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FOR SUSTAINABLE INFRASTRUCTURE

Graduate School of Design
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NUEVO NECAXA-ÁVILA CAMACHO HIGHWAY - MEXICO

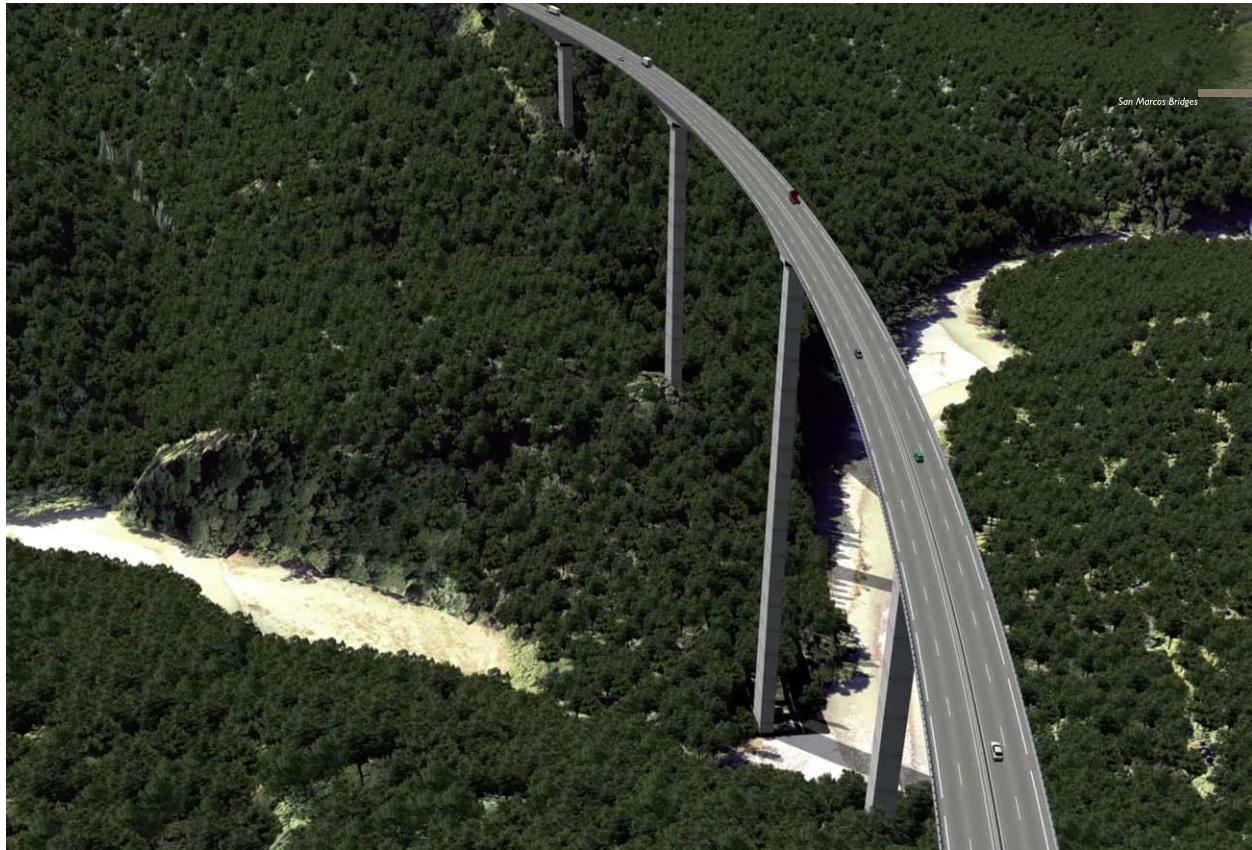


Figure 01: View of the San Marcos Bridge/ Source: ICA, Globalvia, FCC Construcción, AUNETI, and CONNET. Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 36.

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1. PROJECT INTRODUCTION

The Necaxa-Avila Camacho Highway is a 37-kilometer, four-lane highway located in the states of Puebla and Veracruz, Mexico. The \$75 million project, actually a small section of the larger Mexico City-Tuxpan Highway, aims to dramatically reduce time from Mexico's capital to Tuxpan. Developed through a unique public-private partnership strategy, the Ministry of Communications and Transportation (Secretaría de Comunicaciones y Transportes, translated according to the ministry's website, SCT), contracted the AUNETI (a consortium of the Mexican ICA, the Spanish FCC Construcción, and financial institutions such as Santander) to build the toll-free highway through a heavily mountainous terrain. One unique feature is the San Marcos Bridge, the world's second highest bridge pier, running 220 meters above the river. This project considered and mitigated the various social, cultural, environmental and health impacts of development through slope re-vegetation programs, hillside stabilization schemes, worker education and vaccination, and school outreach programs, to name a few.

2. PROJECT DESCRIPTION & LOCATION



Figure 02: Map of Nuevo Necaxa-Avila Camacho Highway trajectory.

Source: ICA, Globalvia, FCC Construcción, AUNETI, and CONNET. *Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan*. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 86.

The Nuevo Necaxa-Avila Camacho Highway is the first section of a larger highway concession, the Nuevo Necaxa-Tihuatlán Highway, which was initiated by the Mexican government. This first section was built under a public-private partnership scheme where the Ministry of Communications and Transportation contracted the consortium AUNETI to design, construct, operate, and maintain the project as a public good for the term length of 30 years. Located in the states of Veracruz and Puebla, the larger highway concession is intended to finish the more extensive Mexico City-Tuxpan Highway, which connects up to North America from Acapulco to Mexico City to Tuxpan, and then up to Chicago and Toronto as part of the North American Free Trade Agreement.¹ Currently, it takes about five hours driving from Mexico City

¹ "Tendencias ICA." *Al Frente*, October 2009, 13.

3. APPLICATION OF THE ENVISION RATING SYSTEM⁷

The *Envision* rating system is a set of criteria that assess and evaluate any specific piece of infrastructure. In this case the infrastructure to be assessed is the Nuevo Necaxa-Àvila Camacho Highway. The main intent of this rating is to evaluate the sustainability efforts and the sociocultural and environmental mitigation efforts during the design and construction process.

Envision consists of 60 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 if the qualifications for each level of achievement has been met for a particular credit. In each of the five categories there is a specific credit called “Innovative or exceed credit requirements”. This is an open window to reward exceptional performance or the application of innovative methods.

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 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 positive impact for the given credit criteria. 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 ISI⁸ and Zofnass Program⁹ websites.

Appendix C provides a table with the detailed project assessment, specifications for each of the credits, and recommendations for the Nuevo Necaxa-Àvila Camacho Highway project.

⁷ Anthony Kane, Zofnass program research director, and Salmaan Khan, research assistant, wrote most parts of this section.

⁸ www.sustainableinfrastructure.org

⁹ www.zofnass.org

4. EVALUATION CATEGORIES

4.1. QUALITY OF LIFE

The first category of *Envision* rating system is Quality of Life. The assessment here mainly refers to the impact of the project on the surrounding communities and their well-being. As stated in the *Envision* manual, “Quality of Life particularly focuses on assessing whether infrastructure projects are in line with community goals, incorporated into existing community networks, and will benefit the community long term.”¹⁰ It also determines if the project is aligned with the community needs.

This category is divided into 3 subcategories and 12 credits: Purpose (QL 1.1, QL 1.2, QL 1.3, and QL 1.4), Community (QL 2.1, QL 2.2, QL 2.3, QL 2.4, QL 2.5, and QL 2.6) and Well-Being (QL 3.1, QL 3.2, QL 3.3).

CREDIT SCORING

| | | | IMPROVED | ENHANCED | SUPERIOR | CONSERVING | RESTORATIVE | |
|--------------------------|-----------|---|----------|----------|----------|------------|-------------|--|
| 1 | PURPOSE | QL1.1 Improve community quality of life | 2 | 5 | 10 | 20 | 25 | |
| 2 | | QL1.2 Stimulate sustainable growth and development | 1 | 2 | 5 | 13 | 16 | |
| 3 | | QL1.3 Develop local skills and capabilities | 1 | 2 | 5 | 12 | 15 | |
| 4 | COMMUNITY | QL2.1 Enhance public health and safety | 2 | | | 16 | | |
| 5 | | QL2.2 Minimize noise and vibration | 1 | | | 8 | 11 | |
| 6 | | QL2.3 Minimize light pollution | 1 | 2 | 4 | 8 | 11 | |
| 7 | | QL2.4 Improve community mobility and access | 1 | 4 | 7 | 14 | | |
| 8 | | QL2.5 Encourage alternative modes of transportation | 1 | 3 | 6 | 12 | 15 | |
| 9 | | QL2.6 Improve site accessibility, safety and wayfinding | | 3 | 6 | 12 | 15 | |
| 10 | WELLBEING | QL3.1 Preserve historic and cultural resources | 1 | | 7 | 13 | 16 | |
| 11 | | QL3.2 Preserve views and local character | 1 | 3 | 6 | 11 | 14 | |
| 12 | | QL3.3 Enhance public space | 1 | 3 | 6 | 11 | 13 | |
| Maximum points possible: | | | | | | | 181 | |

Figure 04: Quality of life category, credits distribution.

4.1.1. Purpose

In the **Purpose subcategory**, one credit was evaluated as Enhanced (QL1.1 Improve Community Quality of Life), one credit as Improving (QL1.2 Stimulate Sustainable Growth and Development), and one as Conserving (QL1.3 Develop Local Skills and Capabilities).

The Manual for Implementing Social Responsibility in Projects outlines steps to address various educational, health, and environmental issues in the community, suggesting programmatic activities and solutions.¹¹ The neighboring localities include: Cuautlita, Patoltecoya, Cuaxicala, Cuahueyatla, San Agustín, Las Pilas, Tepapatlaxco, Teteloloya, Tacubaya, La Esperanza San Pedro Petlacotla, Nuevo Tenancingo, and Plan de Ayala.¹² Various minutes and photo reports confirm communication and remediation between community members and the project team.¹³

¹⁰ *Envision* Guidance Manual, p.30

¹¹ ICA. “Manual Para Implementar Responsabilidad Social En Los Proyectos,” n.d.

