydropower plants provide 80% of domestic energy generation

It is suggested that to advance to higher levels of achievement, the government should make efforts to implement administrative policies and set guidelines for public bidding to increase the use of renewable energy and ensure the efficiency of energy systems, through commissioning and monitoring energy consumption, during the useful life of the project.

Water

The Water subcategory evaluates how infrastructure projects reduce overall water use, particularly that of potable water, considering the uncertain future of water availability given the vertiginous growth of population as well as the increasing demands for water by cities, industries, domestic households, and agriculture. Climate change already poses severe threats to development, mainly concerning availability, quantity, and quality of water due to potential disturbances in hydrological cycles across the planet. Therefore it is critical to shift from development as usual toward water efficiency in project design and implementation. Planners and designers should strive to reduce overall water use, in particular potable water use, by advocating for alternative water-capturing sources, as well as reusing and recycling to meet water needs.

From this perspective, the design and implementation of the Northern Section have shown satisfactory concerns for protecting freshwater availability by conducting diligent efforts to monitor physical-chemical characteristics of surrounding watersheds and analyzing underground water, aiming to protect freshwater assets in directly and indirectly affected areas. In addition, there is evidence of water treatment and reuse in specific construction tasks. However, planning documents lack calculations of the total amount of potable water required for constructing and operating the road. Therefore, project managers should be encouraged to quantify water needs, and should design strategies to reduce potable water consumption.

Regarding the reduction of potable water consumption, planning documents have evidenced some degree of care to reuse water to meet regulatory requirements. Moreover, equipment for water collection and small water treatment plants were installed around construction sites. These actions are definitely helping to promote the use of gray water and recycled water and reduce potable water consumption during construction, but no specific evidence regarding percentages of reduction in potable water use were noticed in the documentation provided. Furthermore, for the road's operation phase it is recommended to elaborate and implement a detailed action plan to use, treat, and reuse nonpotable water in complementary facilities and green areas.

There is also room for improvement in establishing requirements in advance for concessionaires to monitor water systems during the road's operation. Monitoring water use and leak detection beyond utility data improves the operational efficiency of the project. Detailed long-term monitoring should be integrated into operations to enable the operators of the highway to allow a responsive management, ensuring efficiency and conserving both quantity and quality of water resources utilized.

²⁷ Roberto Moreno Leiva (CAF Responsabilidad Ambiental y Social) in discussion with Zofnass Team, (8 October 2015).

6 NATURAL WORLD CATEGORY

The Natural World category focuses on how infrastructure projects may impact natural systems and promotes opportunities for positive synergistic effects. Envision encourages strategies for conservation and distinguishes projects with a focus on enhancing surrounding natural systems. Natural World is subdivided into three subcategories: Siting, Land and Water, and Biodiversity.

Siting

Often the implementation of large infrastructure projects has direct and indirect impacts both in the natural world and the cityscape around it. For this reason, how the project is designed and located will drive the reconciliation between development and preservation. The Northern Section has a high level of performance in most of the aspects analyzed within the Siting category, demonstrating notable concerns and substantial planning to avoid direct and indirect impacts in high-value ecological areas.

The final route of the Northern Section was adjusted in order to have a minimal impact on high-value ecological areas. Notable efforts to engage with a wide range of stakeholders have been conducted by project managers to determine sensitive areas, which are avoided by the implementation of strategic tunnels and viaducts in order to minimize vegetation removal and to preserve the overall fauna and local flora. Thorough quantitative and qualitative inventories assessed a wide range of vegetation, thus allowing the rebound of prime habitat and its connection to other biomes over the directly and indirectly affected areas. Although, the suppression of native vegetation has been considered low by the developer, the implementation of effective actions for environmental compensations are still pending.

It's important to mention that robust geological studies have positively influenced the design of the Northern Section, allowing the project to be built mostly in downslope areas and thus to mitigate risks of landslides. Added to noteworthy emergency plans in case of landslides, this has earned the project's high performance. Preventive actions were also implemented for the stabilization of unstable or eroded slopes not directly affected by sections of cut and fill.

From the perspective of natural water management, the project prevented uncontrolled stormwater runoff and ensured floodplain functions. Planning documents outline the implementation of infrastructure designed for water flow-through such as channels, hydraulic staircases, and other appropriate drainage systems, when necessary to maintain floodplain functions. Regular monitoring and evaluation of surface water and wetlands to assess any direct or indirect impacts on water quality and availability were also considered. The project considered a 100-foot buffer to protect wetlands and surface water¹⁶, in accordance with Brazilian regulations, but there is room for improvement in implementing strategies to protect vegetation and soil and restore wetlands that go beyond regulation standards.

¹⁶DERSA, and Zofnass Program for Sustainable Infrastructure - Harvard University. Rodoanel Northern Section Self Assessment. 2015. 124

¹⁷DERSA, and Zofnass Program for Sustainable Infrastructure - Harvard University. Rodoanel Northern Section Self Assessment. 2015. 142

Avoiding construction on agricultural land or undeveloped areas prevents further damage to the environment, while providing an opportunity to redevelop underutilized sites. Even though 27% of the project's total development area encompasses gray and brownfields¹⁷, increasing the utilization of previously occupied land is recommended. Nonetheless, in the case of the Rodoanel Northern Section, the complex challenge of how to optimize the use of developed land with the construction of new infrastructure, as well as minimize displacement of informal settlers, remains open.

Land and Water

The Land and Water subcategory seeks to assess efforts to minimize impacts on natural species and existing hydrologic cycles. To do so, the project must take robust actions to avoid contamination of land, surface water, and underground water by hazardous substances (such as fertilizers, fossil fuels, and pesticides) that would cause severe damage to the environment and to neighboring communities.

The development of the Northern Section embeds notable measures for erosion control and stormwater management by implementing temporary and permanent drainage systems throughout all phases of the project, including temporary drainage for the development and deactivation of support facilities, and silt retention barriers during earthwork and while undertaking environmental restoration. Since 2013 diligent efforts have been employed to monitor and evaluate water quality. 38 water spots¹⁸ have been monitored, showing no serious change in the water quality directly related to the development of the project. Nevertheless, according to planning documents, the establishment of further guidelines to prevent water contamination during the road operation is part of the responsibilities of future owners in conjunction with the state water and sewage authority CETESB.

Although planning efforts have preserved full permeability characteristics for 70%¹⁹ of the directly affected area, the project could have achieved a superior performance by improving water storage capacity and returning the infiltration and evapotranspiration capacities to predevelopment condition. These could have been achieved throughout the implementation of green micro drainage systems (instead of gray traditional channeling) and by adopting modern permeable asphaltic technologies. Other measures suitable to the case of the Northern Section encompass the implementation of rain gardens and bioretention, rooftop gardens, and rainwater harvesting systems for support areas. Instead of gray infrastructure for stormwater management, planners should consider employing vegetated swales, buffers, and strips for drainage functions, among other possibilities.

In order to preserve land and watersheds and water tables, it is important to minimize or eliminate the use of chemical pesticides and fertilizers. However, some practices to compensate the development footprint (such as reforestation) foresee the use of herbicide (glyphosate)²⁰ in areas where manual/mechanical control such as manual mowing and mulching are difficult to undertake in order to control herbaceous weeds and grasses. From this perspective, project managers should strongly overemphasize the application of runoff control measures during tasks of forest restoration, besides hiring specialized sustainable forestry management companies to mitigate risks of water contamination. In addition, the developer should consider implementing operational policies for acquisition of seedlings from sustainable nurseries as well as growing plants not dependent on the use of synthetic herbicides, thus shifting the focus from prevention to the elimination of pesticides and synthetic pollutants that could eventually contaminate surface and groundwater.

¹⁸DERSA, and Zofnass Program for Sustainable Infrastructure - Harvard University. Rodoanel Northern Section Self Assessment. 2015. 152.

¹⁹DERSA, and Zofnass Program for Sustainable Infrastructure - Harvard University. Rodoanel Northern Section Self Assessment. 2015. 156.

²⁰Consórcio Coprape Appe - São Paulo and Dersa. P2.11, ANEXO 02 - Instrução Técnica para Implantação da Restauração Florestal e Revegetação dentro e fora da Faixa de Domínio, em Áreas de Apoio e em Terceiros Locais." Vol. II. 3. 2011.

Biodiversity

The Biodiversity subcategory assesses how the project has minimized its negative impacts on natural species and their habitat. The development of the Northern Section achieved superior performance with regard to preserving species biodiversity, controlling invasive species, restoring disturbed soils, and maintaining wetland and surface water functions.

Comprehensive mapping displaying an inventory of all assessed forest formation, vegetation, and floristic categories has allowed managers to preserve and restore habitats surrounding the Northern Section. In addition, information gathered has informed decision making in order to avoid biome disruptions, such as the use of tunnels to cross areas of rough terrain and passages for wildlife benefiting a wide variety of species such as rodents, marsupials, lizards, and mammals of medium and large sizes. Project managers worked diligently to develop administrative programs aimed at preserving local species and biological heritage. As an example, the project team developed a special program to support the protection and readaptation of howler monkey populations around the Northern Section.

Beyond the identification of invasive species, planning documents outline robust actions to monitor and evaluate local fauna and flora during all phases of the Northern Section's development. Land demarcation and fences were established to avoid human and invasive terrestrial fauna. Also, administrative programs for periodic control of invasive species outline actions for thinning vines and weeds, instructions for mechanical mowing, and in extreme cases the application of herbicides accompanied by proper drainage systems. Results of these actions must be periodically reported to the environmental agency CETESB.

The project has performed actions beyond regulatory requirements with regard to the restoration of disturbed soils through revegetation efforts and compensatory planting covering the total domain area and indirectly affected areas. Several actions to avoid erosion, to maintain soil hydrological functions, and to preserve geological stability were outlined in planning documents. In the same way, a wide range of actions to maintain wetlands and preserve aquatic habitats have been undertaken by the project team. Besides robust surface and underground water monitoring in conjunction with CETESB, infrastructural features such as channels and hydraulic staircases were implemented to preserve water functions, connectivity, and sediment transport. Measures to prevent pollutant contamination and erosion, and infrastructures to sustain stormwater flow and drainage, have also credited the project's performance in this subcategory.

²⁸ Ministerio de Planificación Federal, Inversión Pública y Servicios. *Plan de Reforestación NEA-NOA* (18 July 2012), 9-11.



CLIMATE & RISK CATEGORY

Envision aims to promote infrastructure developments that are sensitive to long-term climate disturbances. The Climate and Risk category focuses on avoiding direct and indirect contributions to greenhouse gas emissions, as well as promoting mitigation and adaptation actions to ensure short- and long-term resilience to hazards. Climate and Risk is subdivided into two subcategories: Emissions and Resilience.

Emissions

The Emissions subcategory seeks to promote the understanding and reduction of dangerous emissions, including greenhouse gas emissions and other dangerous air pollutants, during all stages of the project's life cycle. The Northern Section achieved a low performance in relation to these aspects, not presenting strategies to minimize gas emissions impacts, and therefore not contributing to reducing overall global risks beyond the area of influence of the project.

The unplanned development occurring in the Metropolitan Region of São Paulo and the region's poor quality of public transportation have resulted in chaotic daily traffic jams which undoubtedly worsen São Paulo's GHG emissions scenario. In this sense, the completion of the Rodoanel project will benefit the region by increasing the average speeds for traffic crossing the metropolitan area. As a result of this improvement in travel, DERSA has estimated an overall reduction of 12.5% in GHG emissions between 2014 and 2024²¹. To estimate this percentage, besides following CETESB's standards, the developer relied on the Brazilian Regional Atmospheric Modeling Systems (BRAMS), also on the CALRoads View, CALINE4, and the AERMOD. However, planning documents have shown no evidence of a comprehensive program for curbing, mitigating and compensating CO₂e emissions generated in the construction of the Northern Section.

Unavoidable CO₂e emissions associated with transportation fuel consumption can be countered by carbon sequestration in the form of planting new forests, which absorb and use CO₂e. Yet, the project would perform better by presenting comprehensive action plans to reduce emissions during the project's maintenance and operation.

It is important to highlight that planning documents outline compliance with local regulations concerning dust and odors. Nonetheless such a large development requires at least as strict monitoring and control of other pollutants, such as ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. Beyond the measures to minimize adverse impacts in air quality required by regulation regarding the control of dust and odors during construction, the addition of active controls, monitoring systems, and mitigation measures are recommended. Furthermore, with regard to the road's operation, action plans to curb pollution according to stringent standards to manage specific types of air pollutants, such as the California Ambient Air Quality Standards or the Coast Air Quality Management, can be integrated into the project.

Recognizing that this type of project, a highway, encourages the use of vehicles, and therefore the generation of air pollutant emissions which enhance the greenhouse effect and temperature rise, it is recommended that the project consider effective proposals to reduce dangerous pollutant emissions in order to mitigate negative impacts of traffic. Although the project has modeled estimates of emissions during its operations phase, it should encourage active controls or actions to mitigate air pollution during that phase. The better integration

²¹Consórcio JGP—PRIME, "Impactos potenciais na infraestrutura viária, no tráfego e nos transportes," in Estudo de impacto ambiental (2010), vol. 6, 43-48.

of this infrastructure with other types of nonmotorized transportation through modal interchange stations, and a vegetation compensation program for carbon sequestration, can be strategies to mitigate the effects of the highway on air and improve overall quality of life for the citizens of São Paulo.

Resilience

Projects may be directly threatened by changes related to climate change, such as rising sea levels or extreme weather and gradual increases in temperature or decreases in precipitation. For communities that rely on infrastructure projects, failure of systems can cause devastating consequences. Therefore, the Resilience subcategory analyzes the project's ability to cope and adapt to short-term risks and long-term conditions related to changing climate. With the exception of preparedness for short-term hazards, the Northern Section achieved low performance, not demonstrating effective strategies to enhance its long-term adaptive capacity and the resilience of the endeavor itself and neighboring communities.

In addition to environmental, geotechnical, and geological risk assessments, planning efforts failed to present specific concerns for delineating threats and potential responses to climate change. Therefore, a thorough comprehensive vulnerability assessment and adaptation plan are urgently necessary in order to provide the endeavor with planning guidelines on mitigating negative impacts and to facilitate the development of adaptation measures in order to ensure overall climate resilience when facing severe distortions in climate patterns.

Moreover, such a colossal long-lasting development must provide evidence of long-term adaptive capacity to function under altered climate conditions. Extreme weather events may occur more often and with greater intensity, and although the project has adopted infrastructural features to cope with extreme climate events, such as storms, this infrastructure has been developed relying on traditional climate models that do not encompass the scientific consensus with regard to threats of global warming. In relation to short-term hazards that might not be related to climate change, the project provided evidence of robust planning, outlining good preparedness and detailed emergency plans to deal with predictable events in relation to landslides and floods based on current and historical patterns of weather conditions.

Hard surfaces, such as rooftops and pavement, absorb a large percentage of the incident solar radiation, heating surfaces and surrounding air; this alters the microclimate around them and can impact local vegetation, wildlife, and community comfort. Considering the nature of the project, the dark paved infrastructure would inevitably trap heat. Urban heat island effects can be minimized and managed through the use of materials with a high solar reflectance index or through increased vegetation, which provides cooling via evapotranspiration and increased shade. The project would advance toward higher performance by presenting plans for voluntarily assessing its solar reflectance index and developing mitigations for its surrounding microclimates accordingly, such as tree planting to provide shade or creating micro-forests in neighboring communities.

APPENDIX A: PROJECT PICTURES AND DRAWINGS



Figure 5: Location map Northern Section in RED.

Sources: Consórcio Cobrape Appe. Executive Summary. São Paulo. 2015. 3.



Figure 6: Northern Section in Yellow.

Sources: Consórcio JGP - PRIME. "Capítulo 3.0 - Estudo de Alternativas." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010.

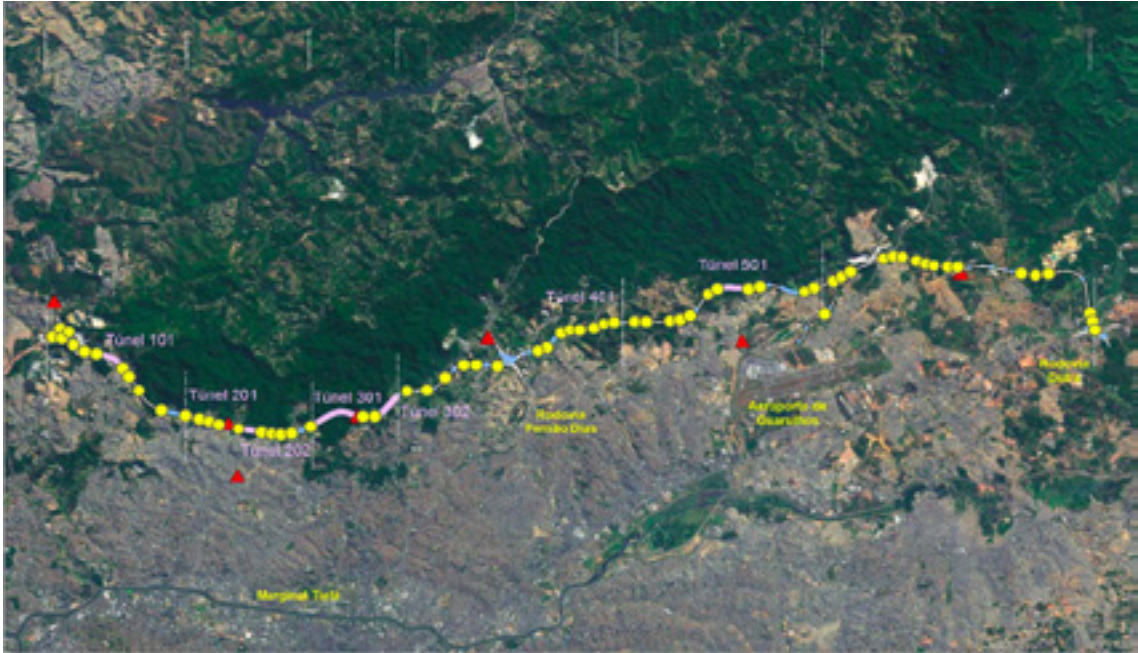


Figure 7: The six segments of the Northern Section and its tunnels

Sources: Consórcio Cobrape Appe. Executive Summary. São Paulo. 2015. 8.



Figure 8: Obra de Arte Especial - Tunnel

Source: Consórcio Cobrape Appe. Executive Summary. São Paulo. 2015. 7



Figure 9: Obra de Arte Especial 202 - Construction Works - Tunnels and Viaducts
Sources: Consórcio Cobrape Appe. Executive Summary. São Paulo. 2015. 7



Figure 10: Construction works
Sources: Consórcio Cobrape Appe. Executive Summary. São Paulo. 2015. 72



Figure 11: Construction Works

Sources: Consórcio Cobrape Appe. Executive Summary. São Paulo. 2015. 72



Figure 12: Tunnels

Sources: Consórcio Cobrape Appe. Executive Summary. São Paulo. 2015. 75



Figure 13: Construction Works

Sources: Consórcio Cobrape Appe. Executive Summary. São Paulo. 2015. 77



Figure 14: Earth works

Sources: Consórcio Cobrape Appe. Executive Summary. São Paulo. 2015. 4



Figure 15: Permanent Drainage System

Sources: Consórcio Cobrape Appe. Executive Summary. São Paulo. 2015. 32



Figure 16: Provisory Drainage System

Sources: Consórcio Cobrape Appe. Executive Summary. São Paulo. 2015. 32



Figure 17: Resettlement Program

Sources: Consórcio Cobrape Appe. Conjunto Habitacional Freguesia do Ó. Executive Summary. 2015. 51



Figure 18:
Resettlement Program
- Housing built in the
city of Guarulhos/SP.
Source:
 Desenvolvimento
 Rodoviário - DERSA.
 Guia Da Região,
 Conjunto Habitacional
 Clarice Lispector. 1-5.



Figure 19: Community
Assessment &
Assistance
Sources: Consórcio
 Cobrape Appe.
 Sumário Executivo.
 São Paulo. 2013. 10



Figure 20: Community Meeting - Resettlement Program
Sources: Consórcio Cobrape Appe. Executive Summary. São Paulo. 2015. 51



Figure 21: Information Center
Sources: Consórcio Cobrape Appe. Executive Summary. São Paulo. 201



Figure 22: Pedestrian pathway
Sources: Consórcio Cobrape Appe. Sumário Executivo. São Paulo. 2013. 42



Figure 23: Supportive facilities
Sources: Consórcio Cobrape Appe. Sumário Executivo. São Paulo. 2013. 68



Figure 24: Noise monitoring prior construction (June 2000)

Sources: Consórcio JGP - PRIME. EIA - Estudo De Impacto Ambiental, Vol. 4. 2010. 31.



Figure 25: Safety signs

Sources: Consórcio Cobrape Appe. Sumário Executivo. São Paulo. 2013. 72



Figure 26: Fauna underpass

Sources: Consórcio Cobrape Appe. Executive Summary. São Paulo. 2015. 60

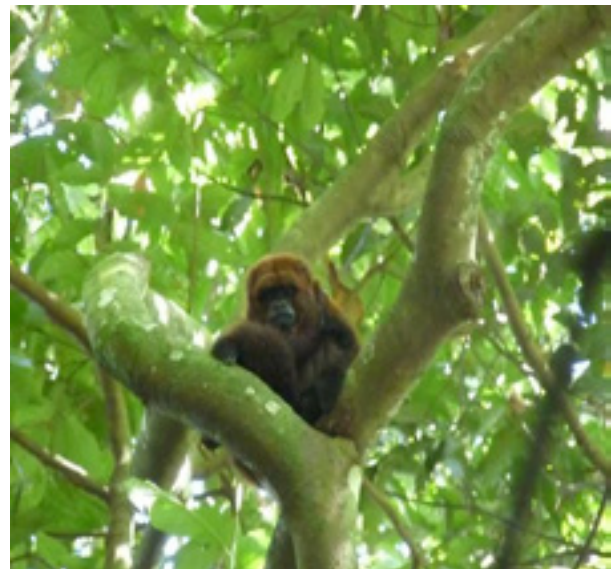


Figure 27: Bugio. Howler Monkeys - Northern Section

Sources: Consórcio JGP - PRIME. EIA - Estudo De Impacto Ambiental, Vol. 4. 2010. 163.