¹² Santamaria, Ariana. “Atencion a Partes Interesadas: CONNET-RS-PRO-001 r0.” CONNET, November 11, 2010.

¹³ CONNET. Camino de Acceso Comunidad Plan de Ayala. Photo report, n.d.

“Atenta nota informativa relativa a la asistencia a la comunidad de Teteloloya el dia 18 octubre 2011.” Secretaria de Comunicaciones y Transportes, n.d.

A list of all of the hired workers confirms that local labor was contracted for the construction process.¹⁴ The project also provided support for its workers to be certified at the primary and secondary education level by the National Institute for the Education of Adults (INEA—Instituto Nacional para la Educacion de los Adultos). According to the documentation, at least one worker was certified for achieving the primary level of education.¹⁵



Figure 05. The administration of the INEA exam.



Figure 06. The certification of primary level education for a worker.
Source: “Aplicacion de Exámenes de INEA,” n.d.

4.1.2. Community:

The Nuevo Necaxa-Ávila Camacho project was evaluated for the following credits in the **Wellbeing subcategory**: two credits were rated as Improved (QL2.1 Enhance Public Health and Safety, QL2.3 Minimize Light Pollution), two were Enhanced (QL2.5 Encourage Alternative Modes of Transportation, QL2.6 Improve Site Accessibility, Safety and Wayfinding), while the last two were evaluated as Conserving (QL2.2 Minimize Noise and Vibration, QL2.4 Improve Community Mobility and Accessibility).

Mexican environmental standard NOM-080-SEMARNAT-1994 establishes noise limits for the machinery used during construction, and NOM-081-SEMARNAT-1994 limits stationary sources of noise pollution.¹⁶ Noise levels were regularly monitored during construction, and noise-reducing equipment was installed in areas that produced more than 85 dB, reducing noise pollution by 50%, according to a photo report.¹⁷ The environmental impact statement states that any activity is prohibited during the night, thereby ensuring that nighttime lighting and noise levels would be kept to a minimum during construction.¹⁸

Traffic-calming and evacuation route signage was installed in and around the project sites and the local communities. The mobility needs of the community were also met; according to a photo report, the

¹⁴ “Base de Datos,” n.d.

¹⁵ “Aplicacion de Exámenes de INEA,” n.d.

¹⁶ “Evaluacion de Cumplimiento Legal,” n.d, sheet: R.1680 MIA-CONNET.

¹⁷ CONNET. Disminucion de Ruido. Photo report, n.d.

CONNET. Toma de Lecturas ABC. Photo report, n.d. //

CONNET. Monitoreo de Ruido. Photo report, n.d.

¹⁸ Consultoria Especializada en Estudios Ambientales. Manifestacion de impacto ambiental modalidad regional para bancos y caminos de acceso de la carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho del km140+123 al km178+500 en el estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d.

locality Plan de Ayala received improved roads, while Teteloloya also secured paths across the highway to connect to the agricultural fields and other localities.¹⁹



Figures 07-10. The rehabilitation of the access road to the community of Plan de Ayala, which was initially used by the project. Source: CONNET. Camino de Acceso Comunidad Plan de Ayala. Photo report, n.d.

4.1.3. Wellbeing

In the **Wellbeing subcategory**, one credit was evaluated as Conserving (QL3.1 Preserve Historic and Cultural Resources), one credit as Improved (QL3.2 Preserve Views and Local Character), and one as No Score (QL3.3 Enhance Public Space).

During the construction of the Nuevo Necaxa-Àvila Camacho highway section, the project workers encountered two archeological sites known as La Esperanza and La Joya, which necessitated professional evaluation by the National Institute of Anthropology and History (Instituto Nacional de Antropologia e Historia – INAH) and authorization of the Mexican government to continue construction. With the discovery, the project siting was modified to avoid the archeological areas, changing the path as well as the location of a terrace.²⁰

¹⁹ CONNET. Camino de Acceso Comunidad Plan de Ayala. Photo report, n.d.

“Atenta nota informativa relativa a la asistencia a la comunidad de Teteloloya el dia 18 octubre 2011.” Secretaria de Comunicaciones y Transportes, n.d.

²⁰ CONNET. “Desvio de Trazo Por Hallazgo de Zona Arqueologica,” n.d., 4.

AUNETI, CONNET, ICA, and FCC Construccion. “Desvio de Trazo Por Hallazgo de Vestigios Arqueologicos,” August 2011.

Furthermore, the project was conscious of the region's natural views and endeavored to preserve panoramas and natural scenery by carefully siting bridges and tunnels through the Sierra Occidental Mountains. Borrow pits and earthworks were reforested and local fauna and flora were saved and released into the wild after remediation.²¹



Figures 11-12. Panoramic photos of the region's natural views preserved.
Source: CONNET. Fotos Panoramicas Nuevo Necaxa-Avila Camacho. Photo report, n.d.

4.1.4. Innovative or exceed credit requirements

The "Manual for Implementing Social Responsibility during the Project" (06-036, p. 2) outlines a program of health and education, including vaccination programs and health campaigns and technical capacitation for the worker community. A registry of the health campaign records all of the workers and project personnel. For the Flu virus, 221 individuals were vaccinated, 72 individuals for intestinal parasites (Albendazole), 148 individuals for Tetanus, and 82 for the Tetanus Viral Influenza. Forty-six individuals were tested for their blood glucose level.

The locality of Teteloloya has requested the construction of a retention wall to protect the community from floods. The project team also trained the community in fighting fires with fire extinguishers, as well as donating first aid kits, fire extinguishers, and walkie-talkies. In addition, the project has donated 80 emergency food packages to the residents of Teteloloya who were affected by Hurricane Arlene. Engineering students from the local University de la Sierra were given a tour of the project to further their experiences in the field.

4.1.5. Summary of results for the Quality of Life Category.

The table below (figure 13) shows the distribution of the credits, as well as the level of performance achieved in each.

²¹ CONNET. Fotos Panoramicas Nuevo Necaxa-Avila Camacho. Photo report, n.d.
CONNET. "Programa de Acciones de Rescate Y Reubicacion de Flora Y Fauna Silvestre," n.d.
CONNET. "Programa de Reforestacion Como Medida de Compensacion Ambiental Y Programa de Restauracion de suelos:Municipios de Huachinango, Xicotepec Y Tlacuilotepec En El Estado de Puebla," July 2010.

| NUEVO NECAXA-AVILA CAMACHO HIGHWAY, MEXICO | | | | PT | Performance | % Total | max |
|--|-----------|---|--|-----------|-------------------|--------------|------------|
| 2 3 4 5 6 7 8 9 10 11 12 | PURPOSE | QL1.1 Improve Community Quality of Life | | 5 | Enhanced | 20.0% | 25 |
| | | QL1.2 Stimulate Sustainable Growth & Development | | 2 | Improved | 12.5% | 16 |
| | | QL1.3 Develop Local Skills And Capabilities | | 12 | Conserving | 80.0% | 15 |
| | COMMUNITY | QL2.1 Enhance Public Health And Safety | | 2 | Improved | 12.5% | 16 |
| | | QL2.2 Minimize Noise And Vibration | | 8 | Conserving | 72.7% | 11 |
| | | QL2.3 Minimize Light Pollution | | 1 | Improved | 9.1% | 11 |
| | | QL2.4 Improve Community Mobility And Access | | 7 | Conserving | 50.0% | 14 |
| | | QL2.5 Encourage Alternative Modes of Transportation | | 3 | Enhanced | 20.0% | 15 |
| | | QL2.6 Improve Site Accessibility, Safety & Wayfinding | | 3 | Enhanced | 20.0% | 15 |
| | WELLBEING | QL3.1 Preserve Historic And Cultural Resources | | 13 | Conserving | 81.3% | 16 |
| | | QL3.2 Preserve Views And Local Character | | 1 | Improved | 7.1% | 14 |
| | | QL3.3 Enhance Public Space | | 0 | No Score | 0.0% | 13 |
| | | QL0.0 Innovate Or Exceed Credit Requirements | | 8 | Innovative credit | | |
| QL | | | | 65 | | 35.9% | 181 |

Figure 13.: Summary of results in Quality of Life category.

Of the three subcategories, Community scored the highest, with two credits achieving the Conserving level. The biggest opportunity for improvement in the Quality of Life category would be in the Wellbeing subcategory, which had one credit evaluated as No Score (QL3.3 Enhance Public Space). Most noteworthy about this section is the allocation of eight points towards the Innovation Credit. The project made a notable effort to reach out to the local communities through health and education programs, ranging from vaccination campaigns, to adult educational support, to building relationships with local schools. Considering the maximum possible values for all credits in the Quality of Life category, the percentage of achievement equals 35.9% or 65 points out of 181.

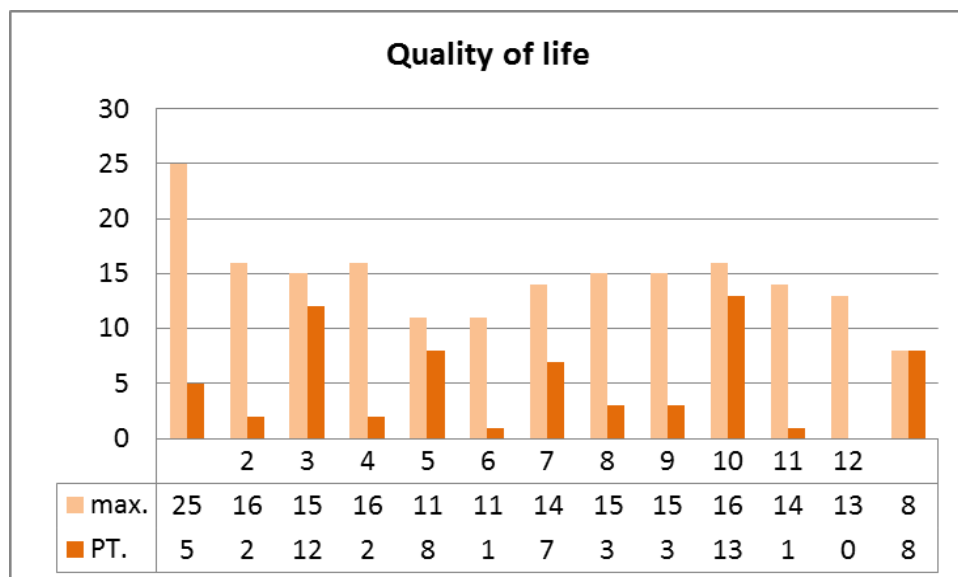


Figure 14. Summary of results in Quality of Life category.

4.2. LEADERSHIP

Envision’s Leadership category evaluates the collaboration, management and planning of the project’s team, as well as its stakeholders. *Envision* states that “communicate and collaborate early on, involve a wide variety of people in creating ideas for the project, and understand the long-term, holistic view of the project and its life cycle.”²²

The 12 credits in this category are: collaboration (LD 1.1, LD 1.2, LD 1.3, LD 1.4), management (LD 2.1, LD 2.2) and planning (LD 3.1, LD 3.2, LD 3.3).

CREDIT SCORING

| | | | IMPROVED | ENHANCED | SUPERIOR | CONSERVING | RESTORATIVE | |
|--------------------------|------------|---------------|---|----------|----------|------------|-------------|----|
| 13 | LEADERSHIP | COLLABORATION | LD1.1 Provide effective leadership and commitment | 2 | 4 | 9 | 17 | |
| 14 | | | LD1.2 Establish a sustainability management system | 1 | 4 | 7 | 14 | |
| 15 | | | LD1.3 Foster collaboration and teamwork | 1 | 4 | 8 | 15 | |
| 16 | | | LD1.4 Provide for stakeholder involvement | 1 | 5 | 9 | 14 | |
| 17 | LEADERSHIP | MANAGEMENT | LD2.1 Pursue by-product synergy opportunities | 1 | 3 | 6 | 12 | 15 |
| 18 | | | LD2.2 Improve infrastructure integration | 1 | 3 | 7 | 13 | 16 |
| 19 | LEADERSHIP | PLANNING | LD3.1 Plan for long-term monitoring and maintenance | 1 | 3 | | 10 | |
| 20 | | | LD3.2 Address conflicting regulations and policies | 1 | 2 | 4 | 8 | |
| 21 | | | LD3.3 Extend useful life | 1 | 3 | 6 | 12 | |
| Maximum points possible: | | | | | | | 121 | |

Figure 15: Leadership category, credits distribution.

4.2.1. Collaboration

In the **Collaboration subcategory**, two credits were evaluated as Enhanced (LD1.2 Establish a Sustainability Management System, LD1.4 Provide for Stakeholder Involvement); one credit was evaluated as Conserving (LD1.1 Provide Effective Leadership and Commitment), and one as No Score (LD1.3 Foster Collaboration and Teamwork).

The Manual for Implementing Social Responsibility in the Project outlines a commitment by ICA, a partner company, to implement programs created by the company’s Commission of Social Sustainability within the communities located near the project. The manual outlines key issues for the community, such as health, education, and the environment, and strategies for identifying and addressing each respective issue. The company recognizes that “the actions targeting social responsibility are a commitment that we have to encourage in our workers, more than for economic benefit but for personal satisfaction.”²³

²² *Envision* Guidance Manual, p.60

²³ ICA. “Manual Para Implementar Responsabilidad Social En Los Proyectos,” n.d., 1. (Translated from: “Las acciones encaminadas a responsabilidad social son un compromiso que tenemos que fomentar en nuestros trabajadores, más que por un beneficio económico, por una satisfacción personal.”)



Figure 16-17. The community of Teteloloya was trained on how to properly use a fire extinguisher.
Source: CONNET. "Vinculos Con Comunidades: Teteloloya, Tlacuilotepec, Puebla," n.d., 10.

As observed in the Quality of Life credits, the project team made various efforts to improve deteriorating road conditions in the region, to vaccinate local workers, and to design a civil emergency response system through donations for: evacuation signs, fire extinguishers, and first aid kits. A reforestation program for the Jicaro tree was also implemented with help of the local primary and secondary schools in Cuaxicala.²⁴



Figure 18. Explaining to students from Cuaxicala how to take care of the Jicaro seedlings.
Source: "Entrega Del Arbol Del Jicaro a Todo El Alumnado de Escuela Secundaria El Vivero Ojo de Agua." October 2012, 11.

²⁴ "Entrega Del Arbol Del Jicaro a Todo El Alumnado de Escuela Secundaria El Vivero Ojo de Agua." October 2012. "Entrega Del Arbol Del Jicaro a Todo El Alumnado de Escuela Primaria Y Padres de Familia En Un Evento Especial 'Adopta Un Arbol.'" November 2012.

4.2.2. Management:

In the **Management subcategory**, one credit was evaluated as Improved (LD2.2 Improve Infrastructure Integration) and one credit as No Score (LD2.1 Pursue By-Product Synergy Opportunities).

According to the provided reports and minutes from community meetings, many of the improvements to the local paths and roads were not integrated into the design from the outset of the project. Instead, improvement in footpaths and roads were implemented after the local communities voiced their concerns about the project's impacts. For example, parts of the highway obstructed old pathways used by the local population and their animals, and so new paths had to be created in response to their needs.²⁵ In one case, a vehicle underpass (paso inferior vehicular—PIV) was also constructed to ensure pedestrian access (located on km 141+480 of the highway section).²⁶

4.2.3. Planning:

In the **Planning subcategory**, one credit was evaluated as Improved (LD3.1 Plan for Long-Term Monitoring and Maintenance), one credit as No Score (LD3.2 Address Conflicting Regulations and Policies), and one as Superior (LD3.3 Extend Useful Life).

The project's efforts to extend the useful life of the highway are notable. Originally planned as two to three lanes for most of the length of the project, it was later changed to a four-lane design to accommodate future increases in highway use. Fortunately, the original design allowed for the expansion of the highway width.²⁷ Furthermore, around 80% of the retaining walls were made with geosynthetic materials (geotextiles, geomesh, geodrains), which are flexible compared to traditional concrete and steel retaining walls. Geosynthetic retaining walls are able to tolerate more movement and are able to accommodate seismic movement without losing structural soundness.²⁸

²⁵ Minuta de acuerdos, in the Cabildo of the Municipal Presidency in Xicotepec de Juarez, Puebla, meeting of 25 September 2009.

Recorrido de Patoltecoya, Minuta del Recorrido de Obra con el presidente auxiliar de Patoltecoya, DDV del a SCT, et al., Meeting of 16 October 2008.

Minuta sobre la visita de Proteccion Civil a la zona de trabajo denominada "Corte 3-ocho" ubicada en el cadenamiento 860+630, in Tepapatlaxco, Meeting of 4 September 2009.

Minuta del recorrido, con motivo de los cruces y la Liberacion de Derecho de Via, in the on-site office in Xicotepec de Juarez, Puebla, Meeting of 24 August 2010.

Minuta de acuerdos para el mejoramiento de la circulacion del camino a San Agustin zonas afectadas por llluvias, in Xicotepec de Juarez, Puebla, Meeting of 25 July 2008.

²⁶ CONNET. Evidencia Fotografica PIVs. Photo report, n.d.

²⁷ CONNET. "Entrega de Estudio Tecnico Justificativo de Cambios Al Proyecto: Documento Conciliado Con AUNETI," August 12, 2010, 10-13.

²⁸ ICA, Globalvia, FCC Construccion, AUNETI, and CONNET. Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 123.



Figure 19. Wall reinforced with geosynthetics.

Source: ICA, Globalvia, FCC Construcción, AUNETI, and CONNET. *Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan*. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 121.

A long-term maintenance plan outlines the maintenance provisions until 2037 for pavement, the drainage system, slopes, reforestation efforts, lateral zones, signals, and bridges, among others.²⁹

4.2.4. Summary of results for the Leadership category.

The table below (Figure 20) shows the distribution of the credits, as well as the level of performance achieved in each.

| NUEVO NECAXA-AVILA CAMACHO HIGHWAY, MEXICO | | | PT. | Performance | % Total | max. | |
|--|------------|---------------|--|-------------|------------|--------|-----|
| 13 | LEADERSHIP | COLLABORATION | LD1.1 Provide Effective Leadership And Commitment | 17 | Conserving | 100.0% | 17 |
| 14 | | | LD1.2 Establish A Sustainability Management System | 4 | Enhanced | 28.6% | 14 |
| 15 | | | LD1.3 Foster Collaboration And Teamwork | 0 | No Score | 0.0% | 15 |
| 16 | | | LD1.4 Provide For Stakeholder Involvement | 4 | Enhanced | 28.6% | 14 |
| 17 | LEADERSHIP | MNGMT. | LD2.1 Pursue By-Product Synergy Opportunities | 0 | No Score | 0.0% | 15 |
| 18 | | | LD2.2 Improve Infrastructure Integration | 1 | Improved | 6.3% | 16 |
| 19 | LEADERSHIP | PLANNING | LD3.1 Plan For Long-Term Monitoring & Maintenance | 1 | Improved | 10.0% | 10 |
| 20 | | | LD3.2 Address Conflicting Regulations & Policies | 0 | No Score | 0.0% | 8 |
| 21 | | | LD3.3 Extend Useful Life | 6 | Superior | 50.0% | 12 |
| | | | LD0.0 Innovate Or Exceed Credit Requirements | N/A | | | |
| | | | LD | 33 | | 27.3% | 121 |

Figure 20 :Summary of results in Leadership category.

²⁹ “Programa de Mantenimiento.” Secretaria de Comunicaciones y Transportes, n.d.