Figure 28: 2nd Campaign fauna monitoring
Sources: Consórcio Cobrape Appe. Sumário Executivo.
São Paulo. 2013. 57



Figure 29: Water spot monitoring
Sources: Consórcio Cobrape Appe. Sumário Executivo.
São Paulo. 2013. 37

APPENDIX B: ENVISION POINTS TABLE

			MEJORA	AUMENTA	SUPERIOR	CONSERVA	RESTAURAR
QUALITY OF LIFE	PURPOSE	QL 1.1 Improve community quality of life	2	5	10	20	25
		QL 1.2 Stimulate sustainable growth and development	1	2	5	13	16
		QL 1.3 Develop local skills and capabilities	1	2	5	12	15
	WELLBEING	QL 2.1 Enhance public health and safety	2	--	--	16	
		QL 2.2 Minimize noise and vibration	1	--	--	8	11
		QL 2.3 Minimize light pollution	1	2	4	8	11
		QL 2.4 Improve community mobility and access	1	4	7	14	
		QL 2.5 Encourage alternative modes of transportation	1	3	6	12	15
	COMMUNITY	QL 2.6 Improve site accessibility, safety and wayfinding	--	3	6	12	15
		QL 3.1 Preserve historic and cultural resources	1	--	7	13	16
		QL 3.2 Preserve views and local character	1	3	6	11	14
	VULNERABLE GROUPS	QL 3.3 Enhance public space	1	3	6	11	13
		QL 4.1 Identify and address the needs of women and diverse communities*	1	2	3	4	
QL 4.2 Stimulate and promote women's economic empowerment		1	2	3	4		
QL 4.3 Improve access and mobility of women and diverse communities*		1	2	3	4	5	
Maximum QL Points:							194"
LEADERSHIP	COLLABORATION	LD 1.1 Provide effective leadership and commitment	2	4	9	17	
		LD 1.2 Establish a sustainability management system	1	4	7	14	
		LD 1.3 Foster collaboration and teamwork	1	4	8	15	
		LD 1.4 Provide for stakeholder involvement	1	5	9	14	
	MANAGEMENT	LD 2.1 Pursue by-product synergy opportunities	1	3	6	12	15
		LD 2.2 Improve infrastructure integration	1	3	7	13	16
	PLANNING	LD 3.1 Plan for long-term monitoring and maintenance	1	3	--	10	
		LD 3.2 Address conflicting regulations and policies	1	2	4	8	
		LD 3.3 Extend useful life	1	3	6	12	
		Maximum LD Points:					
RESOURCE ALLOCATION	MATERIALS	RA 1.1 Reduce net embodied energy	2	6	12	18	
		RA 1.2 Support sustainable procurement practices	2	3	6	9	
		RA 1.3 Use recycled materials	2	5	11	14	
		RA 1.4 Use regional materials	3	6	9	10	
		RA 1.5 Divert waste from landfills	3	6	8	11	
		RA 1.6 Reduce excavated materials taken off site	2	4	5	6	
		RA 1.7 Provide for deconstruction recycling	1	4	8	12	
	ENERGY	RA 2.1 Reduce energy consumption	3	7	12	18	
		RA 2.2 Use renewable energy	4	6	13	16	20
	WATER	RA 2.3 Commission and monitor energy systems	--	3	--	11	
		RA 3.1 Protect fresh water availability	2	4	9	17	21
		RA 3.2 Reduce potable water consumption	4	9	13	17	21
		RA 3.3 Monitor water systems	1	3	6	11	
Maximum RA Points:							182"
NATURAL WORLD	SITING	NW 1.1 Preserve prime habitat	--	--	9	14	18
		NW 1.2 Protect wetlands and surface water	1	4	9	14	18
		NW 1.3 Preserve prime farmland	--	--	6	12	15
		NW 1.4 Avoid adverse geology	1	2	3	5	
		NW 1.5 Preserve floodplain functions	2	5	8	14	
		NW 1.6 Avoid unsuitable development on steep slopes	1	--	4	6	
		NW 1.7 Preserve greenfields	3	6	10	15	23
	LAND & WATER	NW 2.1 Manage stormwater	--	4	9	17	21
		NW 2.2 Reduce pesticide and fertilizer impacts	1	2	5	9	
	BIODIVERSITY	NW 2.3 Prevent surface and groundwater contamination	1	4	9	14	18
		NW 3.1 Preserve species biodiversity	2	--	--	13	16
		NW 3.2 Control invasive species	--	--	5	9	11
		NW 3.3 Restore disturbed soils	--	--	--	8	10
NW 3.4 Maintain wetland and surface water functions	3	6	9	15	19		
Maximum NW Points:							203"
CLIMATE & RISK	EMISSIONS	CR 1.1 Reduce greenhouse gas emissions	4	7	13	18	25
		CR 1.2 Reduce air pollutant emissions	2	6	--	12	15
		CR 2.1 Assess climate threat	--	--	--	15	
	RESILIENCE	CR 2.2 Avoid traps and vulnerabilities	2	6	12	16	20
		CR 2.3 Prepare for long-term adaptability	--	--	--	16	20
		CR 2.4 Prepare for short-term hazards	3	--	10	17	21
		CR 2.5 Manage heat islands effects	1	2	4	6	
Maximum CR Points:							122"

*Indigenous or afro-descendant peoples
 **Not every credit has a restorative level. Therefore totals include the maximum possible points for each credit whether conserving or restorative.

Maximum TOTAL Points: **822"**

APPENDIX C: GRAPHS

MARIO COVAS RODOANEL PROJECT- NORTHERN SECTION BRAZIL PROYECTO RODOANEL MARIO COVAS- SECCIÓN NORTE

			I	E	S	C	R*
CALIDAD DE VIDA	PURPOSE PROPÓSITO	QL1.1 Improve Community Quality of life QL1.1 Mejorar la Calidad de Vida de la Comunidad					
		QL1.2 Stimulate Sustainable Growth & Development QL1.2 Estimular el desarrollo y el crecimiento sostenible					
		QL1.3 Develop Local Skills And Capabilities QL1.3 Desarrollar Capacidades y Habilidades Locales					
QUALITY OF LIFE	COMMUNITY COMUNIDAD	QL2.1 Enhance Public Health And Safety QL2.1 Mejorar la Salud Pública y Seguridad					
		QL2.2 Minimize Noise and Vibration QL 2.2 Minimizar Ruidos y Vibraciones					
		QL2.3 Minimize Light Pollution QL 2.3 Minimizar Contaminación Lumínica					
		QL2.4 Improve Community Mobility and Access QL2.4 Mejorar el acceso y la movilidad de la Comunidad					
		QL2.5 Encourage Alternative Modes of Transportation QL2.5 Fomentar modos alternativos de transporte					
		QL2.6 Improve Site Accessibility, Safety & Wayfinding QL2.6 Mejorar la accesibilidad, seguridad y señalización					
		QL3.1 Preserve Historic And Cultural Resources QL3.1 Preservar los recursos históricos y culturales					
WELLBEING BIENESTAR	VULNERABLE GROUPS GRUPOS VULNERABLES	QL3.2 Preserve Views And Local Character QL3.2 Preservar las vistas y el carácter local					
		QL3.3 Enhance Public Space QL3.3 Mejorar el espacio público					
		QL4.1 Identify and adress the needs of minorities QL4.1 Identificar y considerar las necesidades de minorias					
QUALITY OF LIFE	VULNERABLE GROUPS GRUPOS VULNERABLES	QL4.2 Stimulate and promote women's empowerment QL4.2 Estimular y promover el empoderamiento femenino					
		QL4.3 Improve access and mobility of minorities QL4.3 Mejorar el acceso y movilidad de minorias					
		QL0.0 Innovate or Exceed Credit Requirements QL0.0 Créditos innovadores o que exceden los requerimientos					

* **I**MPROVE **E**NHANCED **S**UPERIOR **C**ONSERVING **R**ESTORATIVE
MEJORA AUMENTA SUPERIOR CONSERVA RESTAURA

Figure 30: Quality of Life category Summary of results

MARIO COVAS RODOANEL PROJECT- NORTHERN SECTION BRAZIL
PROYECTO RODOANEL MARIO COVAS- SECCIÓN NORTE

			I	E	S	C	R*
LIDERAZGO	COLLABORATION COLABORACIÓN	LD1.1 Provide Effective Leadership And Commitment LD1.1 Proporcionar compromiso y liderazgo efectivo					
		LD1.2 Establish a Sustainability Management System LD1.2 Establecer un sistema de gestión de la sostenibilidad					
		LD1.3 Foster Collaboration and Teamwork LD1.3 Promover colaboración y trabajo en equipo					
		LD1.4 Provide For Stakeholder Involvement LD1.4 Fomentar la participación de las partes interesadas					
LEADERSHIP	MANAGEMENT GESTIÓN	LD 2.1 Pursue By-Products Synergy Opportunities LD 2.1 Buscar oportunidades de sinergia derivada					
		LD2.2 Improve Infrastructure Integration LD 2.2 Mejorar la integración de infraestructuras					
		LD3.1 Plan For Long-Term Monitoring & Maintenance LD3.1 Planificar el monitoreo y mantenimiento a largo plazo					
PLANNING PLANIFICACIÓN	LD3.2 Address Conflicting Regulations & Policies LD3.2 Lidiar con reglamentos y políticas en conflicto						
	LD3.3 Extend Useful Life LD3.3 Extender la vida útil						
	QL0.0 Innovate or Exceed Credit Requirements QL0.0 Créditos innovadores o que exceden los requerimientos						

* **I**MPROVE **E**NHANCED **S**UPERIOR **C**ONSERVING **R**ESTORATIVE
 MEJORA AUMENTA SUPERIOR CONSERVA RESTAURA

Figure 31: Leadership category Summary of results

MARIO COVAS RODOANEL PROJECT- NORTHERN SECTION BRAZIL
PROYECTO RODOANEL MARIO COVAS- SECCIÓN NORTE

			I	E	S	C	R*
RESOURCE ALLOCATION	MATERIALS MATERIALES	RA1.1 Reduce Net Embodied Energy RA1.1 Reducir energía neta incorporada					
		RA1.2 Support Sustainable Procurement Practices RA1.2 Apoyar prácticas de adquisición sustentable					
		RA1.3 Used Recycled Materials RA1.3 Utilizar materiales reciclados					
		RA1.4 Use Regional Materials RA1.4 Utilizar materiales de la región					
		RA1.5 Divert Waste From Landfills RA1.5 Disminuir la disposición final en rellenos sanitarios					
		RA1.6 Reduce Excavated Materials Taken Off Site RA1.6 Reducir los materiales de excavación sacados del local del proyecto					
		RA1.7 Provide for Deconstruction & Recycling RA1.7 Prever condiciones para la remoción de la construcción y el reciclaje					
	ENERGY ENERGÍA	RA2.1 Reduce Energy Consumption RA2.1 Reducir el consumo de energía					
		RA2.2 Use Renewable Energy RA2.2 Usar energías renovables					
		RA2.3 Commision & Monitor Energy Systems RA2.3 Puesta en servicio y monitoreo de sistemas energéticos					
	WATER AGUA	RA3.1 Protect Fresh Water Availability RA3.1 Proteger la disponibilidad de agua dulce					
		RA3.2 Reduce Potable Water Consumption RA3.2 Reducir el consumo de agua potable					
		RA3.3 Monitor Water Systems RA3.3 Monitorear sistemas de provisión de agua					
		QL0.0 Innovate or Exceed Credit Requirements QL0.0 Créditos innovadores o que exceden los requerimientos					

* **I**MPROVE **E**NHANCED **S**UPERIOR **C**ONSERVING **R**ESTORATIVE
 MEJORA AUMENTA SUPERIOR CONSERVA RESTAURA

Figure 32: Resource Allocation category Summary of results

MARIO COVAS RODOANEL PROJECT- NORTHERN SECTION BRAZIL
PROYECTO RODOANEL MARIO COVAS- SECCIÓN NORTE

			I	E	S	C	R*
MUNDO NATURAL	SITING EMPLAZAMIENTO	NW1.1 Preserve Prime Habitat NW1.1 Preservar hábitats de alta calidad					
		NW1.2 Preserve Wetlands and Surface Water NW1.2 Preservar humedales y aguas superficiales					
		NW1.3 Preserve Prime Farmland NW1.3 Preservar tierras agrícolas de alta calidad					
		NW1.4 Avoid Adverse Geology NW1.4 Evitar zonas de geología adversa					
		NW1.5 Preserve Floodplain functions NW1.5 Preservar funciones de llanura aluvial					
		NW1.6 Avoid Unsuitable Development in Steep Slopes NW1.6 Evitar la ocupación inadecuada en pendientes pronunciadas					
		NW1.7 Preserve Greenfields NW1.7 Preservar áreas sin ocupación					
NATURAL WORLD	LAND+WATER IMPACTOS EN EL AGUA Y SUELO	NW2.1 Manage Stormwater NW2.1 Gestión de aguas pluviales					
		NW2.2 Reduce Pesticides and Fertilizer Impacts NW2.2 Reducir el impacto de fertilizantes y plaguicidas					
		NW2.3 Prevent Surface and Groundwater Contamination NW2.3 Prevenir la contaminación de aguas superficiales y profundas					
NATURAL WORLD	BIODIVERSITY BIODIVERSIDAD	NW3.1 Preserve Species Biodiversity NW3.1 Preservar la biodiversidad					
		NW3.2 Control Invasive Species NW3.2 Control de especies invasivas					
		NW3.3 Restore Disturbed Soils NW3.3 Restaurar suelos alterados					
		NW3.4 Maintain Wetland and Surface Water Functions NW3.4 Preservar los humedales y las funciones de aguas superficiales					
		QL0.0 Innovate or Exceed Credit Requirements QL0.0 Créditos innovadores o que exceden los requerimientos					

* **I**MPROVE **E**NHANCED **S**UPERIOR **C**ONSERVING **R**ESTORATIVE
 MEJORA AUMENTA SUPERIOR CONSERVA RESTAURA

Figure 33: Natural World category Summary of results

MARIO COVAS RODOANEL PROJECT- NORTHERN SECTION BRAZIL
PROYECTO RODOANEL MARIO COVAS- SECCIÓN NORTE

			I	E	S	C	R*
CLIMA Y RIESGO	MATERIALS MATERIALES	CR1.1 Reduce Greenhouse Gas Emissions CR1.1 Reducir las emisiones de Gases de Efecto Invernadero (GEI)					
		CR1.2 Reduce Air Pollutant Emissions CR1.2 Reducir las emisiones contaminantes del aire					
CLIMATE AND RISK	ENERGY ENERGÍA	CR2.1 Assess Climate Threat CR2.1 Evaluar amenazas relacionadas al Cambio Climático					
		CR2.2 Avoid Traps and Vulnerabilities CR2.2 Evitar situaciones de riesgo y vulnerabilidad					
		CR2.3 Prepare for Long-Term Adaptability CR2.3 Establecer estrategias de adaptación de largo plazo, frente al cambio climático					
		CR2.4 Prepare for Short-Term Hazards CR2.4 Preparación frente a riesgos de corto plazo					
		CR2.5 Manage Heat Island Effects CR2.5 Administrar el efecto Isla de Calor					
		QL0.0 Innovate or Exceed Credit Requirements QL0.0 Créditos innovadores o que exceden los requerimientos					

* **I**MPROVE **E**NHANCED **S**UPERIOR **C**ONSERVING **R**ESTORATIVE
 MEJORA AUMENTA SUPERIOR CONSERVA RESTAURA

Figure 34: Climate & Risk category Summary of results

MARIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL			PT.	PERFORMANCE	
1	QUALITY OF LIFE	PURPOSE	QL1.1 Improve community quality if life	20	Conserving
2			QL1.2 Stimulate sustainable growth and development	5	Superior
3			QL1.3 Develop local skills and capabilities	12	Conserving
4		WELLBEING	QL2.1 Enhance public health and safety	2	Improved
5			QL2.2 Minimize noise and vibration	8	Conserving
6			QL2.3 Minimize light pollution	8	Conserving
7			QL2.4 Improve community mobility and access	7	Superior
8			QL2.5 Encourage alternatives modes of transportation	1	Improved
9			QL2.6 Improve site accessability, safety and wayfinding	12	Conserving
10		COMMUNITY	QL3.1 Preserve historic and cultural resources	13	Conserving
11			QL3.2 Preserve views and local character	1	Improved
12			QL3.3 Enhance public space	6	Superior
13		VULNERABLE GROUPS	QL4.1 Identify and adress the needs of women and diverse communities (indigenous or afro-descendant peoples)	4	Conserving
14			QL4.2 Stimulate and promote women's economic empowerment	3	Superior
15			QL 4.3 Improve access and mobility of women and diverse communities*	2	Enhanced
QL0.0 Innovate or Exceed Credit Requirements			8	N/A	
QL			112		

MARIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL			PT.	PERFORMANCE	
16	LEADERSHIP	COLLABORATION	LD 1.1 Provide effective leadership and commitment	9	Superior
17			LD 1.2 Establish a sustainability management system	7	Superior
18			LD 1.3 Foster collaboration and teamwork	4	Enhanced
19			LD 1.4 Provide for stakeholder involvement	14	Conserving
20		MANAGEMENT	LD 2.1 Pursue by-product synergy opportunities	1	Improved
21			LD 2.2 Improve infrastructure integration	13	Conserving
22		PLANNING	LD 3.1 Plan for long-term monitoring and maintenance	3	Enhanced
23			LD 3.2 Address conflicting regulations and polices	0	No score
24			LD 3.3 Extend useful life	3	Enhanced
LD0.0 Innovate Or Exceed Credit Requirements			0	N/A	
LD			54		

MARIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL			PT.	PERFORMANCE	
25	RESOURCE ALLOCATION	MATERIALS	RA 1.1 Reduce net embodied energy	0	No score
26			RA 1.2 Support sustainable procurement practices	3	Enhanced
27			RA 1.3 Use recycled materials	0	No score
28			RA 1.4 Use regional materials	10	Conserving
29			RA 1.5 Divert waste from landfills	8	Superior
30			RA 1.6 Reduce excavated materials taken off site	6	Conserving
31			RA 1.7 Provide for deconstruction recycling	1	Improved
32		ENERGY	RA 2.1 Reduce energy consumption	12	Superior
33			RA 2.2 Use renewable energy	0	No score
34			RA 2.3 Commission and monitor energy systems	0	No score
35		WATER	RA 3.1 Protect fresh water availability	2	Improved
36			RA 3.2 Reduce potable water consumption	0	No score
37			RA 3.3 Monitor water systems	0	No score
			RA0.0 Innovate Or Exceed Credit Requirements	0	N/A
RA			42		

MARIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL			PT.	PERFORMANCE	
38	NATURAL WORLD	SITING	NW 1.1 Preserve prime habitat	18	Restorative
39			NW 1.2 Protect wetlands and surface water	4	Enhanced
40			NW 1.3 Preserve prime farmland	0	No score
41			NW 1.4 Avoid adverse geology	3	Superior
42			NW 1.5 Preserve floodplain functions	5	Enhanced
43			NW 1.6 Avoid unsuitable development on steep slopes	4	Superior
44			NW 1.7 Preserve greenfields	3	Improved
45		LAND & WATER	NW 2.1 Manage stormwater	4	Enhanced
46			NW 2.2 Reduce pesticide and fertilizer impacts	1	Improved
47			NW 2.3 Prevent surface and groundwater contamination	9	Superior
48		BIODIVERSITY	NW 3.1 Preserve species biodiversity	16	Restorative
49			NW 3.2 Control invasive species	9	Conserving
50			NW 3.3 Restore disturbed soils	8	Conserving
51			NW 3.4 Maintain wetland and surface water functions	15	Conserving
			NW0.0 Innovate Or Exceed Credit Requirements	9	N/A
NW			108		

MARIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL			PT.	PERFORMANCE	
52	CLIMATE	EMISSIONS	CR 1.1 Reduce greenhouse gas emissions	4	Improved
53			CR 1.2 Reduce air pollutant emissions	0	No Score
54		RESILIENCE	CR 2.1 Assess climate threat	0	No Score
55			CR 2.2 Avoid traps and vulnerabilities	0	No Score
56			CR 2.3 Prepare for long-term adaptability	0	Superior
57			CR 2.4 Prepare for short-term hazards	17	Conserving
58			CR 2.5 Manage heat islands effects	0	No Score
			CR0.0 Innovate Or Exceed Credit Requirements	0	N/A
CR			21		
Total Points			337		

**MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
CREDIT SPREADSHEET WITH DETAILS**

CATEGORY I, PEOPLE AND LEADERSHIP		
SUB CATEGORY: QUALITY OF LIFE		
	Score	MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
GL1.1 IMPROVE COMMUNITY QUALITY OF LIFE	10	Superior
		<p>Beyond the benefits to traffic flow and logistics in the Metropolitan Region of São Paulo, documentation provided by DERSA clearly evidences that the project team has employed meritorious social efforts by conducting a holistic assessment to align the needs and goals of the surrounding communities with the development of such a large infrastructure project. The final layout of the Northern Section is seen as having lower social and environmental impacts due to participatory planning and public consultations, than would a similar project under comparable technical and economic conditions that would have not undertaken such measures. In addition to the guidelines established by the IDB, DERSA, and the Government of the State of São Paulo to provide due compensation and support the community, assessments such as the Specific Plans for Resettlement and Indemnities (PERIs), Master Plan for Resettlements (PDRIs), environmental impact assessments (EIAs) and (RIMA), and AAEs (Strategic Environmental Assessments), and EIA/Rima, outline steps to address the provisions of adequate housing to those relocated from the direct affected area (DAA). Compensation includes a new housing unit at no cost, with access to basic amenities (water, sewage, electricity, etc.). In terms of sustainable development and social engagement, assessments were conducted and meeting minutes were provided, showing evidence of strong stakeholder participation during the licensing processes; these have emphasized requirements for adverse social impact mitigations and environmental compensations in compliance with existing regulations. Furthermore, socio-economic programs which were described in the documentation sought to support income generation for neighboring communities and facilitate their access to public services such as education, professional training, social assistance, and health care in the three municipalities traversed by the final tracing of the Northern Section.</p>
	Source	<ul style="list-style-type: none"> - Consórcio Cobrape - APPE. Sumário Executivo, (São Paulo:, 2015), 77. - DERSA. Plano Específico De Reassentamento E Indenização Sítio Botuquara, Taipas, Jd. Paraná E Jd. Vista Alegre Município De São Paulo - SP, 2013, 148. - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. (São Paulo:, 2010), 249. (Hereafter cited in text as EIA) - DERSA. Plano Diretor de Reassentamento e Indenização - PDRI Consórcio Cobrape Appe - São Paulo 2011. 17-37. - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 5. São Paulo, 2010. 123-174. - Fundação Escola De Sociologia E Política De São Paulo FESPSP. "AAE - Avaliação Ambiental Estratégica." In Programa Rodoanel Mário Covas, 1-60. Vol. 5. São Paulo:, 2014. - DERSA. "Relatório Síntese Do Perfil Dos Estabelecimentos Comerciais E De Serviços Selecionados No Programa De Monitoramento Pelo Risco De Empobrecimento - "Marco Zero"." In Rodoanel Norte. 1-42. 2014. - Covas, Bruno. Deliberação CONSEMA Nº. 22/2011. Governo Do Estado De São Paulo, 2011. CONSEMA. "Ata Da 85ª Reunião Extraordinária Do Plenário Do Conselho Estadual De Meio Ambiente CONSEMA, Realizada No Dia 28 De Junho De 2011". Governo Do Estado De São