“Programa de Mantimiento Y Conservacion Del Tramo Carretero 1.” Secretaria de Comunicaciones y Transportes, n.d.

Of the three subcategories, Collaboration scored the highest, with one credit achieving the Conserving level. The biggest opportunity for improvement in the Leadership category would be in the Management subcategory with one credit evaluated as No Score (LD2.1 Pursue By-Product Synergy Opportunities). A noteworthy effort in the planning sub-category (LD3.3 Extend Useful Life) is the use of geosynthetic retaining walls, which are more tolerate more movement and are able to accommodate seismic movement without losing structural soundness.³⁰ This is technique promotes resiliency and extends the project useful life. Considering the maximum possible values for all credits in the Leadership category, the percentage of achievement equals 27.3% or 33 points out of 121.

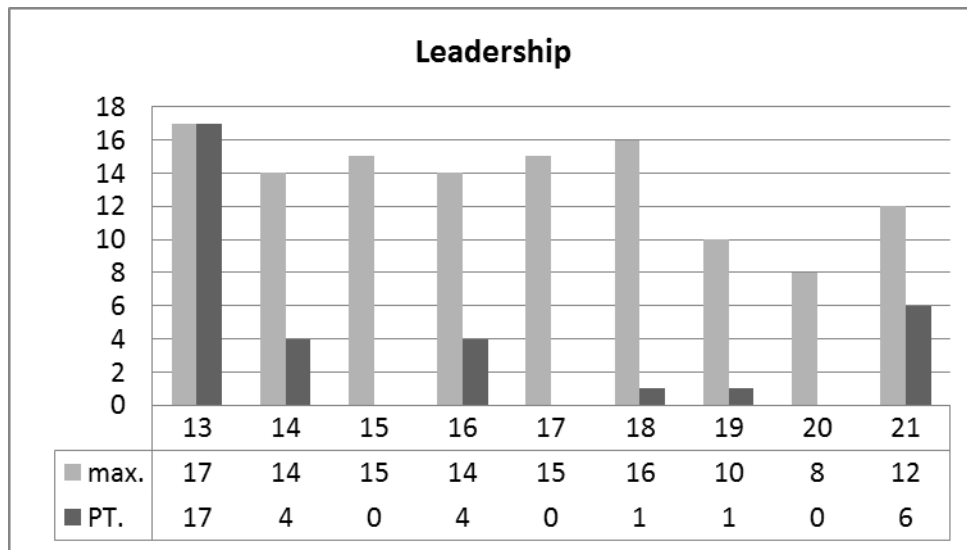


Figure 21: Summary of results in Leadership category.

³⁰ ICA, Globalvia, FCC Construcción, AUNETI, and CONNET. Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 123.

4.3 RESOURCE ALLOCATION

The Resource Allocation (RA) category deals with the quality and source of the materials used in the project during its construction and operation phases. Use and allocation of materials and other resources has a great impact on the overall sustainability of the project. The RA category is divided into 13 credits: materials (RA 1.1, RA 1.2, RA 1.3, RA 1.4, RA 1.5, RA 1.6, RA 1.7), energy (RA 2.1, RA 2.2, RA 2.3) and water (RA 3.1, RA 3.2, RA 3.3).

CREDIT SCORING

| | | | IMPROVED | ENHANCED | SUPERIOR | CONSERVING | RESTORATIVE | |
|--------------------------|---------------------|-----------|---|----------|----------|------------|-------------|----|
| 22 | RESOURCE ALLOCATION | MATERIALS | RA1.1 Reduce net embodied energy | 2 | 6 | 12 | 18 | |
| 23 | | | RA1.2 Support sustainable procurement practices | 2 | 3 | 6 | 9 | |
| 24 | | | RA1.3 Use recycled materials | 2 | 5 | 11 | 14 | |
| 25 | | | RA1.4 Use regional materials | 3 | 6 | 9 | 10 | |
| 26 | | | RA1.5 Divert waste from landfills | 3 | 6 | 8 | 11 | |
| 27 | | | RA1.6 Reduce excavated materials taken off site | 2 | 4 | 5 | 6 | |
| 28 | | | RA1.7 Provide for deconstruction and recycling | 1 | 4 | 8 | 12 | |
| 29 | RESOURCE ALLOCATION | ENERGY | RA2.1 Reduce energy consumption | 3 | 7 | 12 | 18 | |
| 30 | | | RA2.2 Use renewable energy | 4 | 6 | 13 | 16 | 20 |
| 31 | | | RA2.3 Commission and monitor energy systems | | 3 | | | 11 |
| 32 | RESOURCE ALLOCATION | WATER | RA3.1 Protect fresh water availability | 2 | 4 | 9 | 17 | 21 |
| 33 | | | RA3.2 Reduce potable water consumption | 4 | 9 | 13 | 17 | 21 |
| 34 | | | RA3.3 Monitor water systems | 1 | 3 | 6 | 11 | |
| Maximum points possible: | | | | | | 182 | | |

Figure 22: Resource Allocation category, credits distribution.

4.3.1. Materials:

In the **Materials subcategory**, three credits were rated as No Score (RA 1.1 Reduce Net Embodied Energy, RA 1.2 Support Sustainable Procurement Practices, and RA 1.7 Provide for Deconstruction & Recycling), while the other four were evaluated as Improved (RA 1.3 Used Recycled Materials, RA 1.4 Use Regional Materials, RA 1.5 Divert Waste from Landfills, and RA 1.6 Reduce Excavated Materials Taken Off Site).

A large portion of the materials that were reused and locally sourced during construction was comprised of earth taken from borrow pits and reused for terracing and landscaping. According to a photographic report, the project was able to reuse around 20-30% of the excavated materials from the borrow pits or from through cuts.³¹ Some of the materials used for scaffolding were reused during construction, while steel drum cases and lumber were donated to local communities for reuse.³² As mandated by Mexican environmental statutes, all contractors, subcontractors and operators were conscious of waste sorting requirements, such as separating recyclables from non-recyclables and industrial waste. The recycling of scrap metal and metal wire reduced the amount of waste generated by the project.³³

³¹ CONNET. Reduccion de polvos. Photo report, n.d.

³² CONNET. *Identificacion de aspectos ambientales*. Photo report, n.d.

³³ CONNET. "Procedimiento de licitacion subcontratos," November 26, 2010, 39.

Lopez, Diana. "Plan de gestion ambiental." Edited by Leonardo Barrera and Jorge Albornoz. CONNET, August 11, 2010, 16.



Figure 23 and 24: lumber scraps that were reused multiple times were donated to the community.
Source: CONNET. *Identificación de aspectos ambientales*. Photo report, n.d., 3.



Figure 25 and 26: Scaffolding materials are reused for bridges only if it is structurally safe during construction.
Source: CONNET. *Identificación de aspectos ambientales*. Photo report, n.d., 1.

Two local suppliers, Grupo Calero and Casa Don Gil, were subcontracted to provide construction materials.³⁴ Plants were also removed during the creation of earthworks and borrow pits, stored, and later replanted during the mitigation processes for the excavated materials.³⁵ Runoff and residual water from agricultural use were captured and reused to hose down construction sites in order to reduce the amount of dust in the air.³⁶

³⁴ CONNET. "Contrato de suministro celebrado entre CONNET y Grupo Calero," August 1, 2010.

CONNET. "Contrato de suministro celebrado entre CONNET y Casa Don Gil," July 15, 2009.

CONNET. "Seguimiento Historico de Proveedores de Servicios," July 1, 2013.

³⁵ CONNET. "Programa de Reforestacion Como Medida de Compensacion Ambiental Y Programa de Restauracion de suelos: Municipios de Huachinango, Xicoteppec Y Tlacuilotepec En El Estado de Puebla," July 2010, 55.

ICA. Bancos de Tiro, Bancos de Prestamo Y Caminos de Acceso de La Autopista Mexico-Tuxpan Del km140+123 Al km178+500. Manifestacion de impacto ambiental modalidad regional, n.d., 52.

³⁶ CONNET. Reduccion de polvos. Photo report, n.d.

4.3.2. Energy:

In the **Energy subcategory**, all three credits achieved No Score (RA 2.1 Reduce Energy Consumption, RA 2.2 Use Renewable Energy, and RA 2.3 Commission and Monitor Energy Systems). Please refer to the Credit Details in the Appendix for further explanation.

4.3.3. Water:

In the **Water subcategory**, one credit was assessed as Conserving (RA 3.2 Reduce Potable Water Consumption), one as Improved (RA 3.3 Monitor Water Systems), and one as No Score (RA 3.1 Protect Freshwater Availability).

The Nuevo Necaxa-Avila Camacho Highway complied with various Mexican environmental statutes regulating the contamination of water sources. The highway received the highest possible score for the RA 3.2 credit due to its efforts to use raw water during the construction process. Raw water was procured for the construction of terraces; the Environmental Impact Statement estimated that around 3,246 cubic meters of water would be needed each day to control the dust and to compact and form the terraces.³⁷ Water catchment areas were excavated to capture runoff and rainwater, while surface water was piped from the local rivers to the construction sites.³⁸

Ojo de Agua, a third party environmental evaluator, was hired to implement an environmental monitoring program during the construction process. After project completion, the velocity of the San Marcos River was found to be unchanged.³⁹



Figure 27 and 28: Water catchment areas were excavated to store runoff or surface waters for later use during construction. Source: CONNET. *El proyecto mantendra la calidad del agua*. Photo report, n.d.

³⁷ Grupo Selome. Manifestacion de Impacto Ambiental. Secretaria de Comunicaciones y Transportes, n.d., 21, 39.

³⁸ CONNET. "Control de Agua Superficial: Mensual Desde Junio 2008 a Julio 2013," July 2013.

³⁹ CONNET. El Proyecto Mantendra La Calidad del Agua. Photo report, n.d.