	Score	MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
		<p>Paulo - Secretaria Estadual De Meio Ambiente, Conselho Estadual De Meio Ambiente 2011. - DERSA. PDDT Vivo 2000/2020 Relatório Executivo. 100. - IBAMA. Parecer Técnico do IBAMA PAR. 002967/2013. Ministério Do Meio Ambiente, 2013. - Instituto Florestal - Reserva Da Biosfera Do Cinturão Verde Da Cidade De São Paulo. Análise Do Acolhimento Das Recomendações Do Conselho De Gestão Da Reserva Da Biosfera Do Cinturão Verde Da Cidade De São Paulo No Processo De Licenciamento Do Empreendimento Rodoanel - Trecho Norte. 2012. 1-50.</p>
	<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Recommendations</p>	<p>The documentation provided indicates that the project team have captured and reviewed community goals and needs as well as considered pros and cons related to environmental footprint. From this perspective, to advance to a higher level the project should provide clearer documentation containing strong endorsements by communities and stakeholders showing their pride and identity towards actions already implemented. Also, the project should employ efforts to increase the thoroughness in terms of requiring specialized analysis of environmental services provided by the affected biomes going beyond existing regulations. By doing so, it would enable underpinning more holistic socio-environmental compensations and promoting a true restoration of community / natural assets.</p>
<p>QL1.2 STIMULATE SUSTAINABLE GROWTH & DEVELOPMENT</p>	<p>5</p>	<p>Superior</p>
		<p>The Rodoanel Program is considered to be one of the strategic implementing actions for road infrastructure in the state of São Paulo. It has been mainly designed to meet the need of facilitating the traffic flow around the Greater São Paulo area and conceived of as an opportunity to promote intermodality within the state. The Master Plan for Transportation Development (PDDT Vivo 2020) assertively foresees the construction of a rail beltway surrounding the Rodoanel, thus materializing the road opens avenues for sustainable mobility. From the community perspective, the Northern Section has been economically empowering them through the generation of a significant number of direct and indirect jobs during all phases (planning, construction and operation). According to the EIA Vol.6, ~9,600 jobs have been created during the 3 years of implementation. With regards to new settlements developed, training offered to families qualifies people for economic activities, and also to further local and regional development. Most of the planning documents strongly emphasize that when concluded, the Rodoanel program will broadly benefit the MRSP with more connectivity between major highways, and in reducing the travel time of cargo trucks crossing the MRSP. To the same extent, these improvements should attract more businesses and help to promote the decentralization of jobs in the MRSP in order to achieve sustainable growth and development at a metropolitan scale.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
GL1.2 STIMULATE SUSTAINABLE GROWTH & DEVELOPMENT	Source	<ul style="list-style-type: none"> - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 1. São Paulo, SP: 2010. 1-146. - Fundação Escola De Sociologia E Política De São Paulo FESPSP. "AAE - Avaliação Ambiental Estratégica." In Programa Rodoanel Mário Covas, 13. Vol. 2. São Paulo. 2014. - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 6. São Paulo, 2010. 128-145. - Consórcio JGP - PRIME. Relatório de Impacto Ambiental - RIMA. São Paulo, 2010. 1-148. - Consórcio Cobrape Appe. Plano Diretor de Reassentamento e Indenização - PDRI - São Paulo, 2011. 80. - Dersa. PDDT Vivo 2000/2020 Relatório Executivo. 30-100. - DERSA. "Capítulo 6 - Medidas De Apoio à Reabilitação E Reinserção Social E Econômica Dos Afetados; Capítulo 7 - Organização Do Processo De Participação." In NT PERIs - Nota Técnica Sobre Os Aspectos Conceituais, Metodológicos E Técnicos Comuns Aos Planos Específicos De Reassentamento E Indenização - PERIs. 2013. - DERSA. "Capítulo 2." In Relatório De Monitoramento (M1) - Famílias Do Programa De Monitoramento Pelo Risco De Empobrecimento. Desenvolvimento Rodoviário. 49. 2015. - "Portal Do Governo Do Estado De São Paulo." Dersa Entrega Novas Instalações Para Escola De Guarulhos Nesta Quarta. Accessed September 23, 2015. http://www.saopaulo.sp.gov.br/spnoticias/salaimprensa/home/imprensa_lenoticia.php?id=241896. - Consórcio Cobrape Appe. Análise Da Viabilidade Econômica Global. São Paulo, 2011. 1-52. - Consórcio Cobrape Appe. Plano De Monitoramento E Avaliação. São Paulo, 2011. 41- 45. - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 1. São Paulo, 2010. 106-111. - Consórcio Cobrape - APPE. Sumário Executivo. São Paulo, 2015. 49-51. - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 2. São Paulo, 2010. 1-183. - DERSA. Relatório De Monitoramento (M1) - Famílias Do Programa De Monitoramento Pelo Risco De Empobrecimento. São Paulo, 2015. 27-49.
	Recommendations	<p>Documentation provided outlines meritorious actions taken to address community-wide considerations. However, in addition the developers should seek to restore, develop, and repurpose community assets by contributing to improving community capacities, and improving cultural and recreational assets that make nearby neighborhoods more livable. Given that a large part of the population affected by the project is young, focusing on building public educational infrastructure as forms of compensation (e.g. universities, schools such as the one built in Guarulhos, and kindergartens) would help to redevelop and repurpose community assets.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
QL1.3 DEVELOP LOCAL SKILLS AND CAPABILITIES	12	Conserving
		<p>The Northern Section planning demonstrates that thorough assessments on socioeconomic conditions have been conducted in neighboring areas, with the aim to improve community wellbeing. As a result, local workers have had the opportunity to join the project’s labor force during all phases (development, implementation, and potentially in future operations). On a broader spectrum, the project has also bridged local workers to existing public provisions such as continued adult education, health services, professional training, and social assistance (strengthening of family and community ties and increased access to citizenship rights, conflict resolution, tutelary councils, issues related to domestic violence, etc.). Furthermore, DERSA’s Program for Social Compensation and Involuntary Resettlement (PSCRI) outlines detailed actions to enhance the professional capabilities of local workers in order to support them with future employment opportunities, lending microcredits, entrepreneurship, and sustained income generation. Good examples of actions and partnerships established by the developer to advance professional capabilities cover fast job sourcing, e-commerce capacitation, and career development coaching. In addition, DERSA’s contractors were instructed and encouraged to have egresses (former prisoners that have already served their sentences), composing their workforce</p>
	Source	<p>Consórcio Cobrape Appe – São Paulo and Dersa. "Capítulo 6, subcapítulo 6.4 - Quantificação dos benefícios." In Análise Da Viabilidade Econômica Global. 2011. 43-49.</p> <ul style="list-style-type: none"> - Consórcio Cobrape Appe. Plano De Monitoramento E Avaliação. São Paulo, 2011. 7- 45. - DERSA. Matriz De Resultados ANEXO II - BR-L1296. São Paulo. 2-4. - DERSA. PERI "Plano Específico De Reassentamento E Indenização Áreas Cidade Soberana II, Recreio São Jorge, Vila Rica, Jardim São João, Jardim São João II, Vila União, Ponte Alta e Vila Carmela – Município de Garulhos." In Rodoanel Norte. 2013. 1-31 - DERSA - CONSÓRCIO COBRAPE - APPE. "2º Relatório de Implementação dos Planos Específicos de Reassentamento - PERIS." In Rodoanel Norte, 214. Desenvolvimento Rodoviário. 2015. 6-38. - Consórcio Cobrape – APPE. Sumário Executivo. São Paulo, 2015. 12-57. - Consórcio Cobrape – APPE. Plano Diretor de Reassentamento e Indenização – PDRI. São Paulo, Dersa, 2011. 1-43. - DERSA. "Plano Específico De Reassentamento E Indenização Sítio Botuquara, Taipas, Jd. Paraná E Jd. Vista Alegre Município De São Paulo - SP." In Rodoanel Norte. 2013. 2 - 41. - DERSA. "Capítulo 6 - Medidas De Apoio à Reabilitação E Reinserção Social E Econômica Dos Afetados. & Capítulo 7 - Organização Do Processo De Participação." In NT PERIs – Nota Técnica Sobre Os Aspectos Conceituais, Metodológicos E Técnicos Comuns Aos Planos Específicos De Reassentamento E Indenização – PERIs, 137. 2013. - DERSA. "Relatório Síntese Do Perfil Dos Estabelecimentos Comerciais E De Serviços Selecionados No Programa De Monitoramento Pelo Risco De Empobrecimento – “Marco Zero”." In Rodoanel Norte. 42. 2014. - DERSA. "Relatório Síntese Do Perfil Das Famílias Selecionadas No Programa De Monitoramento Pelo Risco De Empobrecimento – “Marco Zero”." In Rodoanel Norte. 3--30. 2014.
Recommendations	<p>Given the low-income conditions of the assisted community, the asserted range of training currently offered is understandable. However, for a restorative transformation that would alleviate poverty and decrease social inequalities, a shift to a wider range of high skilled training is required. For this to happen, retrofitting or creating accessible educational infrastructure (universities, elementary and professional schools) as sorts of compensations would support long-term community sustainability, and local workforce competitiveness.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
QL2.1 ENHANCE PUBLIC HEALTH AND SAFETY	2	Improved
		<p>This credit takes into account the implications of using new materials, technologies or methodologies to reduce risks to workers and overall public health and safety to acceptable levels. Taking attentive care to safeguard public health and safety by meeting regulatory requirements is evidenced in the design documentation of the Northern Section. Thus, most technologies employed were already part of DERSA's expertise. It is important to praise the project's compliance with current laws and technical standards related to occupational health and safety. According to planning documents, by avoiding unknown manipulations, the project team is understood to have mitigated a wide range of potential risks. In addition, the developer has provided several training sessions and lectures regarding safety at work to all employees (including contractors). With regards to the safety of neighboring communities, DERSA has established channels of communications that would make the population aware about any possible inconvenience related to construction works (such as detonations, needs for traffic diversion and work opportunities as well). DERSA's policies, such as NR-33 and NR-15 underpin that no task force should operate close to the limit of any technical capacity. Further still, project managers have up-graded safety norms in tunnels beyond regulations and engaged with local authorities to improve safety systems and procedures against fire in tunnels, including commissioning, simulations and monitoring in this regard.</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP - PRIME. Relatório De Comentários Aos Questionamentos E às Sugestões Recebidas Durante as Audiências Públicas Do EIA/RIMA Realizadas Pelo CONSEMA. 3-64. 2011. - DERSA. Revisão Estudo De Caso - Setor Público - Projeto Rodoanel Mário Covas - Trecho Norte. Report. DERSA, 2016. 1-5. - Banco InterAmericano De Desenvolvimento. "Informe De Gestão Ambiental e Social Do Programa." In Brasil - Projeto Rodoanel Mário Covas Trecho Norte (BR-L1296). 38- 77. 2011. - Ministério Do Trabalho E Emprego. NR-33 Segurança E Saúde Nos Trabalhos Em Espaços Confinados. 1-9. 2012. - Ministério Do Trabalho E Emprego. NR-15 - Atividades E Operações Insalubres Anexo N.º 6 Trabalho sob Condições Hiperbáricas. 11-54. 1983. - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 7. São Paulo. 61-64. 2010. - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 5. São Paulo, 2010. - Consórcio Coprape Appe. "P1.02 - Programa De Detalhamento Do Projeto De Engenharia Para Atender as Condicionantes Ambientais; P2.01 Programa De Planejamento Ambiental Contínuo Da Construção; P2.02 - Programa De Adequação Ambiental De Procedimentos Construtivos." In PBA - Projeto Básico Ambiental. Vol. I & II. 2011. - Companhia Ambiental Do Estado De São Paulo. Parecer Técnico Da CETESB N.º. 018/11/IE. CETESB, 2011. 519 - Consórcio Cobrape Appe. PERI- Plano Específico De Reassentamento E Indenização - Taipas/SP (Setores 34, 35, 36 E 37) Município De São Paulo. 2013. - Consórcio Coprape Appe - "P1.04 - Programa de Incorporação de Condições Ambientais nos Editais de Contratação de Obra; P2.03 - Programa de Operacionalização de Sistemas de Gestão Ambiental pelas Construtoras Contratadas; P2.05 - Programa de Segurança do Trabalho e Saúde Ocupacional na Construção." In PBA - Projeto Básico Ambiental. Vol. I & II. São Paulo, 2011.

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
QL2.2 MINIMIZE NOISE AND VIBRATION	Recommendations	Even though the project conducts a comprehensive risks assessment considering design, construction and operation of the highway, the use of new or non-standards technologies, material and methodologies is limited. For a higher level of achievement in this credit, innovation in construction and design taking into account a systematic assessment of the additional risks and security measures implied is necessary.
	8	Conserving
	Source	<p>According to the EIA, 77% of the nearby surrounding areas of the Northern Section incurred noise levels above the limits set by regulations prior to the construction works in 2010. Noise limits are regulated by the national policy NBR 10.151. Nevertheless, although there is still an absence of specific policies that regulate noises from road operations in Brazil, DERSA's project team and its consultants undertook several studies; as a result, noise barriers were constructed in critical points prior to the road's operation. This mitigation has been informed by robust studies on noise and vibration dispersions. In regards to the construction of the Northern Section, DERSA is monitoring noise and vibration of all detonations carried out for the construction of tunnels. Planning documents also outline good examples of noise/vibration mitigations and management due to pre-determined times to execute the blasts, limited time for construction works, and strict compliance to legal and regulatory limits of sound pressure and vibration. From October to December 2014, new noise-monitoring campaigns were executed around the construction sites, and the information gathered supported the completion of solid modeling of data, followed by improvements in the engineering projects.</p> <ul style="list-style-type: none"> - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 4. São Paulo, 2010. 24-29. - Consórcio Cobrape - APPE. Sumário Executivo. São Paulo, 2015. 1- 77. - Banco InterAmericano De Desenvolvimento. "Informe De Gestão Ambiental e Social Do Programa." In Brasil - Projeto Rodoanel Mário Covas Trecho Norte (BR-L1296). 38- 77. 2011. - Desenvolvimento Rodoviário - DERSA. "Apresentação Rodoanel Trecho 12 - Mitigação De Ruídos Para Os Bairros: Santa Inês, Celeste E Residencial Itatinga". - Consórcio JGP - PRIME. "Capítulo 5.0, Subcapítulo 5.3, Item 5.3.1, Subitem 5.3.1.5 - Ruído." In EIA - Estudo De Impacto Ambiental. Vol. 4. 2010. - Consórcio JGP - PRIME, "Capítulo 7.0 - Estudos Para Adequação Do Projeto Visando à Mitigação De Ruído Em Receptores Críticos; & Capítulo 7.0, Item M3.03.01 - Monitoramento De Ruído Durante a Operação." In EIA - Estudo De Impacto Ambiental. Vol. 7.2010. - Consórcio Coprape Appe. "P2.04, Item P2.04.4 - Subprograma de Monitoramento de Ruído nas Frentes de Obra e em Receptores Críticos; P2.04, Item P2.04.5 - Subprograma de Monitoramento de Vibração." In PBA - Projeto Básico Ambiental. Vol. I & II. 2011. - Pisani Studio Di Ingegneria Acustica. Progetto Esecutivo Di Barriere Acustiche Sul Rodoanel Trecho 12 RELAZIONE TECNICA - ILLUSTRATIVA., 2013. 1-50.
	Recommendations	The project team should establish robust monitoring and evaluation (M&E) programs during the road operation. M&E outputs from the operations can inform and support the enforcement of current regulatory standards and promote new public policies devoted to creating quieter communities.

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
QL2.3 MINIMIZE LIGHT POLLUTION	8	Conserving
		<p>The project team conducted an overall assessment of the lightning needs for the project; this is supported by the documentation provided, which outlines comprehensive planning undertaken by Rodoanel’s project managers, to minimize light pollution, and reduce energy consumption. The Northern Section will only have lighting in the areas outlined by the studies as being necessary; this includes at road intersections, weight stations, tunnel connections, substations, and general purposed ground spaces (such as police stations, tolls, etc.). Furthermore, the installed LED lamps that fully direct spotlight downward, prevent the escape of light into the sky. Moreover, this technology results in lower maintenance costs, lower energy consumption, and increased durability of the electrical installations.</p>
	Source	<ul style="list-style-type: none"> - Banco InterAmericano De Desenvolvimento. Informe De Gestão Ambiental e Social Do Programa. In Brasil - “Projeto Rodoanel Mário Covas Trecho Norte (BR-L1296).” 342. 2011. - Dersa. “Relatório Técnico - Estudo Alternativo de Iluminação de Túneis (RT-15.10.000-E09/001).” 2014. 18 - Dersa. Memória de Cálculo - Instalações Elétricas e Iluminação, Pista Externa e Pista Interna (MC-15.11.101-E03/001). 2014. - Dersa. Especificação de Materiais e Equipamentos - Luminária com Tecnologia LED, Túneis 201 e 202 (EM-15.12.000-E03/001). 2014.
Recommendations	<p>In addition to the already taken asserted measures, the project would advance to higher achievement levels by monitoring and evaluating light pollution from other sections that are under operation. Data gathered would shed light on further needs for corrective actions related to avoiding light spillage derived from traffic.</p>	
QL2.4 IMPROVE COMMUNITY MOBILITY AND ACCESS	7	Superior
		<p>Planning documents provided evidence of significant care taken towards local traffic potentially affected by the construction, qualifying the project as Superior in this subcategory. Specific traffic control methods and engineering modeling were employed to analyze each route across direct and indirect domain areas. Moreover, in order to preserve flow of local traffic, the transiting of heavy trucks had was restricted during rush hour, as well as by nearby schools and streets containing traffic lights. The developers were proactive in designing specific mobility plans with alternative routes to the each of the six construction sites along the Northern Section. In addition, there is evidence of the employment of proper signaling, engagement with public transit authorities, adequacy of accessibility through the implementation of provisory pathways, as well as the overall organization of pedestrians and vehicles during the construction period. Booklets regarding possible alternative routes were distributed throughout the neighboring communities. Furthermore, in order to facilitate the transport of workers, vans have been made available for internal transportation within and around construction sites. Cargo and passengers vehicles were circulating within stipulated speed limits in the construction areas, thus complying with the internal safety regulations of DERSA’s Work Traffic Control Plan.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
GL2.5 ENCOURAGE ALTERNATIVE MODES OF TRANSPORTATION	Source	<ul style="list-style-type: none"> - Consórcio Mendes Isolux. “Plano De Mobilidade Urbana - Trecho Norte - Lote 01”. 2014. 1-33. - Construtora OAS. “Plano De Mobilidade Urbana Revisão 2 - Trecho Norte - Lote 02”. 2014. 3- 59. - Construtora OAS. “Plano De Mobilidade Urbana Revisão 2 - Trecho Norte - Lote 03”. 2014. 54. - Acciona Infraestructuras S.A. “Plano De Mobilidade Urbana - Trecho Norte - Lote 04”. 2014. 145. - Consórcio Construcap - Copasa S.A. “Plano De Mobilidade Urbana - Trecho Norte - Lote 05”. 2014. 46. - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 5. São Paulo, 2010. 249. - Consórcio Cobrape - APPE. Sumário Executivo. São Paulo, 2015. 20-57. - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 6. São Paulo, 2010. 80-128 . - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 4. São Paulo, 2010. 81-175. - Consórcio JGP - PRIME. Relatório De Comentários Aos Questionamentos E às Sugestões Recebidas Durante as Audiências Públicas Do EIA/RIMA Realizadas Pelo CONSEMA. 2011. 2-94. - Desenvolvimento Rodoviário - DERSA. CE EG/DIOBA 2 024/2013 - Termo De Permissão De Ocupação De Vias - TPOV. 2013. 11.
	Recommendations	<p>Reporting the outputs generated from monitoring traffic in neighboring areas with special attention to the indirectly affected areas Mairporã, Franco da Rocha and Caieiras would advance the project to higher levels of achievement, since these neighborhoods are potentially at risk for witnessing an increase in traffic jams on their local roads. In addition, further actions could be suggested to improve walkability, which are conducive to achieving better standards of community livability. In addition, the project should give broader attention to the adjacent amenities of public transportation hubs that could enhance the worker’s’ daily commutes.</p>
	1	Improved
		<p>Looking beyond the broader benefits that the Northern Section will bring to the Metropolitan Region of São Paulo, to the same extent the surrounding communities are obtaining direct support from the developers in order to improve their walkability, through the implementation of temporary pedestrian pathways. Reports that were provided outline action plans for minimizing interference with pedestrians and automobile traffic flows. Additional support includes permanent monitoring, and the availability of a call center for potential complaints regarding traffic congestion in the surrounding neighborhoods. In addition, construction works have brought the installations of provisory pedestrian pathways, and proper signaling throughout the neighborhoods surrounding the construction sites.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
Source		<ul style="list-style-type: none"> - Consórcio Coprape Appe. "P2.04.6 - Planos de Tráfego Durante as Obras" In PBA - Projeto Básico Ambiental. Vol. I. 2011.1 - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 6. subitem 7.4.3.1 Impactos Potenciais na Infra-Estrutura Viária. São Paulo. 2010. 80. - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 2. São Paulo, 2010. 183. - Consórcio Cobrape - APPE. Sumário Executivo. São Paulo, SP. 2015. 1- 77. - Fundação Escola De Sociologia E Política De São Paulo. "RELATÓRIO DE IMPACTO AMBIENTAL - RIMA." In PROGRAMA RODOANEL MARIO COVAS Trecho Sul Modificado, 107. 2004.
	Recommendations	<p>For a higher level of achievement, project managers should have outlined in the planning documents means to advocate incentivizing the use of non-motorized transportation, and the transition of provisory to permanent pathways in order to support pedestrians' walkability over the long term. Partnerships to provide free bicycles for workers to borrow, and implement bike lanes would promote sustainable mobility, reduce fuel expenses, and curb GHG emissions.</p>
QL2.4 IMPROVE COMMUNITY MOBILITY AND ACCESS	12	Conserving
		<p>The participatory planning of the Northern Section made it possible to implement the project with a minimized social and environmental footprint. Prior to and during the construction process, many assessments (EIAs, AAEs, PBAs, PAE) were conducted with a focus on identifying and managing potential risks involving the community and workers. In addition, each of the six construction sites had their own specific accessibility and safety plan. Positive outcomes described and proven by pictures and reports highlight the project's compliance with local regulations. Moreover, proper licensing and policies enforced in public procurements and biddings have reflected positively on the implementation of specific and comprehensive wayfindings. In this sense, notable safety and security levels were achieved on the site through adopting proper signage, evacuation routes, demarcated areas (space restrictions), and traffic signs in surrounding vicinities. Project managers have also engaged with public authorities developing the Emergency Action Plan in order to assist and mitigate the risks of accidents involving the community and workers during construction phases. Broader benefits of proper signage and land demarcation are extended to protect the local community, natural vegetation, wetlands, and potential archeological sites.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
QL3.1 PRESERVE HISTORIC AND CULTURAL RESOURCES	Source	<ul style="list-style-type: none"> - Consórcio Coprape Appe. "P2.01 Programa De Planejamento Ambiental Contínuo Da Construção; P2.02 - Programa De Adequação Ambiental De Procedimentos Construtivos." In PBA - Projeto Básico Ambiental. Vol. I & II. 2011. - Fundação Escola De Sociologia E Política De São Paulo FESPSP. "Anexo A1 - Relatório Temático: Transportes, Circulação Viária e Logística." In Programa Rodoanel - Avaliação Ambiental Estratégica, 83. 2004. - Vicentini, Vera, Luis Uechi, Nicolás Castelli, Caterina Vecco, Paulo Carvalho, Carlos Lago, José Vasquez, Ernani Pilla, Maria Cunha, and Andrés Consuegra. "Anexo De Análisis Económico." In Proyecto Rodoanel Mário Covas - Tramo Norte 1, 16. Banco InterAmericano De Desenvolvimento. - Consórcio Mendes Isolux. "Plano De Mobilidade Urbana - Trecho Norte - Lote 01". 2014. 1-33. - Construtora OAS. "Plano De Mobilidade Urbana Revisão 2 - Trecho Norte - Lote 02". 2014. 3- 59. - Construtora OAS. "Plano De Mobilidade Urbana Revisão 2 - Trecho Norte - Lote 03". 2014. 54. - Acciona Infraestructuras S.A. "Plano De Mobilidade Urbana - Trecho Norte - Lote 04". 2014. 145. - Consórcio Construcap - Copasa S.A. "Plano De Mobilidade Urbana - Trecho Norte - Lote 05". 2014. 46. - DERSA. PERI "Plano Específico De Reassentamento E Indenização Áreas Cidade Soberana II, Recreio São Jorge, Vila Rica, Jardim São João, Jardim São João II, Vila União, Ponte Alta e Vila Carmela - Município de Garulhos." In Rodoanel Norte, 110. 2013 - DERSA - CONSÓRCIO COBRAPE - APPE. "2º RELATÓRIO DE IMPLEMENTAÇÃO DOS PLANOS ESPECÍFICOS DE REASSENTAMENTO E INDENIZAÇÃO - PERIs." In Rodoanel Norte, 22- 214. 2015.
	Recommendations	<p>In addition to the notable steps taken to improve the safety and organization of its surroundings, the project would advance to a higher level of achievement by investing in the design and installation of traffic signage that could be used after the construction work is finished. This would serve to sustain public safety for a longer duration and leave a positive legacy with respect to local accessibility beyond the construction process.</p>
	13	Conserving
		<p>As described in the planning documents, the Rodoanel program for Archaeological Rescue and Preservation of Archaeological Heritage, History, and Culture outlines goals to identify indigenous remnants and historic resources in the areas directly affected by the construction of works across the Northern Section. Moreover, it seeks to find the occurrence of archaeological remains and curate found parts, as well as preserve the immaterial culture (understood as a set of cultural expressions, traditions and popular manifestations derived from the collective conscious that emanates from the surrounding communities). The EIA Vol. III indicates that archaeological studies have been carried out and archived with the Instituto de Patrimônio Histórico e Artístico Nacional (National Institute of Historical and Artistic Heritage - IPHAN). Prior to initiating the construction of the Northern Section, an initial archaeology assessment, as well as an Archaeological Diagnosis, Impacts and Mitigation Measures Assessment were both conducted. In addition, an inventory of the historical assets, as well as archaeological and cultural interest was compiled for the three municipalities along the Northern Section, which was incorporated into the master plan for the environmental protected reserve (Parque Estadual Serra da Cantareira).</p>

	Score	MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
	Source	<ul style="list-style-type: none"> - Consórcio JGP - PRIME. Estudo De Impacto Ambiental. Vol. 3. São Paulo, 2010. 205. Banco InterAmericano De Desenvolvimento. "Informe De Gestão Ambiental e Social Do Programa." In Brasil - Projeto Rodoanel Mário Covas Trecho Norte (BR-L1296), 342. 2011. - Consórcio Cobrape - APPE. Sumário Executivo. São Paulo, 2015. 77. - IPHAN - Instituto Do Patrimônio Histórico Nacional. Parecer Técnico 292/10 9ª SR/IPHAN/SP. 2010. - Consórcio Coprape Appe. "P2.10 Programa de Prospecção, Resgate Arqueológico e Preservação do Patrimônio Arqueológico, Histórico e - Cultural." In PBA - Projeto Básico Ambiental. Vol. II. São Paulo, 2011. - Origem Arqueologia Pat. Cultural E Natural S/S Ltda. Relatório Final Do Programa De Gestão Estratégica Do Patrimônio Diretamente Afetada Do Rodoanel Mário Covas Trecho Norte - Etapa De Resgate E Monitoramento Arqueológico Da Região Metropolitana De São Paulo (Arujá, Guarulhos E São Paulo). 329. 2014. - Origem Arqueologia Pat. Cultural E Natural S/S Ltda. Relatório Técnico Da Vila Histórica Da Cantareira. 6. 2012. Prefeitura De São Paulo. Ofício Do Conselho Municipal De Preservação Do Patrimônio Histórico Cultural E Ambiental Da Cidade De São Paulo - CONPRESP N° 772/CONPRESP/2012. 2012.
	Recommendations	<p>Aside from the impressive work conducted by the developer to preserve historic and cultural resources, the project could obtain a higher level of achievement by shifting from preservation to the restoration and enhancement of cultural aspects related to Rodoanel's development. Seeking partnerships to curate findings derived from the archeological research that was conducted, and if possible, including these findings into program design; one example would be incorporating the presentation of indigenous artefacts and cultural aspects corresponding to the pre-colonial period of São Paulo into the MRSP public school system.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
QL3.2 PRESERVE VIEWS AND LOCAL CHARACTER	1	Improved
		<p>The project has encompassed participatory planning and stakeholder engagement and, as a result, the final tracing design has had minimal adverse social and ecological impacts. Nevertheless, such a large development would inevitably modify the landscape and local character. In planning documents there were no specific mentions about preserving existing views. However, due to notable mitigation efforts to protect green areas and to enhance the ecological relevance of habitats and natural landscapes, the project has been credited as improving local character. In addition, the Strategic Environmental Evaluation (AAE) Vol.1 outlines clauses requiring the developer and its contractors to restore and preserve landscape features, including penalties for noncompliance as well as enforcing the monitoring and evaluation of executed reparations.</p>
	Source	<ul style="list-style-type: none"> - Fundação Escola De Sociologia E Política De São Paulo FESPSP "AAE-Avaliação Ambiental Estratégica." In Programa Rodoanel Mário Covas, 24. Vol. 1. São Paulo. 12. 2014. - Consórcio Coprape Appe. "P2.04, Item P2.04.4 - Subprograma de Monitoramento de Ruído nas Frentes de Obra e em Receptores Críticos; P2.01 Programa De Planejamento Ambiental Contínuo Da Construção; P2.02 - Programa De Adequação Ambiental De Procedimentos Construtivos." In PBA - Projeto Básico Ambiental. Vol. I & II. São Paulo: Dersa, 2011. - Consórcio PRIME, Ambiente Brasil E JHE "Capítulo 6.2 - Atividades Durante a Construção." In Manual De Supervisão Ambiental, 15, 17. 2015.
Recommendations	<p>The aesthetics of urban and natural landscapes are important aspects related to livability. From this perspective, in order to achieve higher levels, the project should seek to incorporate design features that reflect the importance of its surrounding aesthetic identity and to enhance planning efforts to avoid negative impacts on views.</p>	
QL3.3 ENHANCE PUBLIC SPACE	1	Improved
		<p>Written management documents evidence the efforts of the project team (working with property owners through participatory planning) to minimize and compensate for impacts related to the project's development. Planning documents outline environmental restoration and fixing public amenities damaged by the road development. Measures to enhance public space such as planting trees are also included on planning documentation. Considerations to wildlife protection is notable since refuges have been created, but granting public access to these areas is not a decision that could be made by Dersa. Further still, credit was given to the consideration of efforts to inform the population about current availability of public equipment and to monitor their daily commuting over newly developed settlements. Information embedded on planning documents has also demonstrated the creation of a new public school "Escola Municipal Nazira Abbud Zanardi" in Guarulhos as well a project in its early phase that intends to create a "geopark" also in Guarulhos in order to boost preservation of local geological assets</p>