4.3.4. Summary of results for the Resource Allocation category.

The table above (figure 29) shows the distribution of the credits, as well as the level of performance achieved in each. Of the three subcategories, Water scored the highest due to the project’s high use of raw water. The biggest opportunity for improvement in the Resource Allocation category would be in the Energy subcategory, which did not receive any points. Considering the maximum possible values for all credits in the Resource Allocation category, the percentage of achievement equals 15.4% or 28 points out of 182.

| NUEVO NECAXA-AVILA CAMACHO HIGHWAY, MEXICO | | | | PT. | Performance | % Total | max. |
|--|---------------------|---|---|------------|-------------|--------------|------------|
| 22 | RESOURCE ALLOCATION | MATERIALS | RA1.1 Reduce Net Embodied Energy | 0 | No Score | 0.0% | 18 |
| 23 | | | RA1.2 Support Sustainable Procurement Practices | 0 | No Score | 0.0% | 9 |
| 24 | | | RA1.3 Used Recycled Materials | 2 | Improved | 14.3% | 14 |
| 25 | | | RA1.4 Use Regional Materials | 3 | Improved | 30.0% | 10 |
| 26 | | | RA1.5 Divert Waste From Landfills | 3 | Improved | 27.3% | 11 |
| 27 | | | RA1.6 Reduce Excavated Materials Taken Off Site | 2 | Improved | 33.3% | 6 |
| 28 | | | RA1.7 Provide for Deconstruction & Recycling | 0 | No Score | 0.0% | 12 |
| 29 | ENERGY | RA2.1 Reduce Energy Consumption | 0 | No Score | 0.0% | 18 | |
| 30 | | RA2.2 Reduce Pesticide and Fertilizer Impacts | 0 | No Score | 0.0% | 20 | |
| 31 | | RA2.3 Commission & Monitor Energy Systems | 0 | No Score | 0.0% | 11 | |
| 32 | WATER | RA3.1 Protect Fresh Water Availability | 0 | No Score | 0.0% | 21 | |
| 33 | | RA3.2 Reduce Potable Water Consumption | 17 | Conserving | 81.0% | 21 | |
| 34 | | RA3.3 Monitor Water Systems | 1 | Improved | 9.1% | 11 | |
| RA0.0 Innovate Or Exceed Credit Requirements | | | | 0 | N/A | | |
| RA | | | | 28 | | 15.4% | 182 |

Figure 29: Summary of results in Resource Allocation category

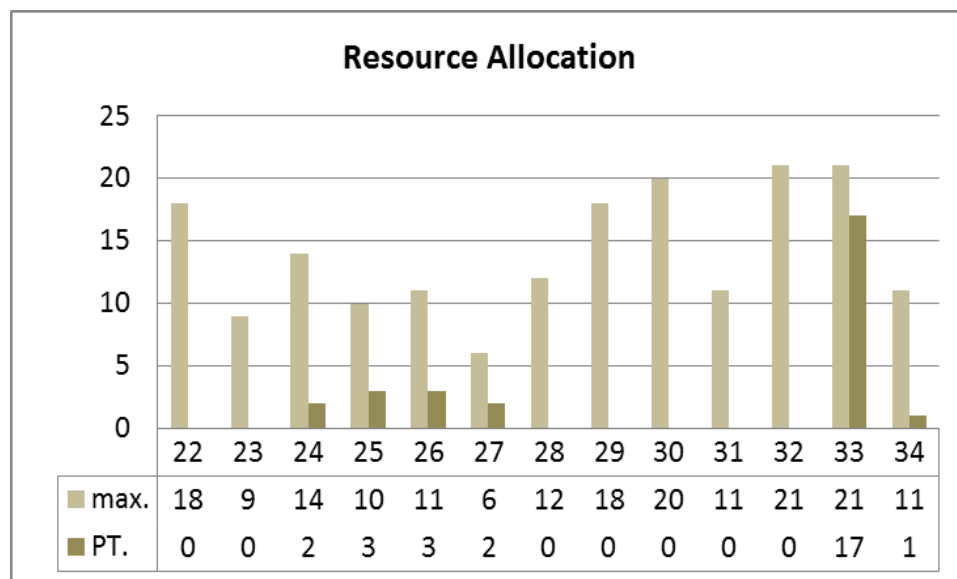


Figure 30: Summary of results in Resource Allocation category

4.4. NATURAL WORLD

The Natural World category addresses “how to understand and minimize negative impacts while considering ways in which the infrastructure can interact with natural systems in a synergistic, positive way.”⁴⁰ The NW category is divided into 14 credits related to project siting (NW 1.1, NW 1.2, NW 1.3, NW 1.4, NW 1.5, NW 1.6, and NW 1.7), impacts on land and water (NW 2.1, NW 2.2, NW 2.3) and biodiversity (NW 3.1, NW 3.2, NW 3.3, NW 3.4).

CREDIT SCORING

| | | | IMPROVED | ENHANCED | SUPERIOR | CONSERVING | RESTORATIVE | |
|--------------------------|---------------|--------------|---|----------|----------|------------|-------------|----|
| 35 | NATURAL WORLD | SITING | NW1.1 Preserve prime habitat | | | 9 | 14 | 18 |
| 36 | | | NW1.2 Protect wetlands and surface water | 1 | 4 | 9 | 14 | 18 |
| 37 | | | NW1.3 Preserve prime farmland | | | 6 | 12 | 15 |
| 38 | | | NW1.4 Avoid adverse geology | 1 | 2 | 3 | 5 | |
| 39 | | | NW1.5 Preserve floodplain functions | 2 | 5 | 8 | 14 | |
| 40 | | | NW1.6 Avoid unsuitable development on steep slopes | 1 | | 4 | 6 | |
| 41 | | | NW1.7 Preserve greenfields | 3 | 6 | 10 | 15 | 23 |
| 42 | | LAND & WATER | NW2.1 Manage stormwater | | 4 | 9 | 17 | 21 |
| 43 | | | NW2.2 Reduce pesticide and fertilizer impacts | 1 | 2 | 5 | 9 | |
| 44 | | | NW2.3 Prevent surface and groundwater contamination | 1 | 4 | 9 | 14 | 18 |
| 45 | | BIODIVERSITY | NW3.1 Preserve species biodiversity | 2 | | | 13 | 16 |
| 46 | | | NW3.2 Control invasive species | | | 5 | 9 | 11 |
| 47 | | | NW3.3 Restore disturbed soils | | | | 8 | 10 |
| 48 | | | NW3.4 Maintain wetland and surface water functions | 3 | 6 | 9 | 15 | 19 |
| Maximum points possible: | | | | | | | 203 | |

Figure 31: Natural World credit distribution

4.4.1. Siting:

In the **Siting subcategory**, three credits were evaluated as No Score (NW 1.1 Preserve Prime Habitat, NW 1.2 Preserve Wetlands and Surface Water, and NW 1.7 Preserve Greenfields), two were evaluated as Conserving (NW 1.3 Preserve Prime Farmland, and NW 1.5 Preserve Floodplain Functions) and two as Superior (NW 1.4 Avoid Adverse Geology, and NW 1.6 Avoid Unsuitable Development on Steep Slopes).

The Nuevo Necaxa-Avila Camacho Highway includes two bridges that span bodies of water in order to avoid developing within the sensitive riverbanks. The Texcapa II Bridge, located at the start of the highway (from 141+270 km to 141+480 km) crosses the Texcapa River; the San Marcos Bridge spans the San Marcos River.⁴¹ Much of the highway traverses the mountainous environment of the Sierra Oriental in the state of Puebla. Consequently, the project is located within a sensitive landscape that is prone to heavy rains, landslides and erosion. Although the project area is known to have the highest potential for landslides in all of Mexico, according to a geological study conducted by third party engineers, the current path taken by the highway does not traverse any of the landslide zones or unstable areas. According to maps provided by the concessionaires, the current path has been changed to avoid geological faults.

⁴⁰ Envision Guidance Manual, p.116

⁴¹ ICA, Globalvia, FCC Construcción, AUNETI, and CONNET. Mexico City-Tuxpan Highway: Nuevo Necaxa-Tehuacan. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 137-138.

CONNET. Zonas de Protección de Vegetación Cercanas a La Riberas. Photo report, n.d.

CONNET. “Entrega de Estudio Técnico Justificativo de Cambios Al Proyecto: Documento Conciliado Con AUNETI,” August 12, 2010, 275.

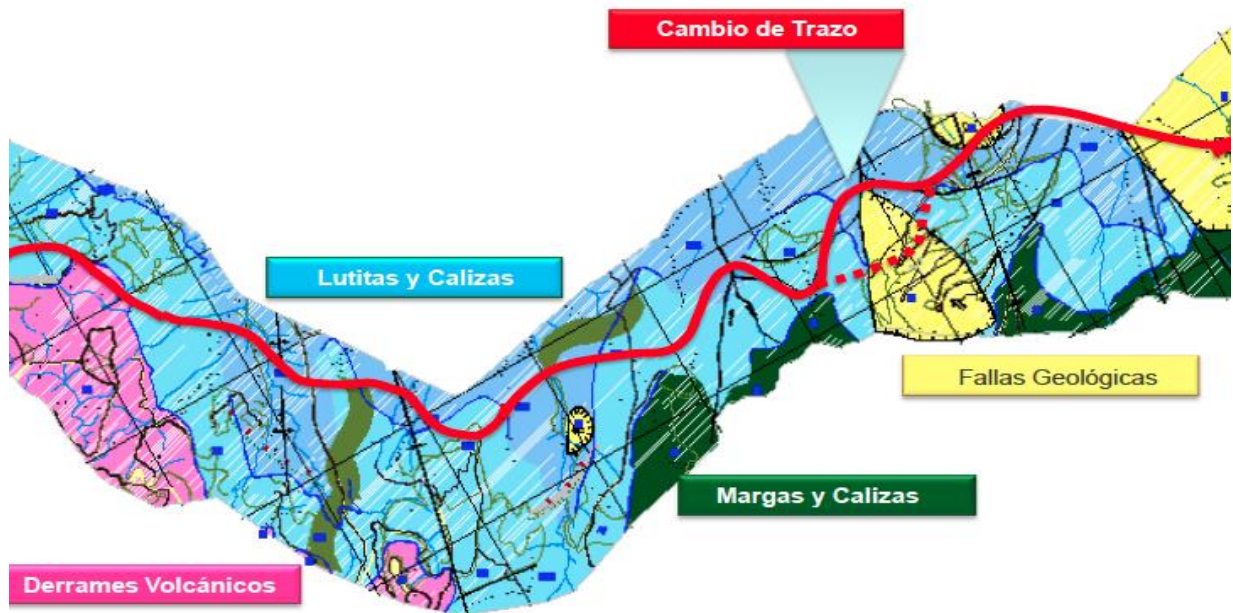


Figure 32: Map of changed highway trajectory/Source: CONNET. "Presentacion Cambio de Trazo TZ," n.d.

Studies have been carried out at the site of each major project component, such as a tunnel or bridge, to ensure that the underlying materials are stable enough to support the structures and not cause erosion of the site.⁴² For example, ultrasonic tests and rock perforation samplings were carried out during the construction of the San Marcos Bridge in order to confirm the structural base of the site's underlying geology.



Figure 33 and 34: Drainage systems were implemented to control runoff and maintain the hydrological system. Source: CONNET. *El Proyecto Mantendra La Conexion Hidrologica de La Zona*. Photo report, n.d.

⁴² CONNET. "Entrega de Estudio Tecnico Justificativo de Cambios Al Proyecto: Documento Conciliado Con AUNETI," August 12, 2010, 31, 151.
CONNET. "Presentacion Cambio de Trazo TZ," n.d.
CONNET. "Entrega de Estudio Tecnico Justificativo de Cambios Al Proyecto: Documento Conciliado Con AUNETI," August 12, 2010, 31-32

Many best management practices were followed to avoid erosion along the slopes and hillsides. For example, canals were built to manage downslope rainwater, and terracing and structural reinforcement of the slopes was implemented to prevent hillside deterioration. The affected slopes were re-vegetated to avoid desertification of soils and erosion.⁴³

4.4.2. Land and Water:

In the **Land and Water subcategory**, one credit was evaluated as Enhanced (NW 2.1 Manage Stormwater), one credit received Conserving (NW 2.2 Reduce Pesticides and Fertilizer Impacts), and one credit achieved Superior (NW 2.3 Prevent Surface Water and Groundwater Contamination).

According to a monitoring test conducted in June 2013,⁴⁴ the post-construction flow velocities of the major water bodies matched their pre-development flow velocities. In addition, the project implemented a reforestation and re-vegetation program to avoid exposing slopes.

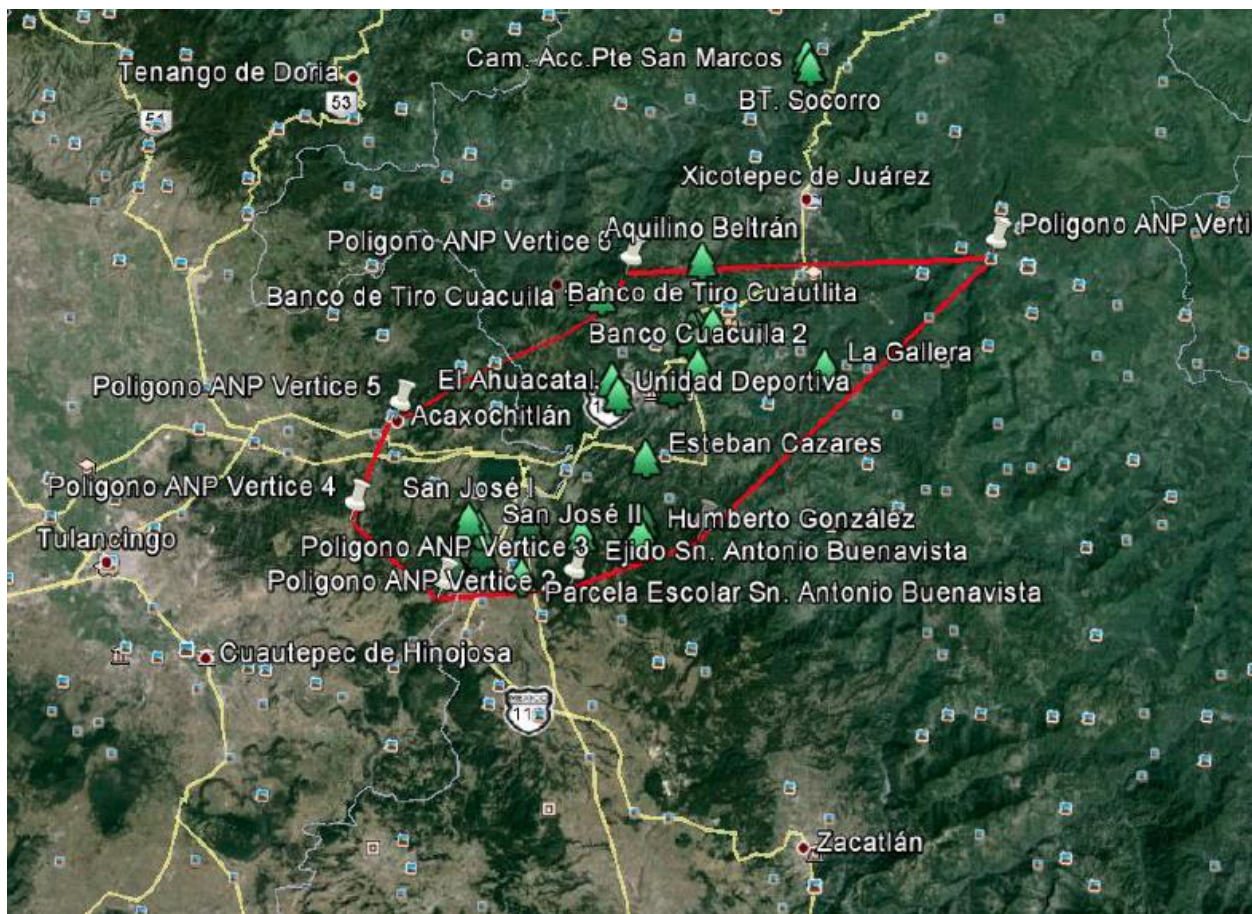


Figure 35: Map of the reforestation sites

Source: CONNET. "Localización de Bancos de Tiro Y Caminos de Acceso Cercanos Al Derecho de vía," n.d.

Native species were chosen to increase the probability of successful re-vegetation. The use of pesticides and fertilizers was limited and controlled; specific recommendations were given regarding the types of

⁴³ CONNET. Arrope de Taludes. Photo report, n.d.

⁴⁴ CONNET. *El Proyecto Mantendra El Transporte de Sedimentos*. Photo report, n.d.

fertilizers (Triple 17 or 19) and methods of application that should be used within 30 days of planting to minimize overtreatment. To minimize the use of herbicides, the land was manually cleared during the reforestation process. The trees were monitored for the presence of pests, weeds and disease, which minimized the use of pesticides, fungicides and herbicides when they were needed. Plans for how to properly replant the native species were provided.⁴⁵

The project follows the procedures for containment and management of possible pollutants during construction that are outlined within Mexican environmental statutes. Recyclables were to be separated, and potentially harmful waste capped and safely stored for timely removal from the site to prevent contamination.⁴⁶ A Preventative Plan for any spillage will also be developed according to a document outlining the major procedures for emergency response.⁴⁷

4.4.3. Biodiversity:

In the **Biodiversity** subcategory, one credit was evaluated as Restorative (NW 3.1 Preserve Species Biodiversity), two credits achieved Conserving (NW 3.3 Restore Disturbed Soils, and NW 3.4 Maintain Wetland and Surface Water Functions), and one credit received Superior (NW 3.2 Control Invasive Species).

The Nuevo Necaxa-Àvila Camacho Highway section achieves the highest score of Restorative for the NW3.1 credit for its efforts to mitigate the negative effects of construction and to create new habitat areas. Two hundred hectares were selected based on specific criteria and were donated to CONANP. Of the landscapes preserved, two types are significant: cloud forests and tropical forests, which contribute to the local hydrological system as well as other ecosystem functions. The 200 hectares are to be perpetually conserved as environmental compensation for the highway project.⁴⁸



Figures 36, 37. Two ecological bridges were constructed to give animals access from one habitat to another.

Source: CONNET. *Proteccion de los habitats existentes a lo largo del proyecto*. Photo report, n.d.

⁴⁵ CONNET. "Programa de Reforestacion Como Medida de Compensacion Ambiental Y Programa de Restauracion de suelos:Municipios de Huachinango, Xicotepec Y Tlacuilotepec En El Estado de Puebla," July 2010, 19-20, 26, 43-44.

⁴⁶ Ojo de Agua. "Programa de Manejo Y Monitoreo Ambiental: Bancos de Tiro, Bancos de Prestamo Y Caminos de Acceso de La Autopista Mexico-Tuxpan Del km140+123 Al km178+500," n.d., 38.

"SGPA/DGIRA.DEI.0554.03." Subsecretaria de Gestion para la Proteccion Ambiental, October 17, 2003, 27-29.

⁴⁷ Barrera, Leonardo. "Procedimiento de Atencion Y Respuesta a Emergencias," July 27, 2012, 6.

⁴⁸ ICA, Globalvia, FCC Construcción, AUNETI, and CONNET. Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 51-53, 75-80.

In addition, two wildlife bridges act as ecological corridors for wild animals to traverse from one habitat to another, while native plants have been selected for the re-vegetation of earthworks and borrow pits to improve the local habitat. The local statute NOM-059-SEMARNAT-2001 requires that plants protected under a specific category need to be saved before vegetation is removed from a site. Similarly, before the creation of an earthwork, search brigades will save the animals categorized for protection.⁴⁹

The Ministry of Environment and Natural Resources (SEMARNAT) has granted the creation of earthworks and borrow pits under the condition that they be reforested and restored. A specific program has been developed and approved by SEMARNAT to restore the disturbed soils in 2013. A total of about 480 hectares of land have been used for access ways, earthworks, and borrow pits and the highway itself, while about 1,400 hectares have been reforested during the entire construction process.