	<p>Score MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Source</p>	<ul style="list-style-type: none"> - Consórcio Cobrape Appe. Relatório Síntese Do Perfil Das Famílias Seleccionadas No Programa De Monitoramento Pelo Risco De Empobrecimento - "Marco Zero". São Paulo. 22. 2014. - Fundação Escola De Sociologia E Política De São Paulo FESPSP. "AAE- Avaliação Ambiental Estratégica." In Programa Rodoanel Mário Covas. Vol. 2. São Paulo.13. 2014. - Consórcio JGP - PRIME. Relatório de Impacto Ambiental - RIMA. São Paulo. 78. 2010. - Consórcio Cobrape - APPE. Sumário Executivo. São Paulo. 14. 2015. - Dersa. Convênio DERSA nº 181/2011 com Companhia de Desenvolvimento Habitacional e Urbano do Estado de São Paulo - CDHU - Apoio Social e Repasse de Unidades Habitacionais, São Paulo 11. 2011. - Dersa. Plano Diretor De Reassentamento E Indenização - PDRI Preliminar. Consórcio Coprape Appe - São Paulo. 30. 2011. - DERSA. "Capítulo 2 and Capítulo 3." In Relatório De Monitoramento (M1) - Famílias Do Programa De Monitoramento Pelo Risco De Empobrecimento. 11-12. 2015. - DERSA - CONSÓRCIO COBRAPE - APPE. "Anexo A, A.2 - Equipamentos Públicos Do Entorno." In Nota Técnica Sobre Aquisição De Terrenos Para a Construção De Unidades Habitacionais Destinadas Ao Atendimento Social No âmbito Do Projeto Rodoanel Trecho Norte, 45-48. 2013. Desenvolvimento Rodoviário - DERSA. "Capítulo 6 - Medidas De Apoio à Reabilitação E Reinserção Social E Econômica Dos Afetados; Capítulo 7 - Organização Do Processo De Participação." In NT PERIs - Nota Técnica Sobre Os Aspectos Conceituais, Metodológicos E Técnicos Comuns Aos Planos Específicos De Reassentamento E Indenização - PERIs. 2013. - Desenvolvimento Rodoviário - DERSA. Guia Da Região, Conjunto Habitacional Clarice Lispector. 4. - Dersa and Associação Mata Ciliar. Plano De Trabalho - Convênio Entre a Associação Mata Ciliar E a DERSA - Desenvolvimento Rodoviário S.A. Para Atendimento De Felinos Silvestres Resgatados No âmbito Dos Empreendimentos "Nova Contornos" E "Rodoanel Trecho Norte", 6. 2014. - Portal Do Governo Do Estado De São Paulo. "Parceria Entre Governo E ONG Ajudará Na Reabilitação De Animais Silvestres Notícias Portal Do Governo Do Estado De São Paulo." August 25, 2015. Accessed September 28, 2015. http://www.saopaulo.sp.gov.br/spnoticias/lenoticia2.php?id=242180&c=6). - Portal Do Governo Do Estado De São Paulo. "Dersa Entrega Novas Instalações Para Escola De Guarulhos Nesta Quarta." August 4, 2015. Accessed September 28, 2015. - DERSA. Revisão Estudo De Caso - Setor Público - Projeto Rodoanel Mário Covas - Trecho Norte. Report. DERSA, 2016. 10.
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Recommendations</p>	<p>In order to achieve higher levels, the project should enhance access for current and future users and ensure the creation of new new public spaces that is likely to be given through the creation of the new Geopark in Guarulhos. At the same time, the project should provide documents attesting stakeholders' satisfaction to the enhancement of their public spaces.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
GL 4.1- IDENTIFY AND ADDRESS THE NEEDS OF WOMEN AND DIVERSE COMMUNITIES (INDIGENOUS OR AFRO-DESCENDANT PEOPLES)	4	Conserving
		<p>The project team was conscious about sensitive impacts related to the surrounding communities of the Northern Section, and therefore notable efforts were conducted in order to better understand the reality of the community on the ground. DERSA presented evidences of diligent efforts to collect data on the neighboring population and at the same time, inform people about the project. For this to happen, Community Information Centers, a free call center to solve doubts, ombudsmen, and Community Development Committees were made available. This supportive framework has been instrumental in generating a robust socio-economic assessment which outlines information from diverse groups amongst the three municipalities affected by the road layout. Data that was gathered pictured poverty, deprivation, poor or no access to public services, as well as age, ethnic, gender and disability-based discrimination. Outputs from this database shed light on several options for assistance, allowing the implementation of targeted economic and social recovery programs. In terms of social justice, planning documents demonstrate that priority for assistance was given according to assessed vulnerability levels, gender, and disabilities.</p>
	Source	<ul style="list-style-type: none"> - Dersa. "Nota Técnica Sobre Os Aspectos Conceituais, Metodológicos, e Técnicos Comuns Aos Planos De Reassentamento E Indenização - PERIS." In Rodoanel Norte, 137. 2013. - Fundação Escola De Sociologia E Política De São Paulo FESPSP. "AAE - Avaliação Ambiental Estratégica." In Programa Rodoanel Mário Covas, 13. Vol. 2. 2014. - Consórcio JGP - PRIME. Relatório de Impacto Ambiental - RIMA. São Paulo, SP. 2010. 148. - DERSA. "Capítulo 2." In Relatório De Monitoramento (M1) - Famílias Do Programa De Monitoramento Pelo Risco De Empobrecimento. Desenvolvimento Rodoviário. 2015. - Consórcio Coprape Appe. Plano Diretor De Reassentamento E Indenização - PDRI Preliminar. 2011. 103 - Consórcio Cobrape Appe. Relatório Síntese Do Perfil Das Famílias Seleccionadas No Programa De Monitoramento Pelo Risco De Empobrecimento - "Marco Zero". - São Paulo. 13. 2014. - Consórcio Cobrape - APPE. "P2.01.1 Subprograma de Mobilização e Desmobilização de Mão-de-Obra". In Sumário Executivo. 30. 2015.
Recommendations	<p>Beyond gender-sensitive assessments and programs promoted by several developer's partners, the project could reach higher levels of achievement for this credit by expanding consideration about the social data. Quality data, when combined with other sustainable development tools can have a restorative effect towards the resilience of disfranchised communities and individuals. The Rodoanel Program has the opportunity to curate the data that already exists, and provide public and easy access to it. By doing so, the availability of quality-data can propitiate other stakeholders to formulate actions targeted towards enhancing social and gender equality for that neighboring area.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
QL4.2 - STIMULATE AND PROMOTE WOMEN'S ECONOMIC EMPOWERMENT	3	Superior
		<p>According to Northern Section social assessments, women represent a slight majority of the population around the construction's directly affected area. For this reason, aside from hiring local women (513 working on construction in total, according to the IDB's survey), DERSA and the São Paulo State Government have engaged in offering a wide range of actions on the ground, with focus on enhancing capabilities and leveraging economic empowerment in compliance with policy documents crafted by the IDB, such as OP-710, and DERSA's PDRI and PERI (Program for Specific Relocation and Indemnisation) social programs guidelines. These normative instructions advocate the importance of bolstering economic empowerment for local women. "Breadwinner" women which have been identified by the project through a Community Development Committee are encouraged in and referred for attending eight-hour technical training sessions on pertinent topics which are aimed to support their households (e.g. domestic bakery training). Local women of all ages have benefited from continued education programs (EJA), in addition to orientations and professional coaching which have been provided by careers development centers for new placements in the labor market.</p>
	Source	<ul style="list-style-type: none"> - Desenvolvimento Rodoviário - DERSA. "Plano Específico De Reassentamento E Indenização Áreas Cidade Soberana II, Recreio São Jorge, Vila Rica, Jardim São João, Jardim São João II, Vila União, Ponte Alta e Vila Carmela - Município de Garulhos." In Rodoanel Norte, 110. 2013. - Loundon Blomquist - Auditores Independentes. Contrato de Empréstimo N°2.618/OC - BR Demonstrações Financeiras em 31 de Dezembro de 2014. 2014. 175. - Dersa. PDDT Vivo 2000/2020 Relatório Executivo. 28. - Consórcio Coprape Appe - São Paulo: Dersa. Plano Diretor De Reassentamento E Indenização - PDRI Preliminar. 2011. 103. Desenvolvimento Rodoviário - DERSA. "Capítulo 6 - Medidas De Apoio à Reabilitação E Reinserção Social E Econômica Dos Afetados; Capítulo 7 - Organização Do Processo De Participação." In NT PERIs - Nota Técnica Sobre Os Aspectos Conceituais, Metodológicos E Técnicos Comuns Aos Planos Específicos De Reassentamento E Indenização - PERIs. 2013. - Desenvolvimento Rodoviário - DERSA. "Relatório Síntese Do Perfil Dos Estabelecimentos Comerciais E De Serviços Selecionados No Programa De Monitoramento Pelo Risco De Empobrecimento - "Marco Zero"." In Rodoanel Norte, 42 2014. - Desenvolvimento Rodoviário - DERSA. "Relatório Síntese Do Perfil Das Famílias Selecionadas No Programa De Monitoramento Pelo Risco De Empobrecimento - "Marco Zero"." In Rodoanel Norte. 2014. - Banco InterAmericano de Desenvolvimento. Quadro - Trabalhadores por Gênero nos Contratos do Rodoanel Trecho Norte (Pesquisa BID). - DERSA. "Trabalho - Mulheres Conquistam Espaço Nos Lotes." In Notícias Rodoanel Norte N°. 12 Outubro/2013. Desenvolvimento Rodoviário 2. 2013. - DERSA. "Gestão e Acompanhamento Social"; Anexo 4, Ficha 8 - P2.01.1 Subprograma de Mobilização e Desmobilização de Mão de- Obra; P2.03.1 Subprograma de Capacitação Profissional; P2.09 Programa de Compensação Social e Reassentamento Involuntário. In "Sumário Executivo UCP/BID. 2015.
Recommendations	<p>_____</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
QL4.3 - IMPROVE ACCESS AND MOBILITY OF WOMEN AND DIVERSE COMMUNITIES (INDIGENOUS OR AFRO-DESCENDANT PEOPLES)	2	Enhanced
		<p>The Rodoanel Program, as well the Northern Section in specific has documented a wide range of assessments, social programs, and actions to address the major needs of women and diverse communities. Moreover, the project has been providing safe access to the construction sites, and positively impacting local women’s lives by ensuring community participation in decision-making processes; such as evidenced by the design change on the final layout, and by building capacity through professional trainings. Newly settled women also receive a neighborhood’s guide to enhance their mobility and access to public equipments (schools, hospitals, sports and leisure centers). However, aside from the general actions, no assessment studies or reports have been done to specifically address the effects of the constructed works on access and patterns of mobility for women and diverse communities.</p>
	Source	<ul style="list-style-type: none"> - DERSA. "Capítulo 6 – Medidas De Apoio à Reabilitação E Reinserção Social E Econômica Dos Afetados; Capítulo 7 – Organização Do Processo De Participação." In NT PERIs – Nota Técnica Sobre Os Aspectos Conceituais, Metodológicos E Técnicos Comuns Aos Planos Específicos De Reassentamento E Indenização – PERIs. 2013. - Fundação Escola De Sociologia E Política De São Paulo FESPSP. "Anexo A1 – Relatório Temático: Transportes, Circulação Viária e Logística." In Programa Rodoanel – Avaliação Ambiental Estratégica, 83. São Paulo. 2004. - DERSA. "Gestão e Acompanhamento Social"; Anexo 4, Ficha 8 – P2.01.1 Subprograma de Mobilização e Desmobilização de Mão de- Obra; P2.03 Subprograma de Capacitação Profissional; P2.09 Programa de Compensação Social e Reassentamento Involuntário. In "Sumário Executivo UCP/BID. 2015. - Consórcio Cobrape Appe. "Capítulo 5 – Diretrizes Vinculantes Do PDRI; Capítulo 7, Subcapítulo 7.6, Item "Reassentamento Em Condições Especiais"." In PDRI – Plano Diretor De Reassentamento E Indenização, 30 - 37. 2011. - Consórcio JGP – PRIME. Estudo De Impacto Ambiental. Vol. 2. São Paulo. 2010. 183. - Dersa. PDDT Vivo 2000/2020 Relatório Executivo. 30. - Consórcio JGP – PRIME. Relatório de Impacto Ambiental - RIMA. São Paulo. 2010. 148. - DERSA - CONSÓRCIO COBRAPE - APPE. "Anexo A, A.2 – Equipamentos Públicos Do Entorno." In Nota Técnica Sobre Aquisição De Terrenos Para a Construção De Unidades Habitacionais Destinadas Ao Atendimento Social No mbito Do Projeto Rodoanel Trecho Norte, 45-48. 2013. - DERSA. Guia Da Região, Conjunto Habitacional Clarice Lispector. 4.
Recommendations	<p>Beyond the demonstrated improvements upon the walkability and livability of the surrounding communities, there is room for improvement for the project by focusing its urban compensations to more comprehensively assist mobility patterns and security aspects related to women, diverse groups, Afro-descendants, and people with special needs.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
GLO.0 INNOVATE OR EXCEED CREDIT REQUIREMENTS	8	<p>Driven by the aim of continuously improving the quality of life of families affected by the development of the Northern Section, Dersa has launched a program named as Programa de Apoio Social e Desenvolvimento Comunitário (Social and Community's Development Program). This program encompasses a wide range of actions to enhance community's citizenry and advance with social justice. This program has been providing the population with social services such as support for issuing documents, conflict mediation, lectures, and cultural activities bringing to impoverished communities more social inclusiveness. Since 2013 more than 13,000 people were benefited. These activities have been facilitated through Committees of Community Development (Comitês de Desenvolvimento Comunitários) which are responsible for engaging community leaders to: 1st) boost a thorough identification of social needs, 2nd) articulations with local NGOs and 3rd) integrating and supporting the accuracy of community's demands to be contemplated over resettlement programs. In addition, a partnership between Dersa and the Department of Justice and Defense of Citizenship (Secretaria da Justiça e Defesa da Cidadania) has brought the opportunity for couples living around the Northern Section to legalize their marital status. Besides providing collective wedding ceremonies (3 ceremonies were held since 2014 benefiting 72 couples) Dersa has propitiated to these couples the opportunity of accessing financial credit and obtaining other family assistances. By doing so, Dersa has exceeded the performance required in this credit advancing with social justice among the areas where the Northern Section lies.</p>
	Source	- DERSA. Revisão Estudo De Caso - Setor Público - Projeto Rodoanel Mário Covas - Trecho Norte. Report. DERSA, 2016. 3-6.
		112

SUB CATEGORY: LEADERSHIP

		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
LD1.1 PROVIDE EFFECTIVE LEADERSHIP AND COMMITMENT	Score	9 Superior
		<p>The design and implementation of the Northern Section rests on robust and integrated commitments between several public authorities, community members, and municipal governments. Every organizational commitment includes a wide range of urban socio-environmental programs aimed to improve the overall quality of life in the areas affected by the project. Published documents (EIAs, AAEs, EIA/Rima) made public the proper environmental licensing at all stages of the project. Moreover, managing a complex project of this nature has required the creation of specific mechanisms of management, execution, corrections, and monitoring to ensure sustainable outcomes. A collegiate council formed by representatives from the three municipalities directly affected by the project was created to undertake engagements with the Departments of Transportation, Environmental, Planning, Water Resources, Metropolitan Transportation and Housing. Designers, contracted builders, and supervisors share responsibilities for sustainable goals clustered over three main phases of the project: A) Pre-Constructive Phase, with detailed engineering activities to meet environmental constraints, B) Construction Phase, with policies and guidance developed to the Environmental Management Systems for Builders and Contractors, and C) Operations Phase, which includes running monitoring programs for environment, labor and occupational health, environmental emergency assistance, and commitments for coordination between the municipalities during the road's operation.</p>
	Source	<ul style="list-style-type: none"> -Desenvolvimento Rodoviário - DERSA. CI PR/PR 015/15 Comitê De Sustentabilidade. 2015. Fundação Escola De Sociologia E Política De São Paulo FESPSP. "AAE -Avaliação Ambiental Estratégica." In Programa Rodoanel Mário Covas, 16. Vol. 8. São Paulo, 2014. - Consórcio JGP - PRIME. EIA - Estudo De Impacto Ambiental. Vol. 7. São Paulo, 2010. 281. - Consórcio JGP - PRIME. "Programa De Estruturação Institucional Para Gestão Socioambiental Do Rodoanel Trecho Norte." In PBA - Projeto Básico Ambiental, 11. - Consórcio JGP - PRIME. "Programa De Detalhamento Do Projeto De Engenharia Para Atender as Condicionantes Ambientais." In PBA - Projeto Básico Ambiental, 34. - Consórcio JGP - PRIME."Programa de Adequação Ambiental de Procedimentos Construtivos." In PBA - Projeto Básico Ambiental. Vol.1. 84. - Consórcio JGP - PRIME. "Programa de Operacionalização de Sistemas de Gestão Ambiental pelas Construtoras Contratadas." In PBA - Projeto Básico Ambiental. Vol. 1. 19. - Consórcio PRIME, Ambiente Brasil E JHE, 2015. "MSA - Manual De Supervisão Ambiental - Revisão 3." In Rodoanel Norte, 98. - Consórcio Cobrape Appe. Relatório Institucional. - São Paulo, 2011. 153.
Recommendations	<p>Besides the positive outcome of strengthening institutional frameworks for sustainability in roads development, narrowing down Dersa's sustainability mission statement will enhance its sustainable core and make clear the company's sustainability targets. Incorporating sets of indicators that are able to depict levels of sustainability achievements and needs in every project phase should result in more robust and assertive action to mitigate impacts and to succeed in long lasting sustainability goals.</p>	

	Score	NGETP - NORTHEAST SECTION (NEA)
LDI.2 ESTABLISH A SUSTAINABILITY MANAGEMENT SYSTEM	7	Superior
	Source	<p>Dersa has been making notable efforts to secure a solid sustainability management framework. Embedded in the development of the Northern Section are lessons learned from the construction of other built Rodoanel Sections. There are many administrative documents evidencing the existence of robust guidelines to meet goals related to the scale and sustainability of the project. Management systems such as the System of Environmental Management (SGA) are in place to guide and commit every stakeholder, including contractors and subcontractors. Further still, the policy-guide ‘Manual de Monitoramento e Supervisão Ambiental’ clearly states roles and duties for environmental monitoring and the supervision of works proposed by the EIA. Thus, the manual contains appropriate procedures to ensure the early identification of impacts and/or environmental risks, downscaling norms and responsibilities to all tiers and third-parties involved. Seeking to enhance the management of sustainability requirements and targets, in February 2015 Dersa launched a Sustainability Committee, which involves several levels of hierarchy in the company including senior managers and directors. This Committee has the duty of supporting the development of public policies and actions to maximize the sustainability performance of all procedures executed by Dersa and involved stakeholders.</p> <ul style="list-style-type: none"> - Fundação Escola De Sociologia E Política De São Paulo FESPSP. "AAE -Avaliação Ambiental Estratégica." In Programa Rodoanel Mário Covas, 16. Vol. 8. São Paulo, 2014. - Consórcio JGP - PRIME. "Capítulo 7.0, subcapítulo 7.5 - Proposição de Medidas Preventivas, Mitigadoras ou Compensatórias e Estruturação em Programas Ambientais." In EIA - Estudo De Impacto Ambiental. Vol. 7. 37. 2010. - DERSA. CI PR/PR 015/15 Comitê De Sustentabilidade. 2015. - Fundação Escola De Sociologia E Política De São Paulo FESPSP. "Capítulo 8 - Recomendações para Gestão do Programa Rodoanel". In "AAE -Avaliação Ambiental Estratégica." Programa Rodoanel Mário Covas, 16. Vol. 8. São Paulo, 2014. - Consórcio Coprape Appe. "P1.01 - Programa de Estruturação Institucional para Gestão Socioambiental do Rodoanel Trecho Norte; P1.02 - Programa de Detalhamento do Projeto de Engenharia para Atender as Condicionantes Ambientais; P2.01 - Programa de Planejamento Ambiental Contínuo da Construção; P2.02 - Programa de Adequação Ambiental de Procedimentos Construtivos; P2.03 - Programa de Operacionalização de Sistemas de Gestão Ambiental pelas Construtoras Contratadas; P2.04 - Programa de Supervisão e Monitoramento Ambiental da Construção; In In PBA - Projeto Básico Ambiental. Vol. I. São Paulo, 2011 - Consórcio PRIME, Ambiente Brasil E JHE. "Capítulo 2 - Estrutura de Gestão Ambiental."; Capítulo 5 - Funções e Responsabilidades; In Manual De Supervisão Ambiental. 6 -17. 2015.
	Recommendations	<p>There is room to improve on the completeness of the newly implemented sustainability management system. Further to existing indicators related to non-conformities, time of action, and faults repetitiveness, incorporating more comprehensive indicators to address commitments in every environmental subprogram is recommended. It should also be considered that the system is robust enough to have the ability to handle unexpected events.</p>

		Score	NGETP - NORTHEAST SECTION (NEA)
LD1.3 FOSTER COLLABORATION AND TEAMWORK	4	Enhanced	
			<p>Working separately, performance is suboptimal - confined to individual project components. Working together as an integrated team, performance can be optimized across the entire project. The design and implementation of the Northern Section is very complex and in most cases decision-making processes require the participation of more than one functional area from Dersa as well as all contracted third parties. Thus, multi-level stakeholder engagement is required. To accomplish this, administrative routines such as checklists prior to construction have been employed at all hierarchical levels to secure licenses, environmental approvals and obligations, and proper suppliers' certifications. Also, embedded in each of the six construction segments are specific master plans containing instructions and guidelines to supervise construction work, orientations to follow the manual for environmental management and PBA (Basic Environmental Plan), and non-conformance reporting. Weekly and monthly meeting minutes in addition to public bidding documents are evidence of a systems view, optimizing the overall performance of the project and including all stakeholders involved. Nonetheless, no evidence was provided regarding the explicit incorporation of risk/reward sharing in the contract between the project's owners and contractors - a necessary condition for a higher level of achievement in this credit.</p>
	Source		<ul style="list-style-type: none"> - Supervisora Ambiental JPG. Reunião Semanal De Supervisão Ambiental - Lote 01. 2015. 1-6. - DERSA. Ata Da Reunião Mensal De Supervisão Ambiental - Conselho Para Certificação De Conformidade Ambiental Dos Lotes. 1-4. 2015. - DERSA. 56ª Reunião De Obras Trecho Norte Rodoanel - Lote 1. Desenvolvimento Rodoviário. 1-3. 2015. - Consórcio PRIME, Ambiente Brasil E JHE. "Capítulo 2 - Estrutura de Gestão Ambiental.;" In Manual De Supervisão Ambiental. 6-9. 2015. - Consórcio Coprape Appe. P2.01 - Programa de Planejamento Ambiental Contínuo da Construção; P2.02 - Programa de Adequação Ambiental de Procedimentos Construtivos; P2.04 - Programa de Supervisão e Monitoramento Ambiental da Construção; In In PBA - Projeto Básico Ambiental. Vol. I. - São Paulo, 2011
Recommendations		<p>Beyond the overview of tasks and management procedures, increasing recognition of the importance of working together as a collaborative team and providing comprehensive documents evidencing true collaborative work as well as the incorporation of integrated new technologies and cross-departmental decision-making processes (environmental, financial, logistics, engineering and social areas) is recommended. Effective risk/reward sharing between the project owner and the project team should also be explicitly incorporated into contracts.</p>	

	Score	NGETP - NORTHEAST SECTION (NEA)
LD1.4 PROVIDE FOR STAKEHOLDER INVOLVEMENT	14	Conserving
	Source	<p>The solid identification and characterization of stakeholders is one of the major strengths of the project. Planning documents for the Northern Section made clear the importance of affected communities and outline proactive efforts to establish an active dialogue among neighbouring communities - by identifying key stakeholders, conducting public meetings, and establishing lines of communication, in addition to designating an ombudsman. Also, community centers were made available in the three municipalities in order to inform the community while gathering data. From a managerial perspective, team management and stakeholder follow-up measures are evidenced through meeting minutes, Gantt charts, environmental policies, executive guidelines and working manuals. It is also clear that public authorities, in all levels of government, have been involved in the licensing processes and deferrals showing robust institutional and legal frameworks. Above all, feedback considerations are materialized in the design of the final tracing that has been modified to address stakeholder inputs in order to achieve a minimal footprint.</p>
Source		<ul style="list-style-type: none"> - Dersa. "IGAS - Informe de Gestão Ambiental e Social do Programa - Categoria Ambiental e Social "A" 2011. 133."Relatório Síntese Do Perfil Das Famílias Seleccionadas No Programa De Monitoramento Pelo Risco De Empobrecimento - "Marco Zero." In Rodoanel Norte, 42. 2014. - Covas, Bruno. Deliberação CONSEMA Nº. 22/2011. Governo Do Estado De São Paulo, 2011. - Governo Do Estado De São Paulo - Secretaria Estadual De Meio Ambiente, Conselho Estadual De Meio Ambiente CONSEMA. Ata Da 85ª Reunião Extraordinária Do Plenário Do Conselho Estadual De Meio Ambiente CONSEMA, Realizada No Dia 28 De Junho De 2011. 2011. - Dersa. PDDT Vivo 2000/2020 Relatório Executivo. 40. - Ministério Do Meio Ambiente. Parecer Técnico do IBAMA PAR. 002967/2013. 2013. - Instituto Florestal - Reserva Da Biosfera Do Cinturão Verde Da Cidade De São Paulo. Análise Do Acolhimento Das Recomendações Do Conselho De Gestão Da Reserva Da Biosfera Do Cinturão Verde Da Cidade De São Paulo No Processo De Licenciamento Do Empreendimento Rodoanel - Trecho Norte. 50. 2012. - CETESB - Companhia Ambiental Do Estado De São Paulo. Parecer Técnico Da CETESB Nº. 018/11/IE. 2011. - Consórcio JGP - PRIME. "EIA - Estudo De Impacto Ambiental - Trecho Norte - Capítulo 3." 183. 2010. - Dersa Desenvolvimento Rodoviário S/A. Programa De Reassentamento - Vídeo Institucional (parte 2). Brazil: 2014. Film. https://www.youtube.com/watch?v=KZcdYJXaNGc - Consórcio Coprape Appe. P2.01 - Programa de Planejamento Ambiental Contínuo da Construção; P2.02 - Programa de Adequação Ambiental de Procedimentos Construtivos; P2.03 - Programa de Operacionalização de Sistemas de Gestão Ambiental pelas Construtoras Contratadas; P2.04 - Programa de Supervisão e Monitoramento Ambiental da Construção; In In PBA - Projeto Básico Ambiental. Vol. I. - São Paulo. 2011. - Consórcio PRIME, Ambiente Brasil E JHE. "Capítulo 2 - Estrutura de Gestão Ambiental."; Capítulo 5 - Funções e Responsabilidades; In Manual De Supervisão Ambiental, 15, 17. 2015.

		Score	NGETP - NORTHEAST SECTION (NEA)
		Recommendations	Beyond the project’s achievements, there is room for improvement in demonstrating specific stakeholder’s feedback from already implemented actions (including assisted communities, environmental agencies etc), with regards to new settlements developed and mobility actions undertaken over direct and indirect affected areas. Further, the project would advance towards higher levels of achievement by enhancing local identity. To qualify for exceptional performance the project should keep broadening its design perspective and present evidence of engagement with nontraditional stakeholders.
		1	Improved
LD2.1 PURSUE BY-PRODUCT SYNERGY OPPORTUNITIES			The purpose of the credit is to identify whether discarded materials and resources of nearby operations can be utilized in the project. Planning and procurement documents indicate that, wherever possible, the project sought to use materials from its own construction site, and otherwise materials were sourced from nearby regions. More importantly, procurement documents including minutes, land-tenure documents and photographs evidence that local acquisitions of soil and discards related to earthworks are passing through proper environmental licensing and environmental impact assessments in compliance with local regulations. There were evidences outlined in the documentation regarding to by-product synergy opportunities, such as the use of used tired blankets during blasts of rocky materials, coconut fiber’s blanket used over slopes in order to avoid erosion. Nevertheless there is still room for improvements on identifying materials that could become part of a local network for re-use and engaging the whole supply chain of nearby facility managers to implement industrial ecology practices.
	Source		<ul style="list-style-type: none"> - DERSA. Solicitação De Cadastramento De Área De Apoio Resolução SMA 30/00 Área De Empréstimo - AE Aroldo Fauthz (RT.091.085.00). Consórcio PRIME, Ambiente Brasil E JHE, 2015. 9. - DERSA. Solicitação De Cadastramento De Área De Apoio Resolução SMA 30/00 Área De Empréstimo - AE PROTENDIT RT.091.088.00. Consórcio PRIME, Ambiente Brasil E JHE, 2014. 11. - DERSA. Solicitação De Cadastramento De Área De Apoio Resolução SMA 30/00 Área De Empréstimo - AE RASA (RT.091.091.00). Consórcio PRIME, Ambiente Brasil E JHE, 2015. 17. - - - - - Dersa. PDDT Vivo 2000/2020 Relatório Executivo. 100 -107. - Fundação Escola De Sociologia E Política De São Paulo FESPSP. “Capítulo 8 - Recomendações para Gestão do Programa Rodoanel”. In “AAE -Avaliação Ambiental Estratégica.” Programa Rodoanel Mário Covas, 16. Vol. 8. São Paulo. 2014. - Consórcio JPG Prime. “Objeto De Licenciamento.” In EIA - Estudo De Impacto Ambiental, 1. Vol. 1. 2010. - Consórcio JPG Prime. “Estrutura e Dinâmica Urbana.” In EIA - Estudo De Impacto Ambiental, 1. Vol. 5. 2010. - Dersa. Proposta De Resolução De Diretoria EG/ASCON. Vol. 006. 2013. 4-5. DERSA, and Ineco Ibei. Ata De Reunião Rodoanel Norte Definição Do Projeto Para Acesso Ao Aeroporto Internacional De Guarulhos. 2012. 1. - DERSA. Revisão Estudo De Caso - Setor Público - Projeto Rodoanel Mário Covas - Trecho Norte. Report. DERSA, 2016. 11-12

LD2.2 IMPROVE INFRASTRUCTURE INTEGRATION	Score	MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
	Recommendations	<p>Besides some isolated efforts presented by the project, a more systematic and affirmative program to reuse unwanted by-products or discarded materials and resources from nearby operations is necessary for a higher level of achievements. Moreover, project managers should advocate for synergistic integration of operational systems and by doing so; orienting effective actions towards the development and/or enhancement of public spaces devoted for coexistence, leisure and social/enjoyment. There are also opportunities to address local mobility by restoring roads damaged by the project and leaving a positive legacy on traffic reorganization, improving walkability by implementing permanent sidewalks instead of provisory paths.</p>
	13	Conserving
	Source	<p>The Rodoanel Program is considered a primary extension of a larger mobility plan that seeks intermodality and the facilitation of traffic across the MRSP. In addition, project planning efforts foresee actions for nuisance mitigations, environmental restoration, and the creation of new settlements with total access to public utilities in order to relocate affected communities. Published documents such as AAEs, PERIs, and PDRIs evidence that the completion of the Northern Section will provide improved efficiency and connectivity to the main road networks, port, and airport. Moreover, beyond the project scope for transportation, affected public infrastructure is being restored and refurbished (e.g. reconstruction of a school in Garulhos and electricity transmission lines, restoration of water and sewage pipes). In the context of community assistance, besides the notable benefits for MRSP mobility, planning efforts translated synergies for assessing other infrastructural elements external to the project, and care was taken to maintain or improve physical and nonphysical community assets, such as boosting local skills and capabilities.</p> <ul style="list-style-type: none"> - Dersa. PDDT Vivo 2000/2020 Relatório Executivo. n.d. - Fundação Escola De Sociologia E Política De São Paulo FESPSP. "Capítulo 8 - Recomendações para Gestão do Programa Rodoanel." In "AAE - Avaliação Ambiental Estratégica." Programa Rodoanel Mário Covas, Vol. 8. São Paulo, 2014. - Consórcio JPG Prime. "Objeto De Licenciamento." In EIA - Estudo De Impacto Ambiental, Vol. 1. 2010. - Consórcio JPG Prime. "Estrutura e Dinâmica Urbana." In EIA - Estudo De Impacto Ambiental, Vol. 5. 2010. - Dersa. Proposta De Resolução De Diretoria EG/ASCON. Vol. 6. 2013. - Dersa, and Ineco Ibei. Ata De Reunião Rodoanel Norte Definição Do Projeto Para Acesso Ao Aeroporto Internacional De Guarulhos. 2012.
Recommendations	<p>The project should forecast in its administrative policies and plans the execution of restorative actions for both natural and man-made infrastructure. Moreover, project managers should advocate for the synergistic integration of operational systems and, in doing so, orient effective actions towards the development and/or enhancement of public spaces devoted to coexistence, leisure, and social enjoyment. There are also opportunities to address local mobility by restoring roads indirectly affected by the project and leaving a positive legacy on traffic reorganization, as well as improving walkability by implementing permanent sidewalks instead of provisory paths.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
LD3.1 PLAN FOR LONG-TERM MONITORING & MAINTENANCE	3	Enhanced
	Source	<p>In the case of the Northern Section, long-term monitoring and maintenance involves mainly the operation of the road. Project charters outline working plans to monitor compliance with all obligations binding on the Operating License and the continuous evaluation of environmental performance during operation. In addition, there are requirements for the issuance of periodic inventory to manage environmental liabilities, common and hazardous waste management plans, and overall monitoring plans for: fauna, flora, air quality and noise control, vegetation lining at the main strips, compensatory afforestation off the domain strip, and traffic and urban sprawl. There are also requirements to develop programs regarding labor safety and occupational health, assistance for environmental emergencies during operation, and neighboring community relations during operation. Dersa will have the responsibility of implementing these programs with the support of its own Board of Directions for Operations and Environmental Management. Considering that concessions are the classic mode of highway operation in the state of São Paulo, if the operation of the Northern Section gets privatized in the future, the private concessionaire will be responsible for implementing monitoring programs under supervision of the State Transport Public Authority ARTESP.</p> <ul style="list-style-type: none"> - CETESB - Companhia Ambiental Do Estado De São Paulo. Parecer Técnico Da CETESB Nº 018/11/IE. 2011. - CETESB - Companhia Ambiental Do Estado De São Paulo. Parecer Técnico Da CETESB Nº 060/13/IE. 2013. - Consórcio JGP PRIME. "Capítulo 7.0, Subcapítulo 7.5 - Proposição de Medidas Preventivas, Mitigadoras ou Compensatórias e Estruturação em Programas Ambientais." In EIA - Estudo De Impacto Ambiental, Vol. 7. 2010. - Companhia Ambiental Do Estado De São Paulo. Licença Ambiental Prévia Nº 2009. 2011. - Governo Do Estado De São Paulo, and Banco InterAmericano De Desenvolvimento. Contrato De Empréstimo. 2012. - Consórcio Coprape Appe - São Paulo, and Dersa. "P2.03 - Programa de Operacionalização de Sistemas de Gestão Ambiental pelas Construtoras Contratadas; P2.04 - Programa de Supervisão e Monitoramento Ambiental da Construção." In PBA - Projeto Básico Ambiental, Vol. 1. 2011.
	Recommendations	<p>In addition to the proposals presented in the planning documents, the project would reach higher levels of achievement by improving the completeness of monitoring plans consolidating clear sets of indicators (beyond liabilities) and by presenting evidences of resource sufficiency to implement and conduct all monitoring activities, as well as providing a breakdown of financial capacity to act upon extraordinary requirements for eventual remediations and preventative measures.</p>

		Score	MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
LD3.2 ADDRESS CONFLICTING REGULATIONS & POLICIES	0	No Score	
			The planning dossier (EIA, RIma, AAE, PERIs, PDRI, PBA) provides substantial documents proving that the development and implementation of the Northern Section complies with overall regulations at municipal, state and federal levels. There are minutes, letters, and memorandums attached to current policies and existing regulations. However, there are no evidences of a systematic assessment of the laws, regulations, policies and standards applicable to the project with the aim of identifying potential conflicts that could jeopardize sustainability goals, objectives, and practices.
	Source		- Consórcio JGP PRIME. "Capítulo 6.0 - Marco Legal e Institucional." In EIA - Estudo De Impacto Ambiental, Vol. 6. 2010.
	Recommendations		Beyond activities to comply with existing laws, standards and regulations, higher levels would be achieved by providing evidences of planning efforts towards a more specific and systematic assessment to mitigate unintentional legal or institutional barriers and, by doing so, supporting continuous sustainability improvements.
LD3.3 EXTEND USEFUL LIFE	3	Enhanced	
			The development of the Rodoanel Program relies on long-term benefits to the mobility of the MRSP. In order to encompass such a large planning horizon, a durable, flexible and resilient design is required. Planning documents show extensive studies assessing the capacity of the road over a long-term horizon in comparison to the growth rate of the fleet, economy and population of the MRSP and the broader country. From this perspective, studies and modeling conducted by Dersa show that the Northern Section will face capacity constraints and heavy traffic flow in 2032. In order to secure and extend the effectiveness of its traffic flow, the Northern Section has embedded in its design a large grassy median strip that will enable the creation of additional lanes in the future and, therefore, increase the lifespan of the road. In addition, the adoption of LED systems for lightning give emphasis to the goal of reducing energy consumption during operations. Similarly to the adoption of the robust pavement (SMA - Stony Matrix Asphalt) that was given through based on a LCA (life-cycle analysis) the project could extend its detailed analysis to other components involved in the construction of the Northern section and therefore, decreasing demands for energy, water, raw material requirements etc. In this way, greenhouse gases emissions related to the construction would decrease to the same extent.
	Source		- Consórcio JGP PRIME. "Capítulo 2.0 - Justificativa do Empreendimento" and "Capítulo 7 - Avaliação dos Impactos Resultantes sobre a Infraestrutura Viária, o Tráfego e os Transportes." In EIA - Estudo De Impacto Ambiental, Vol. 1. 2010. - Consórcio Cobrape Appe - São Paulo, and Dersa. "Capítulo 6, Subcapítulo 6.4 - Quantificação dos Benefícios." In Análise Da Viabilidade Econômica Global. 2011. - Dersa. Quadro "VDMs Projetados por Segmento do Rodoanel (V_10b)". n.d. - DERSA. Revisão Estudo De Caso - Setor Público - Projeto Rodoanel Mário Covas - Trecho Norte. Report. DERSA, 2016. 17.

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
	Recommendations	The evidence presented in relation with the pavement-utilized probes that more durability is considered. However for a higher achievement the project should consider an overall flexible and resilient design that is able to adapt to future changes and extreme unforeseen events. In addition, it is highly recommended to include an economic study about potential variables that could affect the planned percentage of investments into maintenance over a longer-term period of operation.
LDO.0 INNOVATE OR EXCEED CREDIT REQUIREMENTS	0	N/A
	54	

CATEGORY II: CLIMATE AND ENVIRONMENT

SUB CATEGORY: RESOURCE ALLOCATION

Score	MÁRIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL	
0	No Score	
RA1.1 REDUCE NET EMBODIED ENERGY		<p>This credit awards projects that reduce the energy consumed during the extraction, processing, manufacturing, and transport of materials and project components. An estimation of the net embodied energy of project materials is required. The design and planning of the Rodoanel Northern Section have shown positive concerns towards sourcing and displacing unwanted materials nearby construction sites and, therefore, planners have estimated at least 10% net energy saving. In addition, seeking to save energy, project managers have sought to optimize the use of existing stone materials and improve logistics by adopting support areas and exceeding material deposits (DMEs) in locations close to the construction work. However, there is no evidence in planning documents that the project has carried out a life-cycle assessment (LCA) including the required energy for the materials utilized in the project's construction, as well as the materials to be used for the ongoing maintenance and operation during the project's life.</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP PRIME. "Capítulo 2.0 - Justificativa do Empreendimento, Capítulo 7 - Avaliação dos Impactos Resultantes sobre a Infraestrutura Viária, o Tráfego e os Transportes." In EIA - Estudo De Impacto Ambiental, Vol. 1. 2010. - DERSA. Solicitação De Cadastramento De Área De Apoio Resolução SMA 30/00 Área De Empréstimo - AE Aroldo Fauthz (RT.091.085.00). Consórcio PRIME, Ambiente Brasil E JHE. 2015. - DERSA. Solicitação De Cadastramento De Área De Apoio Resolução SMA 30/00 Área De Empréstimo - AE PROTENDIT (RT.091.088.00). Consórcio PRIME, Ambiente Brasil E JHE. 2014. - DERSA. Solicitação De Cadastramento De Área De Apoio Resolução SMA 30/00 Área De Empréstimo - AE RASA (RT.091.091.00). Consórcio PRIME, Ambiente Brasil E JHE. 2015. - Dersa. Relatório De Identificação De Áreas Para DMEs (RT.093.012.00), Vol. 1/2. Consórcio PRIME, Ambiente Brasil E JHE. 2012. - Dersa. Informações Complementares 1 - Prioridade 1 - Solicitação De Licença De Instalação. 2012. - Dersa and Cetesb. Pedido De Dispensa De Licença Ambiental Para Britadores Móveis. Vol. CE EG/DIGAM 429/13. 2013.
	Recommendations	<p>It is recommended to conduct a life-cycle assessment (LCA). The LCA should include the energy required for material extraction, transportation, refinement, manufacture and all undertaken processes related to the project. The inclusion of these studies would lead to better practices for future road developments and raise awareness towards reductions in net embodied energy.</p>

		Score	MÁRIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL
RA1.2 SUPPORT SUSTAINABLE PROCUREMENT PRACTICES		3	Enhanced
	Source		<p>The project team seeks suppliers who meet competency and qualification criteria in the three main pillars of sustainability. Additionally, DERSA evaluates suppliers' status regarding economic and financial capacity as well as legal, institutional and fiscal trustworthiness. Regarding social concerns, DERSA's suppliers must present evidence of a positive social reputation, which includes not making use of child labor, providing for safety and occupational health, and guaranteeing workers' social security rights, among others. In terms of environmental standards, all suppliers for the Northern Section must comply with norms and regulations established by Cetesb - the Environmental Company of the State of São Paulo. Therefore, the developer considers that 100% of the acquired materials meet all Brazilian environmental standards. Nonetheless, the project would reach higher levels of achievement by requiring that materials be from suppliers with audited evidence of sustainability excellency according to certifying third-party organizations.</p> <ul style="list-style-type: none"> - Governo Do Estado De São Paulo, and Banco InterAmericano De Desenvolvimento. Contrato De Empréstimo. 2012. - Cetesb - Companhia Ambiental Do Estado De São Paulo. Licença Ambiental De Instalação 2.167. 2013. - Cetesb - Companhia Ambiental Do Estado De São Paulo. Licença Ambiental De Instalação 2.209. 2013. - Consórcio Coprape Appe - São Paulo and Dersa. "P2.03 - Programa de Operacionalização de Sistemas de Gestão Ambiental Pelas Construtoras Contratadas; P2.04 - Programa de Supervisão e Monitoramento Ambiental da Construção." In PBA - Projeto Básico Ambiental, Vol. 1. 2011. - Dersa. "Capítulo 9, Subcapítulo 9.7 - Ensaio Diversos." In Relatório Técnico Mensal De Supervisão Técnica De Obras Nº 28. 2013. - Dersa. "Seção 5 - Termos De Referência." In Solicitação De Proposta SDP LPI 007/2011-CI - Lote 5 - Título Dos Serviços De Consultoria: Prestação De Serviços Técnicos Especializados De Engenharia Para Apoio à Fiscalização, Supervisão E Acompanhamento Das Obras De Construção Do Trecho Norte Do Rodoanel. 2013.
	Recommendations		<p>Beyond a procurement system that complies with Brazilian legal requirements, the project can advance towards higher levels of achievement by increasing its reliance on suppliers embedding third-party certifications and auditable standards. In addition to Cetesb certification, DERSA's buyers and planners should consider purchasing materials certified by ISO, Forest Stewardship Council (FSC), and Energy Star, among other clean industry seals and labels.</p>

Score		MÁRIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL
0	No Score	
RA1.3 USED RECYCLED MATERIALS		<p>This credit evaluates the project’s ability to reduce the use of virgin materials and to avoid sending useful components to landfills by specifying reused materials (including structures) and materials with recycled content. This should be presented in form of percentage. The development of the Northern Section encompasses heavy earthworks. From the perspective of reusing materials, most of the concerns are related to soil and raw stony materials. Planning documents outline that raw materials of low quality for construction are going to be reused as long as they receive adequate treatment. In this way, planners aim to minimize soil replacement volumes and thereby avoid demands for more licensed discards areas with undesirable environmental impacts. Moreover, sharing deposits of excess material is another strategic move to avoid sending useful elements to landfills. Further still, the project has incorporated coconut fiber blankets over slopes to avoid erosion and has been utilizing used tires blankets to buffer debris from blasts of stony materials. However, to fulfill this credit it is necessary to provide an inventory showing percentages of recycled materials used, as well as the location, weight or volume of reused structures, including pavements and complementary facilities. Calculations do not include plants or soils. To that end, beyond earth and stony materials planning documents have not outlined the specific percentage of industrialized recycled components used for the project.</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP PRIME. "Capítulo 2.0 – Procedimentos Executivos." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consórcio Coprape Appe - São Paulo and Dersa. "P2.01 – Programa de Planejamento Ambiental Contínuo da Construção; P2.04, Anexo 08; P2.04.7 – Plano de Gerenciamento de Resíduos Sólidos." In PBA – Projeto Básico Ambiental, Vol. 1. 2011. - Dersa. "Capítulo 9, Subcapítulo 9.7 – Ensaios Diversos." In Relatório Técnico Mensal De Supervisão Técnica De Obras Nº 28. 2013. - Dersa, and Cetesb. Pedido De Dispensa De Licença Ambiental Para Britadores Móveis. Vol. CE EG/DIGAM 429/13. 2013. - Dersa. Informações Complementares 1 – Prioridade 1 – Solicitação De Licença De Instalação. 2012. - DERSA. Revisão Estudo De Caso - Setor Público - Projeto Rodoanel Mário Covas - Trecho Norte. Report. DERSA, 2016 .11-13.
	Recommendations	<p>Planners should consider improving efforts to increase the overall percentage of recycled materials used during the development of the project beyond processing local materials on site. By doing so, the project would achieve higher levels in this credit. It is recommended to elaborate and take inventory of materials by weight and volume to specify the inclusion of those containing recycled content.</p>