4.4.4. Summary of results, Natural World category:

The table above (figure 38) shows the distribution of the credits, as well as the level of performance achieved in each. Since this is a new construction project on undeveloped land, there is no significant opportunity for improvement in the Siting sub category, which has three credits achieving No Score. However, the project offsets these credits by demonstrating high scores in the biodiversity (80%) and land and water subcategories (50%). The NW 3.1 Credit received the highest possible rating of Restorative for its contribution of 200 hectares of land dedicated for ecological preservation. Considering the maximum possible values for all credits in the Natural World category, the percentage of achievement equals 45.8%, or 93 points out of 203.

| NUEVO NECAXA-AVILA CAMACHO HIGHWAY, MEXICO | | | PT | Performance | % Total | max | |
|--|---------------|---|--|-------------|--------------|------------|----|
| 35 | NATURAL WORLD | SITING | NW1.1 Preserve Prime Habitat | 0 | No Score | 0.0% | 18 |
| 36 | | | NW1.2 Preserve Wetlands and Surface Water | 0 | No Score | 0.0% | 18 |
| 37 | | | NW1.3 Preserve Prime Farmland | 6 | Conserving | 40.0% | 15 |
| 38 | | | NW1.4 Avoid Adverse Geology | 3 | Superior | 60.0% | 5 |
| 39 | | | NW1.5 Preserve Floodplain Functions | 14 | Conserving | 100.0% | 14 |
| 40 | | | NW1.6 Avoid Unsuitable Development on Steep Slopes | 4 | Superior | 66.7% | 6 |
| 41 | | | NW1.7 Preserve Greenfields | 0 | No Score | 0.0% | 23 |
| 42 | L & W | NW2.1 Manage Stormwater | 4 | Enhanced | 19.0% | 21 | |
| 43 | | NW2.2 Reduce Pesticides and Fertilizer Impacts | 9 | Conserving | 100.0% | 9 | |
| 44 | | NW2.3 Prevent Surface and Groundwater Contamination | 9 | Superior | 50.0% | 18 | |
| 45 | BIODIVERSITY | NW3.1 Preserve Species Biodiversity | 16 | Restorative | 100.0% | 16 | |
| 46 | | NW3.2 Control Invasive Species | 5 | Superior | 45.5% | 11 | |
| 47 | | NW3.3 Restore Disturbed Soils | 8 | Conserving | 80.0% | 10 | |
| 48 | | NW3.4 Maintain Wetland and Surface Water Functions | 15 | Conserving | 78.9% | 19 | |
| | | NW0.0 Innovate or Exceed Credit Requirements | 0 | N/A | | | |
| | | NW | 93 | | 45.8% | 203 | |

Figure 38. Summary of results in the Natural World category.

⁴⁹ Ojo de Agua. "Programa de acciones de proteccion y conservacion de flora silvestre," n.d., 5-22, 67. // CONNET. "Programa de Acciones de Rescate Y Reubicacion de Flora Y Fauna Silvestre," n.d., 31.

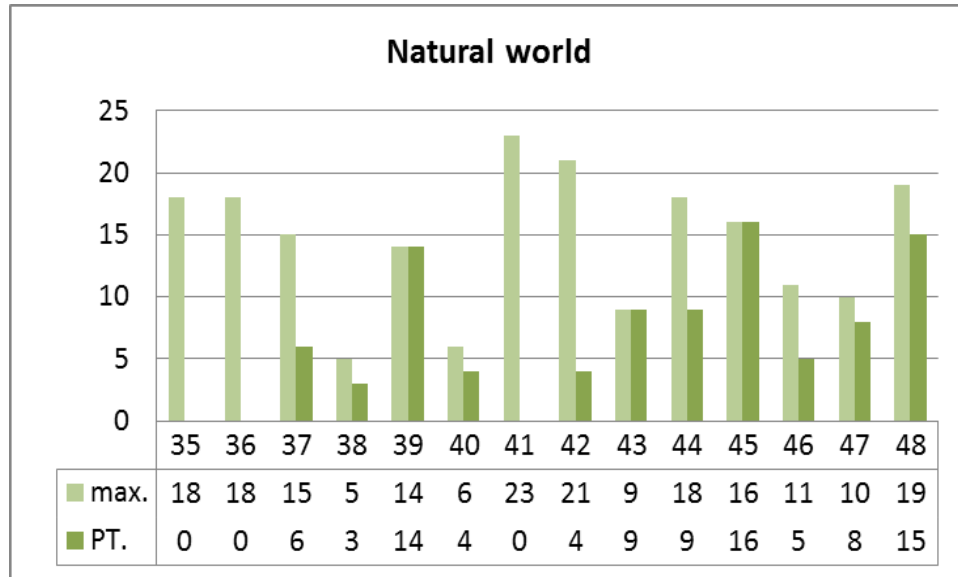


Figure 39. Summary of results in the Natural World category

4.5. CLIMATE AND RISK

Envision’s Climate and Risk category is divided into two main sub-categories, emissions and resilience. The main goals of the category are to “minimize emissions that may contribute to increased short and long-term risks” and “to ensure infrastructure projects are resilient to short-term hazards or long-term altered future conditions.”⁵⁰ The credits are distributed as: Emissions (CR 1.1, CR 1.2), and Resilience (CR 2.1, CR 2.2, CR 2.3, CR 2.4, CR 2.5).

CREDIT SCORING

| | | | IMPROVED | ENHANCED | SUPERIOR | CONSERVING | RESTORATIVE |
|--------------------------|----------------|--|----------|----------|----------|------------|-------------|
| 49 | CLIMATE & RISK | EMISSIONS | | | | | |
| 50 | | CR1.1 Reduce greenhouse gas emissions | 4 | 7 | 13 | 18 | 25 |
| 51 | | CR1.2 Reduce air pollutant emissions | 2 | 6 | | 12 | 15 |
| 52 | RESILIENCE | CR2.1 Assess climate threat | | | | 15 | |
| 53 | | CR2.2 Avoid traps and vulnerabilities | 2 | 6 | 12 | 16 | 20 |
| 54 | | CR2.3 Prepare for long-term adaptability | | | | 16 | 20 |
| 55 | | CR2.4 Prepare for short-term hazards | 3 | | 10 | 17 | 21 |
| | | CR2.5 Manage heat islands effects | 1 | 2 | 4 | 6 | |
| Maximum points possible: | | | | | | | 116 |

Figure 40: Climate and Risk credit distribution.

4.5.1 Emissions

Both credits within the **Emissions subcategory** achieved No Score (CR 1.1 Reduce Greenhouse Gas Emissions, and CR 1.2 Reduce Air Pollutant Emissions). Please refer to the Credit Details in the Appendix for further explanation.

⁵⁰ Envision Guidance Manual, p.150

4.5.2 Resilience

In the **Resilience subcategory**, three credits were assessed as No Score (CR 2.1 Assess Climate Threat, CR 2.3 Prepare for Long-Term Adaptability, and CR 2.5 Manage Heat Island Effects), one credit received Enhanced (CR 2.2 Avoid Traps and Vulnerabilities), and one credit received Improved (CR 2.4 Prepare for Short-Term Hazards).

The Evaluation of Risks (Evaluación de Riesgos) document provided outlines the various traps and vulnerabilities of nine communities in proximity to the Nuevo Necaxa-Àvila Camacho project. Potential negative impacts of the highway project are anticipated to extend to the towns and villages of Patoltecoya, Cuaxicala, Cuahueyatla, San Augustin, Xicotepec, Tepapatlaxco, Teteloloya, La Esperanza, and Plan de Ayala. Among the identified community issues were deterioration of local or rural roads, rockslides, possible inundation, and sound pollution. Consequently, the project qualifies for the Enhanced level for specifying unique solutions for each location to avoid these configuration traps.⁵¹

4.5.3 Summary of results Climate and Risk category.

The table above (figure 41) shows the distribution of the credits, as well as the level of performance achieved in each.

| NUEVO NECAXA-AVILA CAMACHO HIGHWAY, MEXICO | | | PT. | Performance | % Total | max. |
|--|-----------|--|-----|-------------|---------|------|
| 49 | EMISSION | CR1.1 Reduce Greenhouse Gas Emissions | 0 | No Score | 0.0% | 25 |
| 50 | | CR1.2 Reduce Air Pollutant Emissions | 0 | No Score | 0.0% | 15 |
| 51 | RESILENCE | CR2.1 Assess Climate Threat | 0 | No Score | 0.0% | 15 |
| 52 | | CR2.2 Avoid Traps And Vulnerabilities | 6 | Enhanced | 30.0% | 20 |
| 53 | | CR2.3 Prepare For Long-Term Adaptability | 0 | No Score | 0.0% | 20 |
| 54 | | CR2.4 Prepare For Short-Term Hazards | 3 | Improved | 14.3% | 21 |
| 55 | | CR2.5 Manage Heat Island Effects | 0 | No Score | 0.0% | 6 |
| CR0.0 Innovate Or Exceed Credit Requirements | | | 0 | N/A | | |
| CR | | | 9 | | 7.4% | 122 |

Figure 41: Summary of results in the Climate & Risk

The biggest opportunity for improvement in the Climate and Risk category would be in the Emissions subcategory, which did not receive any points. Considering the maximum possible values for all credits in the Climate and Risk category, the percentage of achievement equals 7.4% or 9 points out of 122.

⁵¹ CONNET. "Programa Interno de Proteccion Civil: Tabla de Identificacion Y Evaluacion de Riesgos Del Inmueble," n.d.