Score		MÁRIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL
RA1.4 USE REGIONAL MATERIALS	10	Conserving
		<p>Diligent planning efforts outlining the use of regional materials in the development of the Northern Section are notable. To fulfill this credit, materials should be sourced within the following distances: soils and mulches - 50 miles / 80 km; aggregate - 50 mi / 80 km; concrete - 100 miles / 160 km; plants - 250 miles / 400 km; all other materials - 500 miles / 800 km.</p> <p>Planning documents provide strong evidence of local sourcing for soil and mulches. Furthermore, they include several maps and images from licensed plots for soil extraction and storage within an optimized distance from construction sites (less than 50 miles for most of materials, including soils, mulches, and aggregates). In the same way, inventory lists related to locally sourced materials and segregates (stony material, soil and vegetation) describe satisfactory distances to achieve planning excellence by minimizing materials transportation. In addition, concrete plants were installed surrounding each of the six plots of construction, avoiding the need for extensive transport.</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP PRIME. "Capítulo 2.0 – Justificativa do Empreendimento, Capítulo 7 – Avaliação dos Impactos Resultantes sobre a Infraestrutura Viária, o Tráfego e os Transportes." In EIA - Estudo De Impacto Ambiental, Vol. 1. 2010. - DERSA. Solicitação De Cadastramento De Área De Apoio Resolução SMA 30/00 Área De Empréstimo - AE Aroldo Fauthz (RT.091.085.00). Consórcio PRIME, Ambiente Brasil E JHE. 2015. - DERSA. Solicitação De Cadastramento De Área De Apoio Resolução SMA 30/00 Área De Empréstimo - AE PROTENDIT (RT.091.088.00). Consórcio PRIME, Ambiente Brasil E JHE. 2014. - DERSA. Solicitação De Cadastramento De Área De Apoio Resolução SMA 30/00 Área De Empréstimo - AE RASA (RT.091.091.00). Consórcio PRIME, Ambiente Brasil E JHE. 2015. - Dersa. Relatório De Identificação De Áreas Para DMEs - RT.093.012.00, Vol. 1/2. Consórcio PRIME, Ambiente Brasil E JHE. 2012.
Recommendations	<p>The project accomplished the maximum level of achievement with at least 95% of the materials locally sourced, therefore no further recommendations are provided.</p>	

		Score	MÁRIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL
RA1.5 DIVERT WASTE FROM LANDFILLS		8	Superior
			<p>There is substantial evidence across planning documents of superior plans for waste management. During construction, in order to comply with environmental guidelines established between the project’s stakeholders, DERSA has developed a strategy to dispose of and control excessive materials and proactively exchange exceeding raw materials between lots of construction. Furthermore, to effectively conduct this plan and achieve goals to divert waste from landfills, DERSA established actions for the common allocation, control and common use of raw materials among the Northern Section construction sites. The developer sought to work collectively with the 3 municipalities in order to check local demands for excavation materials (mainly dirt and rock). In addition to diverting 75% of waste from landfills due to reutilization, it also foresees measures to reduce waste generation at the source by adopting specific and appropriate procedures for the classification and management of solid waste. In addition, only companies that are specialized and licensed by environmental agencies are entitled to carry out waste transport to its final destination. Looking into the future, planning documents already establish what should be the appropriate procedures for inventory, classification, segregation, recycling, temporary storage, transportation and disposal of waste generated during the operation phase of the highway.</p>
	Source		<ul style="list-style-type: none"> - Consórcio Coprape Appe – São Paulo and Dersa. “P2.02 – Procedimentos de Desativação e Recuperação”; “P2.04.7 – Plano de Gerenciamento de Resíduos Sólidos.” In “PBA – Projeto Básico Ambiental.” Vol. 1. 2011. - Consórcio JGP PRIME. “Capítulo 2.0 – Procedimentos Executivos.” In EIA - Estudo De Impacto Ambiental.” Vol. 2. 2010. - Dersa. “Capítulo 9, Subcapítulo 9.7 – Ensaios Diversos.” In Relatório Técnico Mensal De Supervisão Técnica De Obras Nº 28”. 2013.
Recommendations			<p>The project’s waste management plan should aim to achieve 100% waste recycling and reuse. To do so, further actions to divert waste from landfills should be considered, such as the integration of recycling and reclamation facilities.</p>

Score		MÁRIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL
RA1.6 REDUCE EXCAVATED MATERIALS TAKEN OFF SITE	6	Conserving
		<p>Planning efforts present meritorious actions to minimize the transportation of soil and stony material beyond construction sites to pre established exceeding materials deposits (DMEs). It is important to highlight that project managers decided that those deposit sites, if located beyond 15 km away, would not be considered as a suitable option for disposing waste and unwanted materials. Furthermore, engineering guidelines advocate for the use of 100% of the material resulting from the earthwork and excavations that offer good mechanical qualities to fulfill flooring base layers. In addition, the project has benefited from the wide availability of good raw materials surrounding the area where the project is situated, thus facilitating local sourcing and substantially decreasing the need for materials transportation.</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP PRIME. "Capítulo 4.0 - Balanço de Materiais." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consórcio Coprape Appe - São Paulo and Dersa. "P1.02 - Programa de Detalhamento do Projeto de Engenharia para Atender as Condicionantes Ambientais. P2.01 - Programa de Planejamento Ambiental Contínuo da Construção." In "PBA - Projeto Básico Ambiental." Vol. I & II. 2011. - Dersa. Distribuição De Volumes. 2015. - Departamento De Estradas De Rodagem - Secretaria Dos Transportes. Especificação Técnica - Escavação E Carga De Material (ET-DE-Q00/002). 1997. - Dersa. Informações Complementares 1 - Prioridade 1 - Solicitação De Licença De Instalação. 2012.
Recommendations	<p>The project achieved the highest level for this credit by beneficially reducing and reusing on site at least 95% of the excavated material.</p>	
RA1.7 PROVIDE FOR DECONSTRUCTION & RECYCLING	1	Improved
		<p>The Rodoanel as a whole has been built to write another chapter in São Paulo's history. Such robust, complex and expensive infrastructure must be strong enough to not be easily dismantled, in this sense the project stayed within the traditional project boundaries of its typology. However, in order to be successfully and optimally constructed, such a colossal endeavor has required a wide range of supportive facilities surrounding construction efforts. More than 75% of components such as hardware, wood, tiles, partitions, doors, windows, cooling systems and basic infrastructure were employed due to easy deconstruction and reuse. Similarly, employed industrial heavy machinery (such as asphalt and concrete plants) after the completion of the Northern Section are going to be reused in other projects. Also noteworthy are the landscape concerns outlined on planning documents which foresee that all sites should be restored to their original condition after deactivation of these support compounds.</p>

Score		MÁRIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL
	Source	<p>- Consórcio Coprape Appe - São Paulo, and Dersa. "P2.02, Anexo 01, M2.02.04 - Procedimento de Desativação e Recuperação." In PBA - Projeto Básico Ambiental, Vol. 1. 14-15. 2011.</p> <p>- DERSA. Revisão Estudo De Caso - Setor Público - Projeto Rodoanel Mário Covas - Trecho Norte. Report. DERSA, 2016. 18-20.</p>
	Recommendations	<p>Project managers should expand the scope of the project to encourage recycling during construction phases and for future operations. In addition, although a highway is a long lasting project, expanding the scope for eventual deconstruction at the end of its useful life would improve the performance of the project.</p>
RA2.1 REDUCE ENERGY CONSUMPTION	12	Superior
		<p>The primary goal of all projects should be to reduce the overall energy consumed as much as possible. In fulfilling this credit, owners should calculate the anticipated operation and maintenance energy consumption of the project on an annual basis to achieve a reduction in operational energy over industry norms. Planning documents show a focus on energy efficiency during all phases of the project. Moreover, climate-minded planners have pushed through design reviews and, as a result, managers have decided to employ lighting only over selected sections, such as tunnels, junctions of highways, and support areas - in other words, lighting only when strictly necessary. For tunnels and support areas (such as emergency and police stations), the project team has assertively opted to implement LED lighting systems. According to the team, with the application of these energy-saving methods, operational energy reductions are estimated to be at least 50% lower than industry norms.</p>
	Source	<p>- Banco InterAmericano De Desenvolvimento. Informe De Gestão Ambiental e Social Do Programa. In Brasil - "Projeto Rodoanel Mário Covas Trecho Norte (BR-L1296)." 2011.</p> <p>- Dersa. "Relatório Técnico - Estudo Alternativo de Iluminação de Túneis (RT-15.10.000-E09/001)." 2014.</p> <p>- Dersa. Memória de Cálculo - Instalações Elétricas e Iluminação, Pista Externa e Pista Interna (MC-15.11.101-E03/001). 2014.</p> <p>- Dersa. Especificação de Materiais e Equipamentos - Luminária com Tecnologia LED, Túneis 201 e 202 (EM-15.12.000-E03/001). 2014.</p>
Recommendations	<p>The team has incorporated energy-efficient equipment and energy saving considerations to the highway's lighting and support areas, but calculations to estimate the project's annual energy consumption and the percentage reduction over industry benchmarks should be documented. This estimation could conduce to the implementation of further actions to achieve greater reductions in energy consumption.</p>	

Score		MÁRIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL
RA2.2 USE RENEWABLE ENERGY	0	No Score
		Beyond decisions about adopting LED lighting systems, no evidences were found in the planning documents prioritizing the use of renewable energy sources to fulfill the project’s energy needs. Although the country publicizes that a substantial percentage of renewable energy is incorporated and distributed throughout its national grid, further information is necessary to evaluate the percentage of renewable energy sources to be utilized for the project’s operational energy needs. Furthermore, when appropriate, renewable energy can be generated on site to help reduce the need for fossil fuels.
	Source	<ul style="list-style-type: none"> - Banco InterAmericano De Desenvolvimento. Informe De Gestão Ambiental e Social Do Programa. In Brasil - “Projeto Rodoanel Mário Covas Trecho Norte (BR-L1296).” 2011. - Dersa. “Relatório Técnico - Estudo Alternativo de Iluminação de Túneis (RT-15.10.000-E09/001).” 2014. - Dersa. Memória de Cálculo - Instalações Elétricas e Iluminação, Pista Externa e Pista Interna (MC-15.11.101-E03/001). 2014. - Dersa. Especificação de Materiais e Equipamentos - Luminária com Tecnologia LED, Túneis 201 e 202 (EM-15.12.000-E03/001). 2014.
Recommendations	Evaluate the feasibility of renewable energy, including non-traditional sources, to effectively increase the portion of operational energy that comes from renewable resources. Concessionaires involved in the operation of the road should present plans to rely on renewable energy resources, such as solar and/or eolic generation, throughout the Northern Section.	
RA 2.3 COMMISSION & MONITOR ENERGY SYSTEMS	0	No Score
		Beyond notable concerns with energy sufficiency that drove a smart design and smart lighting as well, particularly with regard to long-term commitments to secure continuous energy savings, there were no evidences in the documents provided outlining the commissioning and monitoring of energy systems to ensure their efficient functioning and extend their useful life. Planning documents state that concessionaires are in charge of deciding how to supply the required energy for the road’s operation, and therefore the ongoing operation and maintenance of energy systems is under their discretion.

		Score	MÁRIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL
	Source		<ul style="list-style-type: none"> - Banco InterAmericano De Desenvolvimento. Informe De Gestão Ambiental e Social Do Programa. In Brasil - "Projeto Rodoanel Mário Covas Trecho Norte (BR-L1296)." 2011. - Dersa. "Relatório Técnico - Estudo Alternativo de Iluminação de Túneis (RT-15.10.000-E09/001)." 2014. - Dersa. Memória de Cálculo - Instalações Elétricas e Iluminação, Pista Externa e Pista Interna (MC-15.11.101-E03/001). 2014.
	Recommendations		<p>In order to secure long-term energy efficiency and sustainability, planners should establish requirements in advance for future owners to follow predetermined comprehensive guidelines on the commission and monitoring of energy systems. Additionally, installing advanced monitoring equipment will better allow operators to identify any efficiency losses.</p>
RA3.1 PROTECT FRESH WATER AVAILABILITY		2	Improved
			<p>Planning efforts considered the need for identifying and preventing negative impacts on water bodies and streams cut by the tracing of the Northern Section. These efforts were divided in two work fronts: assessing surface and underground water among direct and indirect affected areas. Therefore, programs to monitor watersheds and underground water were designed along with the development of specific mitigations efforts. In compliance with local regulations, DERSA has engaged with local water and sanitation authorities and with state environmental agencies (CETESB and SABESP) to avoid negative impacts and cross-check monitoring data. Engagement with these public stakeholders has generated comprehensive water assessments that were properly incorporated into planning efforts. Nonetheless, there are no evidences in planning documents quantifying the amount of fresh water required for the project's construction phases or during operations. Therefore, no planning actions were described as covering strategies for reductions in water consumption, offsetting withdraws or replenishing the amount of fresh water used.</p>
	Source		<ul style="list-style-type: none"> - Consórcio JGP - PRIME. "Capítulo 5.0 - Recursos Hídricos Superficiais." In EIA - Estudo De Impacto Ambiental, Vol. 3. 2010. - Consórcio JGP - PRIME. "Capítulo 5.0 - Hidrografia E Drenagem and Subitem 5.3.1.4 - Usos E Qualidade Da Água." In EIA - Estudo De Impacto Ambiental, Vol. 4. 2010. - Consórcio JGP - PRIME. "Capítulo 5.0 - Recursos Hídricos na ADA." In EIA - Estudo De Impacto Ambiental, Vol. 5. 2010. - Consórcio JGP - PRIME. "Capítulo 7.0 - Impactos Potenciais nos Recursos Hídricos Superficiais." In EIA - Estudo De Impacto Ambiental, Vol. 6. 2010. - Consórcio JGP - PRIME. "Capítulo 7.0 - Subitem 7.4.1.3 Impactos Potenciais nos Recursos Hídricos Subterrâneos." In EIA - Estudo De Impacto Ambiental, Vol. 6. 2010. - Consórcio JGP - PRIME. "Relatório Final - Capítulo 2 Bacia Do Alto Tietê E Sistema Cantareira." In Plano Diretor De Aproveitamento De Recursos Hídricos Para a Macrometrópole Paulista, No Estado De São Paulo, Vol. 1. 2010. - JGP Consultoria E Participações Ltda. "Supervisão Ambiental Lote 1." In Captação E Utilização Da Água. 2013. Agentes De Comunicação. Reuso De Água Da Perfuração Do Túnel 202 Oeste, Na Rampa De Lavagem - Lote 2 OAS. 2015.

Score		MÁRIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL
RA3.2 REDUCE POTABLE WATER CONSUMPTION	Recommendations	In order to advance towards higher levels of achievement, it is recommended to conduct an assessment of the project's water requirements and incorporate design features to minimize the long-term negative net impact on ground and surface water source quality and quantity, including managing runoff to recharge groundwater and surface water supplies.
	0	No score
		<p>Planning documents have evidenced to an extent the care taken towards reusing water meeting regulatory requirements. Moreover, water collection equipment (especially re-utilizing water from drilling tunnels) and small water treatment plants were installed around construction sites. These outlined actions are indeed helping to promote the use of greywater and recycled water while reducing potable water consumption. However, to fulfill this credit at least a 25% potable water consumption reduction should be demonstrated, and no specific evidences regarding percentage reductions in potable water use were noticed in the documentation provided. Therefore, there is room for improvement in adopting innovative construction methods or incorporating water saving strategies into the design.</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP - PRIME. "Capítulo 5.0 - Recursos Hídricos Superficiais." In EIA - Estudo De Impacto Ambiental, Vol. 3. 2010. - Consórcio JGP - PRIME. "Capítulo 5.0 - Hidrografia E Drenagem and Subitem 5.3.1.4 - Usos E Qualidade Da Água." In EIA - Estudo De Impacto Ambiental, Vol. 4. 2010. - JGP Consultoria E Participações Ltda. "Supervisão Ambiental Lote 1." In Captação E Utilização Da Água. 2013. - Agentes De Comunicação. Reuso De Água Da Perfuração Do Túnel 202 Oeste, Na Rampa De Lavagem - Lote 2 OAS. 2015.
Recommendations	The performance of the project would be enhanced by presenting evidence by percentage of effective reductions achieved in potable water use through the adoption of water saving strategies for construction and a more detailed action plan to use, treat, and reuse non-potable water during the road's operation phase.	

Score		MÁRIO COVAS RODOANEL PROGRAM - NORTHERN SECTION BRAZIL
RA 3.3 MONITOR WATER SYSTEMS	0	No score
		This credit evaluates the implementation of programs to monitor water usage and leak detection beyond utility data to improve the operational efficiency of the project. Even though planning efforts have been conducted to monitor changes in morphology and physico-chemical parameters in the surrounding watershed among direct and indirect affected areas, no information was provided in relation to monitoring water consumption during the road's operation phase, such as road cleaning, complementary facilities, or watering green areas.
	Source	<ul style="list-style-type: none"> - Consórcio JGP - PRIME. "Capítulo 5.0 - Recursos Hídricos Superficiais." In EIA - Estudo De Impacto Ambiental, Vol. 3. 2010. - Consórcio JGP - PRIME. "Capítulo 5.0 - Hidrografia E Drenagem and Subitem 5.3.1.4 - Usos E Qualidade Da Água." In EIA - Estudo De Impacto Ambiental, Vol. 4. 2010. - Consórcio JGP - PRIME. "Capítulo 5.0 - Recursos Hídricos na ADA." In EIA - Estudo De Impacto Ambiental, Vol. 5. 2010. - Consórcio JGP - PRIME. "Capítulo 7.0 - Impactos Potenciais nos Recursos Hídricos Superficiais." In EIA - Estudo De Impacto Ambiental, Vol. 6. 2010. - Consórcio JGP - PRIME. "Capítulo 7.0 - Subitem 7.4.1.3 - Impactos Potenciais nos Recursos Hídricos Subterrâneos." In EIA - Estudo De Impacto Ambiental, Vol. 6. 2010. - Consórcio JGP - PRIME. "Relatório Final - Capítulo 2 Bacia Do Alto Tietê E Sistema Cantareira." In Plano Diretor De Aproveitamento De Recursos Hídricos Para a Macrometrópole Paulista, No Estado De São Paulo, Vol. 1. 2010. - JGP Consultoria E Participações Ltda. "Supervisão Ambiental Lote 1." In Captação E Utilização Da Água. 2013. - Agentes De Comunicação. Reuso De Água Da Perfuração Do Túnel 202 Oeste, Na Rampa De Lavagem - Lote 2 OAS. 2015. - Cetesb - Companhia Ambiental Do Estado De São Paulo. Licença De Operação Supermix Concreto S/A. 2012.
Recommendations	Beyond monitoring the water quality of surrounding natural assets during construction work, an initial commissioning of the project's water systems is recommended. Additionally, long-term monitoring should be incorporated to ensure efficiency and to facilitate responsive management in making adjustments to reduce negative impacts and conserve both the quantity and quality of water resources.	
RA 0.0 INNOVATE OR EXCEED CREDIT REQUIREMENTS		N/A

SUB CATEGORY: NATURAL WORLD

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
NW1.1 PRESERVE PRIME HABITAT	18	Restorative
		<p>Planning documents have outlined extensive narratives describing interdisciplinary and multi-stakeholder engagement (including environmental authorities such as CETESB as a third party) to assess and mitigate impacts on prime habitat. The latest up-date of these commitments fourfold on actions for: a) forest restoration b) institutional support for the creation of preservation parks (Private Reserves for Natural Heritages RPPN), and c) watersheds restoration. Since 2012 the project team has been assessing and evaluating lands that are potentially available and suitable for the required efforts of environmental compensation. To date, DERSA has identified 1.888 (ha) of feasible land to implement the compromised compensation of 640 (ha). A partner of Dersa, the Botanical Institute has been guiding the compensation action-plan and suggested that 67% of these 640 (ha) should be designated for tree planting (1.066.440 seedlings), 27% to enrich native plants species, 5% to regenerate delicate species of flora and 1% for topsoil restoration. Although, the suppression of native vegetation has been considered low by the developer, the implementation of effective actions for environmental compensations are still pending. Compensation efforts are forecasted to be outsourced in 2016 for further implementation. It is important to highlight that project managers have also opted for the construction of tunnels and viaducts contributing to minimize vegetation removal. Moreover, prior to any intervention among natural habitats, project managers have diligently obtained proper environmental licensing in addition to conducting a thorough quantitative and qualitative inventory of the vegetation affected. As a result, the developer expects a substantial increase in prime habitat and connectivity between natural biomes.</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP – PRIME. "Capítulo 3.0, Subcapítulo 3.3 Alternativas de Traçado." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Dersa. Envision - Plantios Compensatórios. 2015 - Consórcio PRIME/AMBIENTE BRASIL/JHE. "Quadro 4.15-1: Quantificação Da Compensação Ambiental Oriundo Dos TCRA's." In Relatório Técnico Mensal Atividades Da Gerenciadora Ambiental Nº 38 RM.091.038.00. 2015. - JGP Consultoria E Participações Ltda. "Supervisão Ambiental Lote 1." In Captação E Utilização Da Água. 2013. - Consórcio PRIME/AMBIENTE BRASIL/JHE. Relatório De Informação Técnica ASV Ajuste De Projeto – RT.091.063.00. Vol. 1. 2013. - Governo Do Estado De São Paulo, and Banco InterAmericano De Desenvolvimento. Contrato De Empréstimo. 2012.
Recommendations	<p>Since the project planning documents have outlined robust engagement for preserving prime habitat, no further recommendations are suitable at this time. Nonetheless, efforts should be made to guarantee and enforce the implementation of these restoration plans in the near future.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
NW1.2 PRESERVE WETLANDS AND SURFACE WATER	4	Enhanced
	Source	<p>The Northern Section’s planning documents outline a wide range of measures and environmental safeguards associated with the maintenance of vegetation and soil protection zones around water bodies, complying with environmental regulations and dealing accordingly with the characteristics of each affected area. The project team has conducted impact assessments to identify water bodies and fountains, adjusting the tracing to a buffer of about 100 feet, establishing a protection zone for any water body or fountain, and thus complying with environmental laws. In special cases, in order to maintain connectivity, project managers conducted the channelling of water bodies. In addition, the planning documents outline regular monitoring and evaluation of surface waters/wetlands to assess any direct or indirect impacts on the quality and water availability.</p> <ul style="list-style-type: none"> - Consórcio JGP – PRIME. "Capítulo 3.0, Subcapítulo 3.3 Alternativas de Traçado." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consórcio JGP – PRIME. "Capítulo 6.0, Subcapítulo 6.1, Item 6.1.2. Legislação Florestal." In EIA - Estudo De Impacto Ambiental, Vol. 5. 2010. - Consórcio JGP – PRIME. "Capítulo 7.0, Subcapítulo 7.5, Item 7.5.2. Programas da Fase de Construção - P2." In EIA - Estudo De Impacto Ambiental, Vol. 7. 2010. - Consórcio Coprape Appe – São Paulo, and Dersa. "P2.02, Anexo 01 - Instruções de Controle Ambiental." In PBA Projeto Básico Ambiental, Vol. 1. 2011. - Consórcio Coprape Appe – São Paulo, and Dersa. "P2.02, Anexo 01, M2.02.04 - Procedimento de Desativação e Recuperação; P2.01 Programa De Planejamento Ambiental Contínuo Da Construção." In PBA – Projeto Básico Ambiental, Vol. 1. 2011. - Consórcio Coprape Appe – São Paulo, and Dersa. "Programa de Gerenciamento de Plantios Compensatórios." In PBA – Projeto Básico Ambiental, Vol. 2. 2011. - Consórcio Coprape Appe – São Paulo, and Dersa. "2.13 - Programa de Apoio a Unidades de Conservação." In PBA Projeto Básico Ambiental, Vol. 2. 2011. - Consórcio PRIME/AMBIENTE BRASIL/JHE. "Quadro 4.15-1: Quantificação Da Compensação Ambiental Oriundo Dos TCRA's." In Relatório Técnico Mensal Atividades Da Gerenciadora Ambiental Nº 38 RM.091.038.00. 2015.
	Recommendations	<p>Improving the performance of the project would require diligent action towards vegetation and soil protection beyond the 100-foot buffer required by law. Project managers are encouraged to partner and engage with environmental entities and local NGOs to develop effective programs for aquatic and wetland restoration.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
NW1.3 PRESERVE PRIME FARMLAND	0	No Score
		<p>Farmland supports the economic base of many rural and suburban communities; moreover, agricultural land is vital to achieve local and national food, health, and economic security. According to the diagnosis conducted in Environmental Impact Assessments, there were no notable farmlands in the area affected by the development of the Northern Section. Only small agricultural lands with no risk of subsistence were found, hence these areas do not have any representation in state or national food production. Affected rural properties were assisted individually through the PERIs (Specific Plan for Resettlements and Indemnisations). In addition, the optimized traced and the adoption of tunnels and other infrastructures have diminished substantially the need for rural displacements. However, in order to fulfill this credit the percentage of farmland affected in relation to the total area of the project should be provided. In addition this credit awards designs that not only avoid expropriations of prime farmland but also protect this areas through the creation of vegetation and soil protection zones (VSPZ).</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP – PRIME. "Capítulo 5.0, Subcapítulo 5.3, Item 5.3.3, Subitem 5.3.3.2 – Uso e Ocupação do Solo." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consórcio JGP – PRIME. "Capítulo 5.0, Subcapítulo 5.4, Item 5.4.4 – Uso e Ocupação Antrópica na ADA." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - DERSA. Revisão Estudo De Caso - Setor Público - Projeto Rodoanel Mário Covas - Trecho Norte. Report. DERSA, 2016. 22.
Recommendations	<p>Even though the prime farmland area affected by the project is minimal, meaningful efforts to avoid the development of prime farmland during the site selection process are recommended in order to avoid any impact on the productive capacity of the soil. Additionally, as part of the mitigation programs in the project’s indirect area of influence, the restoration of prime farmland to a productive state can be a significant contribution for communities and future generations.</p>	
NW1.4 AVOID ADVERSE GEOLOGY	3	Superior
		<p>During the planning phase, project managers carried out very detailed geological and hydrogeological studies to assess aquifers and strengths or weaknesses of the land’s geotechnical behavior where the Northern Section sits. As a result, several guidelines to monitor and protect aquifers in the indirect area of the tracing were proposed, thus guiding the implementation of the project. In relation to aquifers, a monitoring system was put in place over a broader area away from the construction site in order to evaluate any further impact related to the implementation of the Northern Section in the underground water of surrounding regions. In addition, geology assessments identified that the main geological threat is related to potential landslides. From this perspective, the design of the Northern Section foresees development mostly in low-lying areas, with some restrictions to hillside sections. To complement the studies conducted prior to excavations and to advance construction work, planning documents outline risk management considerations with a focus on providing specific emergency plans in case of landslides during construction efforts.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
NW1.5 PRESERVE FLOODPLAIN FUNCTIONS	Source	<ul style="list-style-type: none"> - ITSEMAP. Plano De Ação De Emergência Do Rodoanel Trecho Norte. - Consórcio JGP – PRIME. "Capítulo 5.0, Subcapítulo 5.2, Item 5.2.1, Subitem 5.2.1.2 - Geologia, Geomorfologia e Pedologia." In EIA - Estudo De Impacto Ambiental, Vol. 3. 2010. - Consórcio JGP – PRIME. "Capítulo 7.0, Subcapítulo 7.4, Item 7.4.1, 7.4.1.1 - Impactos Potenciais nos Terrenos." In EIA - Estudo De Impacto Ambiental, Vol. 6. 2010. - Consórcio Coprape Appe – São Paulo, and Dersa. "P2.06 – Programa de Atendimento a Emergências Ambientais Durante a Construção." In PBA – Projeto Básico Ambiental, Vol. 2. 2011. - ITSEMAP. PAE – Plano de Ação de Emergência do Rodoanel Trecho Norte. - Acciona. PAE – Plano de Ação de Emergência do Rodoanel Trecho Norte – Lote 6. - Consórcio Coprape Appe – São Paulo, and Dersa. "P2.01 – Programa de Planejamento Ambiental Contínuo da Construção; P2.02 – Programa de Adequação Ambiental de Procedimentos Construtivos; P2.06 – Programa de Atendimento a Emergências Ambientais Durante a Construção." In PBA – Projeto Básico Ambiental, Vol. 1 & 2. 2011. - Consórcio JGP – PRIME. "Capítulo 3.0 – Estudo de alternativas." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consórcio JGP – PRIME. "Capítulo 5.0, Subcapítulo 5.2, Item 5.2.1, Subitem 5.2.1.2 - Geologia, Geomorfologia e Pedologia, Subitem 5.2.1.2.1 Cavidades Naturais na All." In EIA - Estudo De Impacto Ambiental, Vol. 3. 2010.
	Recommendations	<p>Risk management controls should include multiple levels of protection and public education. The project would advance to higher levels of achievement by presenting a geological risk assessment providing guidelines and an action plan for the road's operation.</p>
	5	Enhanced
		<p>The project team has worked to develop infrastructural systems that maintain floodplain functions. The system of galleries implemented is called Obras de Artes Especiais (OAE) and it works as a full surface drainage system ensuring the controlled flow of rainwater to the public storm drainage network and/or to the nearest watercourse. According to the project requirements these structures must include, whenever necessary, channels for water passage and transition, a hydraulic staircase, and other appropriate factors specifically designed for proper water management. In addition, it is outlined in planning documents that any constructive intervention must respect a 100-foot buffer from every identified waterbody in the area of construction. To ensure that floodplains are not disturbed by constructive work, periodic water monitoring must be conducted and its results used to guide corrections and mitigations towards securing floodplain functions. To conclude, it is worth mentioning that the OAE system for drainage foresees the implementation of devices to retain leaks that could happen accidentally during the construction and during the road's operation.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
Source		<ul style="list-style-type: none"> - Consórcio JGP - PRIME. "Capítulo 3.0, Subcapítulo 3.3 - Alternativas de Traçado." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consórcio JGP - PRIME. "Capítulo 7.0, Subcapítulo 7.4, Item 7.4.1, 7.4.1.1 - Impactos Potenciais nos Terrenos." In EIA - Estudo De Impacto Ambiental, Vol. 6. 2010. - Consórcio JGP - PRIME. "Capítulo 7.0, Subcapítulo 7.6, Item 7.6.1, Subitem 7.6.1.1 - Avaliação dos Impactos Resultantes sobre os Terrenos." In EIA - Estudo De Impacto Ambiental, Vol. 7. 2010. - Consórcio Coprape Appe - São Paulo, and Dersa. "P2.01 - Programa de Planejamento Ambiental Contínuo da Construção; P2.02 - Programa de Adequação Ambiental de Procedimentos Construtivos; P2.04 - Programa de Supervisão e Monitoramento Ambiental da Construção." In PBA - Projeto Básico Ambiental, Vol. 1. 2011. - Consórcio JGP - PRIME. "Capítulo 5.0, subcapítulo 5.3, Item 5.3.2, Subitem 5.3.2.3 - Caracterização da Fauna Aquática Associada." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consórcio Coprape Appe - São Paulo, and Dersa. "P2.11 - Programa de Gerenciamento de Plantios Compensatórios; P2.11, Anexo 02 - Instrução Técnica para Implantação da Restauração Florestal e Revegetação Dentro e Fora da Faixa de Domínio, em Áreas de Apoio e em Terceiros Locais." In PBA - Projeto Básico Ambiental, Vol. 2. 2011. - CETESB - Companhia Ambiental Do Estado De São Paulo. Parecer Técnico Da CETESB Nº 060/13/IE. 2013.
	Recommendations	<p>The project maintains floodplain functions however; the extent of these efforts could be extended to enhancement of riparian and aquatic habitat, considering aquatic connectivity and sediment transport. Besides, extreme flood events caused by climate change and the restoration of connectivity to fragmented aquatic and riparian habitats should be considered.</p>
NW1.6 AVOID UNSUITABLE DEVELOPMENT ON STEEP SLOPES	4	Superior
		<p>Based on planning documents, notable attention has been given to avoid developing the Northern Section in areas that would present risks of changing the stability of slopes and increasing susceptibility to erosion and landslides. Moreover, special action plans were developed prior to cut and fill in areas with unfavorable slopes and with unstable soil conditions, mainly in relation to the crossing tunnels. Preventive actions were also implemented towards the stabilization of unstable or eroded slopes not directly affected by sections in cut and fill. In addition, detailed emergency plans were drawn in advance to deal with landslides of major proportions, with the risk of slope destabilization by human occupation, and slippage of large proportions resulting in the siltation of waterways and a loss of vegetation.</p>

Score	MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Source</p>	<ul style="list-style-type: none"> - Consórcio JGP - PRIME. "Capítulo 7.0, Subcapítulo 7.6, Item 7.6.1, Subitem 7.6.1.1 - Avaliação dos Impactos Resultantes sobre os Terrenos." In EIA - Estudo De Impacto Ambiental, Vol. 7. 2010. - Consórcio Coprape Appe - São Paulo, and Dersa. "P1.02 - Programa de Detalhamento do Projeto de Engenharia para Atender as Condicionantes Ambientais; P1.04 - Programa de Incorporação de Condições Ambientais nos Editais de Contratação de Obra; P2.01 - Programa de Planejamento Ambiental Contínuo da Construção; P2.02 - Programa de Adequação Ambiental de Procedimentos Construtivos; P2.04 - Programa de Supervisão e Monitoramento Ambiental da Construção, Anexos 2 e 3." In PBA - Projeto Básico Ambiental, Vol. 1. 2011. - DERSA. "Item 4.10 - Supervisão e Monitoramento Ambiental da Construção, Tabela 4.10 - Manejo de Não Conformidades." In 1º e 2º Relatório Trimestral De Acompanhamento Das Licenças De Instalação Nº 2.167 E 2.209. 2013. - DERSA. "Item 5.10 - Supervisão e Monitoramento Ambiental da Construção, Quadro 5.10 - Quadro das não conformidades anotadas no período." In 1º e 2º Relatório Trimestral De Acompanhamento Das Licenças De Instalação Nº 2.167 E 2.209. 2013. - ITSEMAP. PGR - Programa de Gerenciamento de Risco Rodoanel Trecho Norte. - Acciona. PGR - Programa de Gerenciamento de Risco Rodoanel Trecho Norte - Lote 6. - Consórcio JGP - PRIME. "Capítulo 3.0, Subcapítulo 3.3, Item 3.3.6 5ª ETAPA - Otimização das Alternativas Preferenciais e Seleção Final do Traçado." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consórcio JGP - PRIME. "Capítulo 3.0, Subcapítulo 3.3, Item 3.3.6 5ª ETAPA - Otimização das Alternativas Preferenciais e Seleção Final do Traçado." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consórcio JGP - PRIME. "Capítulo 7.0, Subcapítulo 7.4, Item 7.4.1, Subitem 7.4.1.1 Impactos Potenciais nos Terrenos." In EIA - Estudo De Impacto Ambiental, Vol. 6. 2010. - Consórcio JGP - PRIME. "Capítulo 7.0, Subcapítulo 7.6, Item 7.6.1, Subitem 7.6.1.1 - Avaliação dos Impactos Resultantes sobre os Terrenos." In EIA - Estudo De Impacto Ambiental, Vol. 7. 2010. 	
	<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Recommendations</p>	<p>Beyond preferring areas downslope and undertaking actions to minimize erosion and landslides, the project would advance towards higher levels of achievement by articulating with officials and stakeholders the need to acquire site options that would effectively avoid hillside areas.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
NW1.7 PRESERVE GREENFIELDS	3	Improved
		<p>Choosing to develop the project on previously developed sites, greyfields, rather than on undeveloped land, greenfields, typically has fewer adverse impacts on the environment. The design of the project prioritized the alternative route that crosses the border region between areas of environmental conservation and urban outskirts of the northern part of the Greater São Paulo Metropolitan Region, and this corresponds to a highly heterogeneous area. Considering technical and economic conditions, the project has avoided building on environmental preservation areas, implying the preservation of greenfields. According to planning documents, the sum of greyfields and brownfields totals 27% of the total area of the project. However, higher levels of achievements are scored within this credit when a higher percentage of the project is located on grey and brownfields. According to planning documents, most of the urban areas located at the metropolitan outskirts were outlined as informal settlements of poor infrastructure, which poses a complex challenge on how to optimize the use of developed land with the construction of new infrastructure as well as to minimize the displacement of informal settlers.</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP – PRIME. "Capítulo 5.0, Subcapítulo 5.3, Item 5.3.3, Subitem 5.3.3.2 - Uso e Ocupação do Solo." In EIA - Estudo De Impacto Ambiental, Vol. 5. 2010. - DERSA. "Item 4.0 Subitem 4.1 - Gerenciamento de Áreas Contaminadas." In 2º Relatório Trimestral De Acompanhamento Das Licenças De Instalação Nº 2.167. 2013. - DERSA. "Item 5.0 Subitem 5.1 - Gerenciamento de Áreas Contaminadas." In 2º Relatório Trimestral De Acompanhamento Das Licenças De Instalação Nº 2.167. 2013. - GEOCON Projetos E Consultoria. Avaliação Ambiental Preliminar Rodoanel Mario Covas Trecho Norte Relatório RG 11-020. 2011. - Consórcio CONAM LBR. Contrato Nº. 4363/13 Contrato De Prestação De Serviços Técnicos Especializados Para Gerenciamento De Áreas Contaminadas. 2013. - DERSA. "Item 4.0 Subitem 4.1 - Gerenciamento de Áreas Contaminadas." In 1º e 2º Relatório Trimestral De Acompanhamento Das Licenças De Instalação Nº 2.167 E 2.209. 2013. - DERSA. "Item 5.0 Subitem 5.1 - Gerenciamento de Áreas Contaminadas - Anexo 5.1 - Áreas Contaminadas." In 3º e 10º Relatório Trimestral De Acompanhamento Das Licenças De Instalação Nº 2.167 E 2.209. 2013.
Recommendations	<p>Project managers should have considered increasing the amount of previously occupied land and expanding programs for community resettlements and restoration with the aim of completely avoiding such a fragile environment surrounding the Northern Section.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
NW2.1 MANAGE STORMWATER	4	Enhanced
		<p>Increasing the quantity of impervious surfaces reduces the amount of stormwater that infiltrates the ground, potentializing also the runoff. This credit awards improvements in water storage/infiltration capacity. In the project, planning documents highlight broader environmental concerns around monitoring the quality and quantity of surface waters while construction work was advancing. With regards to the directly affected area, composed mainly of heterogeneous terrain mixing green and brownfields, 70% of the total area had its soil infiltration capacity preserved. For the remaining 30%, which decreased permeability, grey channels were developed to drain the water from paved segments. Further, planning efforts have embedded strategies to avoid erosion by implementing traditional drainage systems throughout the implementation of the Northern Section - including development and deconstruction of support areas (such as offices and other facilities at each construction site), silting barriers for heavy construction work and during environmental restoration efforts. In addition, to contribute to the attenuation of flood peaks downstream the road, there has been noticed on the design features for water retaining reservoirs over of the beltway. Nevertheless, due to the newness of permeable asphaltic technology and green micro-drainage systems, current planning documents have not determined any percentage of increase in terms of water storage capacity nor returned the site's infiltration/evapotranspiration capacity back to pre-development conditions.</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP - PRIME. "Capítulo 5.0, Subcapítulo 5.2, Item 5.2.1, Subitem 5.2.1.3 - Recursos Hídricos Superficiais." In EIA - Estudo De Impacto Ambiental, Vol. 4. 2010. - Consórcio JGP - PRIME. "Capítulo 5.0, Subcapítulo 5.3, Item 5.3.1, Subitem 5.3.1.4 - Usos e Qualidade da Água." In EIA - Estudo De Impacto Ambiental, Vol. 4. 2010. - Consórcio Coprape Appe, São Paulo and Dersa. "P2.04, Anexo 02 - P2.04.1. Subprograma de Monitoramento da Qualidade das Águas Superficiais." In PBA - Projeto Básico Ambiental, Vol. 1. 2011. - Consórcio Coprape Appe, São Paulo and Dersa. "P2.02, P2.02.1 - Subprograma de Controle de Processos Erosivos e Assoreamento." In PBA - Projeto Básico Ambiental, Vol. 1. 2011. - DERSA. Instrução De Projetos - Elaboração De Projetos De Drenagem Provisória - IP-DE-A00/002. 2009. - DERSA. Nota Técnica - Elaboração De Projetos De Drenagem Provisória - NT-DE-H05/001. 2009. - DERSA. Nota Técnica - Elaboração De Projetos De Drenagem Provisória (Continuação) - NT-DE-H05/002. 2009. - DERSA. Instrução De Projetos - Elaboração De Projetos De Drenagem Provisória - IP-DE-H05/001. 2009. - Dersa. "IGAS - Informe de Gestão Ambiental e Social do Programa, Anexo 9 - Comentários ao documento intitulado COUNTER-RIMA, Mário Covas Ring Road, North Section Program - Environmental Impact Assessment EI/RIMA". 2011. - DERSA. Revisão Estudo De Caso - Setor Público - Projeto Rodoanel Mário Covas - Trecho Norte. Report. DERSA, 2016. 23.

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
NW2.2 REDUCE PESTICIDES AND FERTILIZER IMPACTS	Recommendations	Planners outlined notable efforts to monitor the development of impervious surfaces of the project as well as provisory stormwater drainage and retention. However, in order to improve water storage/infiltration and evapotranspiration capacity to pre-development conditions, planners should integrate low-impact development measures such as rain gardens and bioretention, rooftop gardens, sidewalk storage, vegetated swales, buffers and strips, tree preservation, rain barrels and cisterns, permeable pavers, and impervious surface reduction, among others.
	1	Improved
		This credit intends to award actions to reduce nonpoint source pollution by reducing the quantity, toxicity, bioavailability, and persistence of pesticides and fertilizers. The project has presented evidences of actions to reduce the use of pesticides in compensatory plantations. It should be given by conducting in advance physico-chemical soil analysis and then, adopting green manuring and composting in order to fix nitrogen in the soil for new plants. Only for cases where mechanic mowing/mulching is not possible, planning documents recommend the use of glyphosate - a postemergence herbicide of mid-toxicity with no residual effects. More specifically, it is recommended the application of 3 lt/ha, except in the 100 feet buffer strips (protected area by law) where the control of weedy species cannot be undertaken by mechanical and physical actions such as selective manual mowing and mulching. Further information about operational policies and programs to control and minimize the use of pesticides and fertilizers in addition to the application of runoff control measures to minimize water contamination is still necessary for achieving higher levels achievement in this credit.
	Source	<ul style="list-style-type: none"> - Consórcio Coprape Appe, São Paulo and Dersa. "P2.11, ANEXO 02 - Instrução Técnica para Implantação da Restauração Florestal e Revegetação dentro e fora da Faixa de Domínio, em Áreas de Apoio e em Terceiros Locais," Vol. 2. 2011. - DERSA. Revisão Estudo De Caso - Setor Público - Projeto Rodoanel Mário Covas - Trecho Norte. Report. DERSA, 2016. 23.
	Recommendations	For reforestation tasks, project managers should strengthen operational policies regarding sustainable procurement, thus allowing only the acquisition of seedlings and plants grown without relying on the use of synthetic fertilizers or pesticides. Moreover, to avoid the chemical contamination of groundwater and surface water, the application of runoff control measures is strongly recommended.

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
NW2.3 PREVENT SURFACE AND GROUNDWATER CONTAMINATION	9	Superior
		<p>This credit awards projects that incorporate measures to prevent pollutants from contaminating surface and groundwater and monitor impacts during operations. Water bodies are identified and monitoring systems of surface and groundwater quality and quantity are included in the project. Since 2013, 19 monitoring campaigns have analyzed 38 points of surrounding water bodies, identifying no serious change in the Quality Water Index. For groundwater, there are additional monitoring efforts to assess the dynamics of water bodies, springs and deep wells located in the area of the tunnels. With regards to the engineering design of the road, planning efforts outlined pollutant containment boxes as technical solutions to minimize possible impacts of dangerous product spills on the highway. Nevertheless, according to planning documents, the establishment of further guidelines to prevent water contamination during the road's operation is a responsibility of future owners in conjunction with the water and sewage authority CETESB.</p>
	Source	<ul style="list-style-type: none"> - Dersa. Informações Complementares 1 - Prioridade 1 - Solicitação De Licença De Instalação. 2012. - Dersa. Informações Complementares 2 - Prioridade 1 - Solicitação De Licença De Instalação. 2012. - DERSA. "Item 4 Subitem 4.11 - Monitoramento da Qualidade das águas superficiais P2.04.1." In 1º e 2º Relatório Trimestral De Acompanhamento Das Licenças De Instalação N° 2.167 E 2.209. 2013. - DERSA. "Item 5 Subitem 5.11 - Monitoramento da Qualidade das águas superficiais P2.04.1." In 3º e 10º Relatório Trimestral De Acompanhamento Das Licenças De Instalação N° 2.167 E 2.209. 2013. GEOCON Projetos E Consultoria. Avaliação Ambiental Preliminar Rodoanel Mario Covas Trecho Norte Relatório RG 11-020. 2011. - Consórcio Coprape Appe, São Paulo and Dersa. "P1.02, Anexo 02 - P2.02.1. Subprograma de Gerenciamento de Áreas Contaminadas; P2.04, Anexo 08 - P2.04.7 Plano de Gerenciamento de Resíduos Sólidos - PGRS." In PBA - Projeto Básico Ambiental, Vol. 1. 2011. - Consórcio PRIME/AMBIENTE BRASIL/JHE. Manual De Supervisão Ambiental Do Trecho Norte - Revisão 3. 2015. - DERSA. "Item 4.0 Subitem 4.1 - Gerenciamento de Áreas Contaminadas." In 2º Relatório Trimestral De Acompanhamento Das Licenças De Instalação N° 2.167. 2013. - DERSA. "Item 5.0 Subitem 5.1 - Gerenciamento de Áreas Contaminadas." In 2º Relatório Trimestral De Acompanhamento Das Licenças De Instalação N° 2.167. 2013. - Consórcio CONAM - LBR. Contrato N°. 4363/13 Contrato De Prestação De Serviços Técnicos Especializados Para Gerenciamento De Áreas Contaminadas. 2013.
Recommendations	<p>Project managers should consider shifting the focus from prevention to reduction and elimination of pollutant sources to restore contaminated land and surrounding water bodies. Moreover, project managers should be encouraged to articulate and set in advance with CETESB enforceable land-use plans (for the public auction) in order to prevent future contamination during the road's operation.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
NW3.1 PRESERVE SPECIES BIODIVERSITY	16	Restorative
		<p>In order to protect biodiversity and restore species and habitats, planning documents have outlined mapping efforts containing inventories of vegetation categories, floristic surveys and representative forest formations, allowing compensatory planting in different locations. Moreover, to avoid major disruptions among remaining forest biomes, tunnels are being built to cross slope areas. Also, wildlife underpasses are being developed to maintain connectivity between biomes and species such as rodents, marsupials, lizards and mammals of medium and large sizes. Nevertheless, the use of heavy machinery during construction and the traffic and pollution of vehicles during the highway’s operation may lead to changes in the structure and biodiversity of nearby forests over the long-term. Therefore, in order to protect existing fauna and flora habitats and to compensate their losses, DERSA has developed several administrative programs to rescue fauna and flora during construction, monitor wildlife crossing among natural biomes in the domain area, and supervise compensatory planting and forest restoration. These activities foresee the preservation of biological and genetic heritage. In addition, it is noteworthy that a special program has been developed to support the protection and re-adaptation of howler monkeys (<i>Alouatta clamitans</i>) during and after the development of the Northern Section.</p>
	Source	<ul style="list-style-type: none"> - Consórcio Coprape Appe, São Paulo and Dersa. “P2.11 - Programa de Gerenciamento de Plantios Compensatórios,” Vol. 2. 2011. - Consórcio Coprape Appe, São Paulo and Dersa. “P2.14 - Conservação de Fauna e Flora,” Vol. 2. 2011. - Consórcio Coprape Appe, São Paulo and Dersa. “P2.16 - Monitoramento Florestal e de Fauna em Áreas Adjacentes ao Empreendimento (Parque Estadual da Cantareira e Outros Remanescentes do Entorno),” Vol. 2. 2011. - Consórcio Coprape Appe, São Paulo and Dersa. “P2.17 - Programa de Monitoramento Direcionado para as Populações de Bugios (<i>Alouatta clamitans</i>) na Área da Fazenda Santa Maria,” Vol. 2. 2011. - DERSA. “Item 4, Subitem 4.25 Gerenciamento Da Implantação De Plantios Compensatórios - P2.11.” In 2º Relatório Trimestral De Acompanhamento Das Licenças De Instalação N° 2.167 E 2.209. 2013. - DERSA. “Item 4, Subitem 4.33 Monitoramento Florestal Em Áreas Adjacentes Ao Empreendimento - P2.16.1.” In 2º Relatório Trimestral De Acompanhamento Das Licenças De Instalação N° 2.167 E 2.209. 2013.
Recommendations	<p>Since the project has achieved restorative levels, no further recommendations are suitable at this time.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
NW 3.2 CONTROL INVASIVE SPECIES	9	Conserving
		<p>The project includes the identification and appointment of control measures for exotic and invasive species of fauna and flora in both direct and indirect affected areas. This process occurs at all stages of the project (planning, implementation and operation), and the results are sent periodically to the CETESB environmental agency. More specifically, areas under control are demarcated and isolated with fences to avoid contact with humans or invasive terrestrial fauna. The invasive species that most require control relate to ivy and weedy grasses. In addition, planning documents outline the periodic management of thinning vine weeds, periodic mechanic mowing of select weeds, and in extreme cases application of herbicides accompanied by drainage systems.</p>
	Source	<ul style="list-style-type: none"> - Consórcio Coprape Appe – São Paulo and Dersa. “P2.11 – Programa de Gerenciamento de Plantios Compensatórios.” Vol. 2. 2011. - Consórcio Coprape Appe – São Paulo and Dersa. “P2.14 – Conservação de Fauna e Flora.” Vol. 2. 2011. - Consórcio Coprape Appe – São Paulo and Dersa. “P2.16 – Monitoramento Florestal e de Fauna em Áreas Adjacentes ao Empreendimento (Parque Estadual da Cantareira e Outros Remanescentes do Entorno).” Vol. 2. 2011. - Consórcio Coprape Appe – São Paulo and Dersa. “P2.17 – Programa de Monitoramento Direcionado para as Populações de Bugios (Alouatta clamitans) na Área da Fazenda Santa Maria.” Vol. 2. 2011. - DERSA. “Item 4, Subitem 4.25 – Gerenciamento Da Implantação De Plantios Compensatórios - P2.11.” In 2º Relatório Trimestral De Acompanhamento Das Licenças De Instalação N° 2.167 E 2.209. 2013. - DERSA. “Item 4, Subitem 4.33 Monitoramento Florestal Em Áreas Adjacentes Ao Empreendimento - P2.16.1.” In 2º Relatório Trimestral De Acompanhamento Das Licenças De Instalação N° 2.167 E 2.209. 2013.
Recommendations	<p>The management/maintenance plan needs to control invasive species needs to address strategies for prediction and prevention (both plants and animals) to minimize potential for invasive species to re-appear after initial removal and/or enter the site from nearby areas. Also the inclusion of methods to restore habitats to pre-invasive state are recommended.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
NW3.3 RESTORE DISTURBED SOILS	8	Conserving
	Source	<p>Planning documents outline notable efforts to restore soils disturbed during the construction of the Northern Section in order to secure ecological functions (such as preventing erosion) and to maintain hydrological functions. These are given through revegetation efforts undertaken in 100% of the domain area and through compensatory planting in external areas. In addition, the developer has established several programs to restore soils and sustain its permeability. These programs were designed to ensure the development and adoption of compensatory reforestation, supervise revegetation tasks, and improve vegetation cover, as well as, soil ability during the pre-construction, construction and operation phases. Beyond regulatory requirements, soil monitoring, vegetation maintenance of recovered soil and its gardening (weeding and mowing) are tasks that are going to be continuously carried out by specialized companies hired by the developer.</p> <ul style="list-style-type: none"> - Fundação Escola De Sociologia E Política De São Paulo FESPSP. "M3.02.04 - Manutenção da forração vegetal e revegetação da faixa de domínio." In EIA Estudo de Impacto Ambiental - Programa Rodoanel Mário Covas, Vol. 5. São Paulo, 2004. - Consórcio JGP - PRIME. "Capítulo 7.0, Subcapítulo 7.6, Item 7.6.1, Subitem 7.6.1.1 - Avaliação dos Impactos Resultantes sobre os Terrenos." In EIA - Estudo De Impacto Ambiental, Vol. 7. 2010. - Consórcio Coprape Appe, São Paulo and Dersa. "P2.02 - Programa de Adequação Ambiental de Procedimentos Construtivos." In PBA - Projeto Básico Ambiental, Vol. 1. 2011. - Consórcio JGP - PRIME. "Capítulo 4.0, Subcapítulo 4.2, Item 4.2.5 - Drenagem." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consórcio JGP - PRIME. "Capítulo 3.0, subcapítulo 3.3 Alternativas de Traçado." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consórcio PRIME/AMBIENTE BRASIL/JHE. "Quadro 4.15-1: Quantificação Da Compensação Ambiental Oriundo Dos TCRAs." In Relatório Técnico Mensal Atividades Da Gerenciadora Ambiental Nº. 38 RM.091.038.00. 2015. - JGP Consultoria E Participações Ltda. "Supervisão Ambiental Lote 1." In Captação E Utilização Da Água. 2013. <p>Consórcio PRIME/AMBIENTE BRASIL/JHE. Relatório De Informação Técnica ASV Ajuste De Projeto RT.091.063.00, Vol. 1. 2013.</p>
	Recommendations	<p>Beyond notable efforts to restore soils disturbed by the development of the Northern Section, the project would score high by presenting evidences of soil restoration affected by previous development (brown and grey fields).</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
NW3.4 MAINTAIN WETLAND AND SURFACE WATER FUNCTIONS	15	Conserving
		<p>Planning documents for the final tracing of the Northern Section provided by DERSA outline a wide range of actions towards maintaining aquatic ecosystem functions as well as considerations around wetlands and their riparian areas. The design of the road itself has avoided development over wetlands and waterbodies and, when necessary, the project developed infrastructural features such as channeling galleries and hydraulic staircases to preserve water connectivity. Furthermore, to maintain water quality the development of the Northern Section embeds several methods for erosion prevention, features for provisory stormwater flow, permanent drainage systems, small stations for wastewater treatment and hazardous pollutant retention devices (infrastructural boxes). In addition, project managers and CETESB (São Paulo's state water and sewage company) have diligently monitored and evaluated several water spots in the direct and indirect affected areas. The developer outlined environmental programs to inventory, monitor, preserve and restore aquatic habitats and species heritage. Planning documents highlight that all drainage systems for surface water maintain sediment transport.</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP - PRIME. "Capítulo 4.0, Subcapítulo 4.5 - Principais Procedimentos Executivos." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consórcio JGP - PRIME. "Capítulo 5.0, Subcapítulo 5.3, Item 5.3.1, Subitem 5.3.1.2 - Hidrografia e Drenagem." In EIA - Estudo De Impacto Ambiental, Vol. 4. 2010. - Consórcio Coprape Appe, São Paulo and Dersa. "P1.02 - Programa de Detalhamento do Projeto de Engenharia para Atender as Condicionantes Ambientais; P2.01 - Programa de Planejamento Ambiental Contínuo da Construção". In PBA - Projeto Básico Ambiental, Vol. 1. 2011. - Consórcio Coprape Appe, São Paulo and Dersa. "P1.04 - Programa de Incorporação de Condições Ambientais nos Editais de Contratação de Obra." In PBA - Projeto Básico Ambiental, Vol. 1. 2011.
Recommendations	<p>The project maintenances hydrologic connections, water quality, aquatic habitat and sediment transportation, however, efforts can be expanded to fully restore ecosystem functions by implementing an specific wetland and surface water restoration plan.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
GLO.0 INNOVATE OR EXCEED CREDIT REQUIREMENTS	9	<p>Beyond expectations, planning documents have highlighted the development of a special program to support the continuity and re-adaptation of endemic specie of howler monkeys (<i>Alouatta clamitans</i>) during and until the end of the construction of the Northern Section. A collaboration between Dersa through the Consórcio JPG-PRIME with the Department of Parks & Veterinary Medicine of Wildlife (DEPAVE 3), Government of the State of São Paulo, the Brazilian Environmental Institute (IBAMA) and the Secretariat of Green Areas of São Paulo City has been promoting campaigns for monitoring this species since 2013 in order to better understand their food and reproductive habits, quantity of individuals, communal living area and ability to cope with and adapt to the development of the Northern Section. Fortunately, the resilience of this species to survive in weakening forest fragments is given due to its ability to maintain its community in relatively small areas (between 50-100 ha) and because its food habits are based on the consumption of a large quantity of leaves. Currently these monkeys are living and being monitored across 90 ha. In addition, according to planning documents, underpasses for terrestrial fauna have been included in the design of the Northern Section, thus avoiding roadkill and superior passes over existing roads (Estrada Santa Inês and Estrada da Roseira) in order to compensate for and sustain the connectivity of fauna between affected natural areas.</p>
		<ul style="list-style-type: none"> - Consórcio Coprape Appe. "Volume II, P2.17 - Programa de Monitoramento Direcionado para as Populações de Bugios (<i>Alouatta clamitans</i>) na Área da Fazenda Santa Maria" In PBA - Projeto Básico Ambiental, Vol. 2. 2011. - DERSA. "Anexo: 5.29 Resgate de Fauna - 8ª Campanha de Monitoramento de Fauna do Rodoanel Mário Covas - Trecho Norte)." In 3º e 10º Relatório Trimestral De Acompanhamento Das Licenças De Instalação N° 2.167 E 2.209. 2013.
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SUB CATEGORY: CLIMATE & RISK

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
CRI.1.1 REDUCE GREENHOUSE GAS EMISSIONS	4	Improved
		<p>The development of the Northern Section is likely to decongest traffic and increase average speeds for crossing the metropolitan region of São Paulo (MRSP). Due to this improvement, DERSA has presented an estimated reduction in greenhouse gas (GHG) emissions of about 12.5% relative to the average daily-expected traffic flow in the benefited area of the MRSP from 2014 to 2024. This estimate was obtained through the Brazilian Regional Atmospheric Modeling System (BRAMS), and through the gases dispersion model CAL-Roads View and AERMOD developed by Lakes Environmental Software Inc. Emissions estimates derived from vehicles produced in Brazil that are going to travel on the Northern Section have followed CETESB certification based on the methodology of the Environmental Company. In addition, emission standards are in compliance with regulations set by the World Health Organization (WHO). It is also included on planning documents a detailed GHG emissions inventory developed by The InterAmerican Development Bank, which contains estimates associated to CO2 sources in the project.</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP – PRIME. "Capítulo 7.0, Subcapítulo 7.4, Item 7.4.3, Subitem 7.4.3.1 - Impactos Potenciais na Infraestrutura Viária, no Tráfego e nos Transportes." In EIA - Estudo De Impacto Ambiental, Vol. 6. 2010. - Consórcio Cobrape Appe, São Paulo and Dersa. "Capítulo 6, Subcapítulo 6.4 - Quantificação dos benefícios." In Análise Da Viabilidade Econômica Global. 2011. - Consorcio Cobrape Appe. "Capítulo 2, Subcapítulo 2.1 - Bloco I: Indicadores Relativos à Matriz De Resultados." In Preparação E Detalhamento De Projeto Rodoanel Trecho Norte, Para Obtenção De Financiamento Junto Ao BID. 2012. - Consorcio Cobrape Appe. "Capítulo 3, Subcapítulo 3.1 - Bloco I: Avaliação dos Indicadores Relativos a Matriz de Resultados." In Preparação E Detalhamento De Projeto Rodoanel Trecho Norte, Para Obtenção De Financiamento Junto Ao BID. 2012. - DERSA. Revisão Estudo De Caso - Setor Público - Projeto Rodoanel Mário Covas - Trecho Norte. Report. DERSA, 2016. 24. - Inter-American Development Bank. Emissions Summary - GHG Inventory Tool for IDB Operational Portfolio. DERSA, 2011.
Recommendations	<p>Since local regulations attribute the responsibility of GHG emissions derived from highways to vehicles, the project would have its performance improved by presenting action-plans to reduce emissions from the construction of the Northern Section in relation to industry levels (at least 10%). This would also shed light on options to reduce net embodied energy and enable more effective actions towards neutralizing CO2 beyond regulatory requirement and renewables.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
CRI.2 REDUCE AIR POLLUTANT EMISSIONS	0	No Score
		<p>The reduction of six criteria pollutants is evaluated in this credit: particulate matter (dust), ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead (in addition to noxious odors). To fulfill this credit, documentation to measure these six pollutants and strategies to reduce air pollution are required. This type of project, a highway, encourages the use of vehicles, and therefore air pollutant emissions. During the construction phase, the project complied with local regulations about dust and odors. However, in relation to the operation phase, planning documents do not show evidences of air pollutants reduction according to international standards (e.g. California Ambient Air Quality Standards or Coast Air Quality Management) beyond estimations of pollutant reductions due to the easing of traffic flows across the Metropolitan Region of São Paulo (MRSP) and predictable engine regulations (PROCONVE) to curb emissions. While complex modeling has thoroughly estimated the potential emissions expected from the road's operation from 2014 to 2024 - with numbers based on local standards and the CALINE4 (California Line Source Dispersion Model) - planning documents do not offer measures to directly reduce air pollutant emissions during the road's operation.</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP - PRIME. "Capítulo 7.0, Subcapítulo 7.4, Item 7.4.3, Subitem 7.4.3.1 - Impactos Potenciais na Infraestrutura Viária, no Tráfego e nos Transportes." In EIA - Estudo De Impacto Ambiental, Vol. 6. 2010. - Fundação Escola De Sociologia E Política De São Paulo FESPSP. "Capítulo 5, Item 5.5 - Efeitos sobre a Qualidade do Ar e Clima". In AAE - Avaliação Ambiental Estratégica, Programa Rodoanel Mário Covas, Vol. 8. São Paulo, 2014. - Consórcio JGP - PRIME. "Anexo 11 - Relatório de Avaliação da Qualidade do Ar e Modelagem de Dispersão de Poluentes." In EIA - Estudo De Impacto Ambiental, Vol. 10. 2010. - Consorcio Cobrape Appe. "Capítulo 6, Subcapítulo 6.4 - Quantificação dos Benefícios." In Preparação E Detalhamento De Projeto Rodoanel Trecho Norte, Para Obtenção De Financiamento Junto Ao BID. 2012.
Recommendations	<p>Even though the project considers modeling estimated emissions during the operation phase, no active controls or mitigation measures to counteract air pollution from the increasing flow of motorized transportation are included. Programs to improve air quality and reduce dangerous emissions associated with the traffic impact are recommended.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
CR2.1 ASSESS CLIMATE THREAT	0	No Score
		<p>Higher average temperatures will not only increase water transpiration rates but will likely also change the quantity, intensity, and timing of precipitation. Changes in long-term weather patterns and extreme weather events have important implications for infrastructure and also for the communities that rely on those projects. Consequently, understanding the potential impacts from climate change is critical to ensure designs can be resilient to future uncertain conditions. Although the project team has carried out its own studies and third party assessments on environmental, pluviometric, geotechnical and geological issues in order to improve the enterprise structures and reduce the risks associated with climate events, a specific Climate Impact Assessment delineating threats and potential responses to climate change was not performed. Assessing the impacts of climate change in the context of Rodoanel can evidence risks related to climate distortions and extreme weather events and how it can negatively impact the endeavor and its surroundings.</p>
	Source	<ul style="list-style-type: none"> - Instituto De Pesquisas Tecnológicas - IPT. Relatório Técnico 137 901-205 Levantamento Das Atuais Condições Estruturais Das Unidades Habitacionais Do Rodoanel Trecho Norte. 2014. - Consórcio PRIME/AMBIENTE BRASIL/JHE. "Pluviometria E Bacias Hidrográficas Críticas Para Erosão E Assoreamento." 2014. - Consórcio PRIME/AMBIENTE BRASIL/JHE. "Reunião Técnica de Prevenção da Estação Chuvosa." 2014. - ITSEMAP. PAE - Plano de Ação de Emergência do Rodoanel Trecho Norte. - Acciona. PAE - Plano de Ação de Emergência do Rodoanel Trecho Norte - Lote 6. - Instituto De Pesquisas Tecnológicas - IPT. Relatório Técnico 137 901-205 Levantamento Das Atuais Condições Estruturais Das Unidades Habitacionais Do Rodoanel Trecho Norte. 2014.
Recommendations	<p>In order to ensure a resilient design for the future, the developer should incorporate into planning efforts studies related to potential negative impacts from climate change against the project's infrastructural assets, vulnerability assessments, and adaptation assessments covering the surrounding natural environment and neighboring communities.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
0	No Score	
CR2.2 AVOID TRAPS AND VULNERABILITIES		<p>This credit recognizes projects that take a long-term view of the effects of resource depletion, extreme natural and human caused events, economic changes, or limitations on the ability to adapt in changing context. Beyond emergency action plans related to socio-environmental and geological conditions, planning documents presented no further evidences regarding the degree of risks and potential traps that climate change can pose to the infrastructure and to the surrounding community. A potential lack of understanding about the long-term resilience of the project and its surroundings in the context of climate change can imply huge financial impacts, operational interruptions and risks to the physical integrity of users, employees and communities. From this perspective there is notable room for improvement towards a resilient design that integrates high-level climate risk assessments taking into consideration nature and the community’s vulnerability, and potential traps related to resources, configurations and potential outdated building codes when considering future climate scenarios.</p>
	Source	<ul style="list-style-type: none"> - DAEE Departamento De Água E Esgoto Do Estado De São Paulo. Guia Prático Para Projetos De Pequenas Obras Hidráulicas. 2005. - DER Departamento De Estradas De Rodagem Do Estado De São Paulo. Estudos Hidrológicos. 2005. - Consórcio JGP - PRIME. "Capítulo 5, Subcapítulo 5.2, Item 5.2.1, Subitem 5.2.1.1 - Clima." In EIA - Estudo De Impacto Ambiental, Vol. 3. 2010. - Consórcio JGP - PRIME. "Capítulo 3.0 - Estudo de Alternativas." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consorcio Cobrape Appe. "Capítulo 1, Subcapítulo 1.2 - As Etapas do Programa." In Preparação E Detalhamento De Projeto Rodoanel Trecho Norte, Para Obtenção De Financiamento Junto Ao BID. 2012. - Consorcio Cobrape Appe. "Anexo 4, Capítulo 9 - Contrato de Concessão, itens 9.03 e 9.04." In Preparação E Detalhamento De Projeto Rodoanel Trecho Norte, Para Obtenção De Financiamento Junto Ao BID. 2012. - DAEE Departamento De Água E Esgoto Do Estado De São Paulo. Guia Prático Para Projetos De Pequenas Obras Hidráulicas. 2005.
	Recommendations	<p>Project managers should take a long-term view and plan for the effects of climate change on the region. A comprehensive vulnerability assessment that incorporates a climate risk framework following future climate models predicted for São Paulo and addressing all types of vulnerabilities is highly recommended in order to enhance the climate resilience of the project and its surrounding socio-environmental aspects.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
0	No Score	
CR2.3 PREPARE FOR LONG-TERM ADAPTABILITY		<p>Infrastructure projects that are designed for today’s conditions may not be able to function adequately under altered conditions in the future; therefore, changes in temperature, humidity, precipitation, seasonal hydrology, flooding, sea level rise, and so on should be considered in infrastructure design. Although the project has assessed climate patterns in the region, the sources considered at the Environmental Impact Assessment do not encompass potential distortions in climate scenarios. Therefore, no evidences with regards to preparedness and long-term adaptability for a changing climate were found in current planning documents. From this perspective, although the project has been developed to cope with extreme climate events (such as a 100-year storm event), it has been developed based on conservative climate models that do not encompass the consensus on threats related to global warming. Extreme weather events may occur more often and with greater intensity. For this reason and since the project has been built to last for an unlimited timeframe, there is an urgent need for improvements in planning efforts to incorporate the assessment of climate vulnerability/resilience in order to avoid negative consequences and adapt to changing long-term scenarios.</p>
	Source	<ul style="list-style-type: none"> - Consórcio JGP - PRIME. "Capítulo 5, Subcapítulo 5.2, Item 5.2.1, Subitem 5.2.1.1 - Clima." In EIA - Estudo De Impacto Ambiental, Vol. 3. 2010. - Consórcio JGP - PRIME. "Capítulo 3.0 - Estudo de Alternativas." In EIA - Estudo De Impacto Ambiental, Vol. 2. 2010. - Consorcio Cobrape-Appe. "Capítulo 1, Subcapítulo 1.2 - As Etapas do Programa." In Preparação E Detalhamento De Projeto Rodoanel Trecho Norte, Para Obtenção De Financiamento Junto Ao BID. 2012. - Consorcio Cobrape-Appe. "Anexo 4, Capítulo 9 - Contrato de Concessão, itens 9.03 e 9.04." In Preparação E Detalhamento De Projeto Rodoanel Trecho Norte, Para Obtenção De Financiamento Junto Ao BID. 2012. - DAEE Departamento De Água E Esgoto Do Estado De São Paulo. Guia Prático Para Projetos De Pequenas Obras Hidráulicas. 2005. - Consórcio Coprape Appe. "P2.01 - Programa de Planejamento Ambiental Contínuo da Construção; P1.02 - Programa de Detalhamento do Projeto de Engenharia para Atender as Condicionantes Ambientais; P2.01 - Programa de Planejamento Ambiental Contínuo da Construção; P2.02 - Programa de Adequação Ambiental de Procedimentos Construtivos; P2.03 - Programa de Operacionalização de Sistemas de Gestão Ambiental pelas Construtoras Contratadas; P2.04 - Programa de Supervisão e Monitoramento Ambiental da Construção." In PBA - Projeto Básico Ambiental, Vol. 1. 2011.
	Recommendations	<p>Such a large development that is being designed to last for a long-term horizon must present evidence of adaptability capacity under altered climate conditions. Therefore, in order to avoid major future costs and risks, project managers must perform a thorough vulnerability assessment incorporating future climate scenarios and then move to action by implementing strategies that prepare the project for (and mitigate the negative consequences of) climate change or other significant alterations in environmental and operating conditions, such as landslides and flooding.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
CR2.4 PREPARE FOR SHORT-TERM HAZARDS	17	Conserving
		<p>In addition to long-term climate related hazards, many infrastructure projects are subject to short-term hazards such as earthquakes, flooding, and fires that may or may not be related to climate change and may be conditioned by other risk factors. Planning documents have assessed short-term hazards mainly with regards to landslides and floods. In this way, the project has outlined actions to improve protections by developing micro- and macro-drainage systems that are likely to cope against extreme weather events. In addition, the final trace of the highway preferred to avoid steep slopes. Regarding precipitation and extreme rainfall, the micro and macro-drainage systems were developed to support extreme weather events such as a 100-year storm. Nonetheless, there is room for improvement in planning efforts towards presenting evidence of creating adaptive capacity and actions to limit hazards by restoring natural environments that might reduce risks. In addition, the literature presented on the environmental impact assessment does not encompass predictions for a changing climate. Further, the rehabilitation of natural systems like ravines and wetlands can minimize the risks of natural hazards, such as landslides or flooding, and therefore these restoration efforts can minimize damage to infrastructure and urban settings.</p>
	Source	<ul style="list-style-type: none"> - Consórcio Coprape Appe - São Paulo and Dersa. "P2.02 - Programa de Adequação Ambiental de Procedimentos Construtivos; P2.04 - Programa de Supervisão e Monitoramento Ambiental da Construção; P2.06 - Programa de Atendimento a Emergências Ambientais Durante a Construção." In PBA - Projeto Básico Ambiental, Vol. 1 & 2. 2011. - DAEE Departamento De Água E Esgoto Do Estado De São Paulo. Guia Prático Para Projetos De Pequenas Obras Hidráulicas. 2005. - DER Departamento De Estradas De Rodagem Do Estado De São Paulo. Estudos Hidrológicos. 2005. - ITSEMAP. PAE - Plano de Ação de Emergência do Rodoanel Trecho Norte. - Acciona. PAE - Plano de Ação de Emergência do Rodoanel Trecho Norte - Lote 6. - Instituto De Pesquisas Tecnológicas - IPT. Relatório Técnico 137 901-205 Levantamento Das Atuais Condições Estruturais Das Unidades Habitacionais Do Rodoanel Trecho Norte. 2014.
Recommendations	<p>Project managers should be encouraged to implement a holistic action plan to restore environments to reduce risks beyond environmental regulations. As an example, the project could have incorporated additional tree planting not only to compensate for suppressed vegetation but, at the same time, to control erosion and runoff. Additionally, the creation of green infrastructure has multiple benefits such as neutralizing carbon emissions from construction and road operations.</p>	

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
0	No Score	
CR2.5 MANAGE HEAT ISLAND EFFECTS		<p>Although planning documents outline comprehensive concerns towards avoiding deforestation and developing environmental compensation in relation to high-ecological value areas, no further specific information was provided on solar reflectance index (SRI) criteria or how vegetation contributes to managing heat island effects. Hard surfaces, such as rooftops and pavement, absorb a large percentage of the incident solar radiation, heating surfaces and surrounding air, altering the microclimate around them and thus impacting local vegetation, wildlife, and community comfort. Considering the nature of the project, the dark paved infrastructure would inevitably trap heat. Urban heat island effect can be minimized and managed through the use of materials with a high solar reflectance index (SRI) or through increased vegetation, which provides cooling via evapotranspiration and increased shade. The project would advance towards higher performance levels by presenting plans for voluntarily assessing its SRI and developing mitigations for its surrounding microclimates accordingly.</p>
	Source	<ul style="list-style-type: none"> - Dersa. IGAS - Informe de Gestão Ambiental e Social do Programa - Anexo VII. 2011. - Consórcio Coprape Appe, São Paulo and Dersa. "P1.02 - Programa de Detalhamento do Projeto de Engenharia para Atender as Condicionantes Ambientais; P2.01 - P2.11 Programa de Gerenciamento de Plantios Compensatórios." In PBA - Projeto Básico Ambiental," Vol. 1 & 2. 2011. - Consórcio JGP - PRIME. "Capítulo 3.0 Estudo de Alternativas." In EIA - Estudo De Impacto Ambiental, Vol. 4. 2010.
	Recommendations	<p>The project could expand the focus of its environmental impact assessments by incorporating compensation targets that go beyond regulations to benefit both the valuable environmental areas and the communities surrounding the project. From this perspective, there is an opportunity to enjoy the need for tree planting and potential land constraints to fight urban heat island effects and benefit neighboring communities as well as the metropolitan region of São Paulo with micro-urban forests.</p>

Score		MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
Q10.0 INNOVATE OR EXCEED CREDIT REQUIREMENTS	9	N/A
	21	

OVERALL

337	MÁRIO COVAS RODOANEL PROJECT - NORTHERN SECTION BRAZIL
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