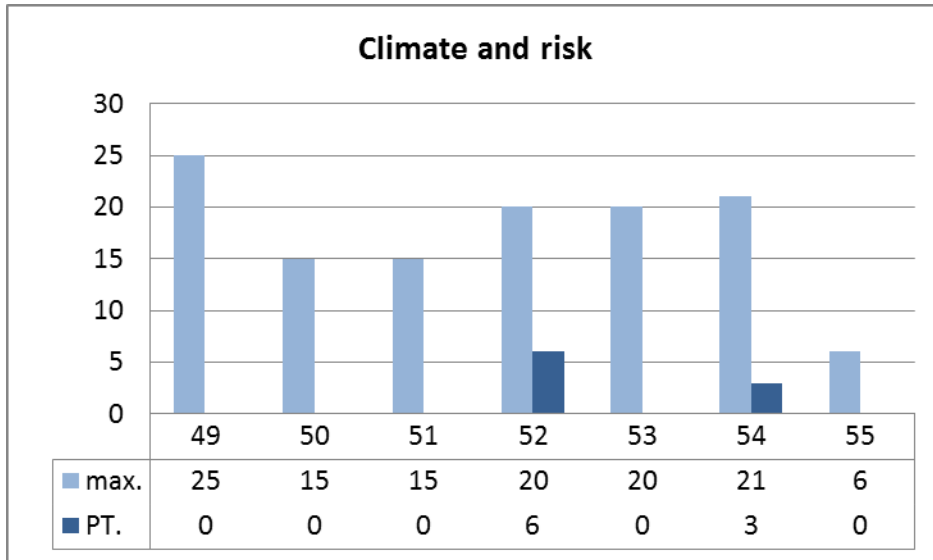


Figure 42: Summary of results in the Climate & Risk category

5. RESULTS AND CONCLUSION

The evaluation of the Nuevo Necaxa-Àvila Camacho Highway has shown the strengths of this project and its significant contribution to Mexico's sustainable development, while also identifying opportunities for improvement.

In the **Quality of Life category**, the project obtained 65 out of 181 points, or 35.9%. This is the second best performance of Nuevo Necaxa-Àvila Camacho Highway in the five categories of *Envision's* rating system. The project is expected to improve the regional and national quality of life through the creation of a direct route from Nuevo Necaxa to Àvila Camacho, thereby decreasing the overall travel time from Mexico City to Tuxpan by half the original time (from five hours and twenty minutes to about two hours and a half). Locally, the project has made some positive impacts on surrounding communities by donating to local schools, creating local employment during the construction phase, and instituting vaccination and adult education programs for its workers. Community needs and concerns were identified and addressed through public hearings and appeals. The local community of Teteloloya was trained in emergency evacuation procedures and how to properly use a fire extinguisher. Jicaro trees were donated to the students of a primary and a secondary school in Cuaxicala.

In the **Leadership category**, the project obtained 33 out of 121 points, or 27.3%, which was the third best performance of Nuevo Necaxa-Àvila Camacho Highway in the five categories of *Envision's* rating system. ICA, a member of the AUNETI consortium, has outlined its commitment to sustainability in its Manual for Implementing Social Responsibility in the Project. This manual identifies specific goals and strategies to address environmental, health and social concerns in the community. The impacts and risks of development have been identified for the nearby localities, and communities have had the opportunity to voice their concerns about the project's effects in the region. Access to local roads has been improved, a flood retention wall was built for one community, while pedestrian and animal access has been ensured through the construction of vehicle underpasses and the amelioration of footpaths.

Furthermore, the useful life of the project has been extended through some major innovations. The use of geosynthetic materials for 80% of the retaining walls was a unique solution to provide flexible yet durable walls compared to the traditional concrete and steel walls. Because geosynthetic retaining walls are flexible and usually modular, they are able to tolerate more movement and thus accommodate seismic shifting without losing structural soundness. The design of the highway lanes was also eventually changed from two lanes to four lanes to accommodate a future increase in highway use, thereby extending the useful life of the project.

In the **Resource Allocation category**, the project obtained 28 of 182 points, or 15.4%. This performance ranked fourth out of the five categories for the Nuevo Necaxa-Àvila Camacho Highway in *Envision's* rating system.

The highest scoring credit in Resource Allocation was RA 3.2 Reduce Potable Water Consumption, which received Conserving. Water catchment areas were excavated to capture runoff and rainwater, while surface water from local rivers was piped to the construction sites. Raw water was used for the construction of the project; potable water was provided for the workers' consumption and sanitation

needs. In comparison to the total volume of water usage for construction, the consumption of potable water was negligible.

The two main opportunities for improvement in this category are in the Energy subcategory and the Materials subcategory, which each have three credits evaluated as No Score. Many of these non-achieving credits required a Life Cycle Analysis, or a similar holistic approach. For example, RA 1.7 Provide for Deconstruction and Recycling, necessitated the inclusion of a lifecycle design at the end of the project's useful life. Similarly, RA 2.1 Reduce Energy Consumption, required a total calculation of the highway's energy consumption and the overall reductions achieved through certain efforts. In these cases, no information was available regarding measures to improve project performance.

In the **Natural World category**, the project obtained 93 out of 203 points, or 45.8%, achieving the highest performance out of the five categories in *Envision's* rating system.

Part of the Nuevo Necaxa-Àvila Camacho Highway runs through the Necaxa River Watershed, which is designated by the Mexican Environmental and Natural Resources Agency as a protected ecological reserve. Consequently, the project does not qualify for two credits in the Siting subcategory. Traversing the Sierra Oriental mountain range, the highway runs through a mountainous, highly erosion-prone area. The project had to avoid unstable slopes during the design and construction phases, particularly around bodies of water to avoid disturbing sensitive watersheds and hydrological processes.

Notable among the project's sustainability initiatives was its effort to preserve species biodiversity. In cooperation with the National Commission of Natural Protected Areas (Comisión Nacional de Àreas Naturales Protegidas, CONANP), the project consortium selected - according to specific criteria - 200 hectares of habitat to be perpetually conserved as environmental compensation for highway development. Two types of landscape were significant: cloud forests and tropical forests, which contribute to the local hydrological system.

In addition, before the creation of an earthwork, search brigades were tasked to save the animals identified for protection. Similar guidelines were outlined for specific native vegetation to be saved and replanted in the mitigation of the earthworks and borrow pits. The use of native species during the re-vegetation efforts and the careful use of fertilizers and pesticides qualified the project for the Conserving level for NW 2.2 Reduce Pesticide and Fertilizer Impacts. Furthermore, the project reused and restored large quantities of disturbed soils resulting from the construction phase. These efforts in the Natural World category demonstrate the project's commitment to sustainability.

In the **Climate and Risk category**, the project obtained 9 out of 122 points, representing 7.4%. This is the least efficient performance of the Nuevo Necaxa-Àvila Camacho Highway out of the five categories of *Envision's* rating system.

The Climate and Risk category represents the largest opportunity for improvement. At the time of the project's evaluation, there was little evidence provided demonstrating that long-term climate impacts were considered in the design of the highway. The Evaluation of Risks (Evaluación de Riesgos) document assesses the likelihood and gravity of various disasters and hazards that might affect the Nuevo Necaxa-Àvila Camacho highway section. Identified risks include geological, hydrological, chemical and social factors.

The graph on the next page shows the performance of the project and total points achieved per category and in summary, benchmarked against the different award levels. The Nuevo Necaxa-Àvila Camacho Highway in Mexico, with 228 points.

The graphs below demonstrate the project’s performance under the three Infrastructure 360° Awards. The **People and Leadership Award** (figure 43) represents the QL and LD categories from the Envision™ Rating System. The project received a score of 98 points out of a total of 302 combined points within these categories, which equates to a 32% level of achievement. The **Climate and Environment Award** (figure 44) represents the RA, NW and CR categories within the Envision™ Rating System. The project received a score of 130 points out of a total of 507 combined points within these categories, which equates to a 26% level of achievement. Thus, the overall achievement of the Nuevo Necaxa-Avila Camacho Highway project under the **Infrastructure 360 Award** (figure 45) is 288 out of 809 points, or 35.6% of the total score.

This report evaluates the sustainability performance of the Nuevo Necaxa-Avila Camacho Highway project according to the Envision™ Rating System. The report identifies areas in which the project scored highly, as well as low-scoring areas that represent opportunities for which the project team can learn and improve on in future projects, as they strive to achieve sustainable project design and construction methodologies.

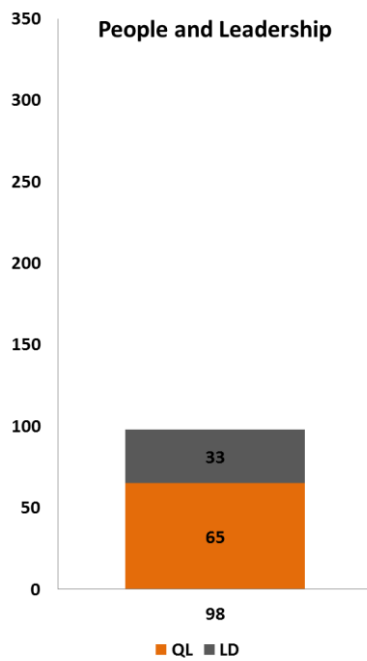


Figure 43: People and Leadership. Score distribution

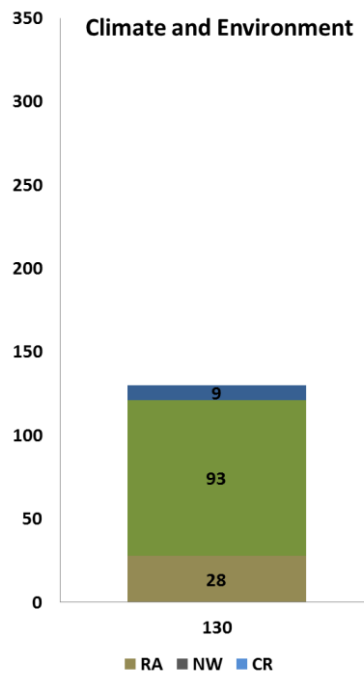


Figure 44: Climate and Environmental. Score distribution

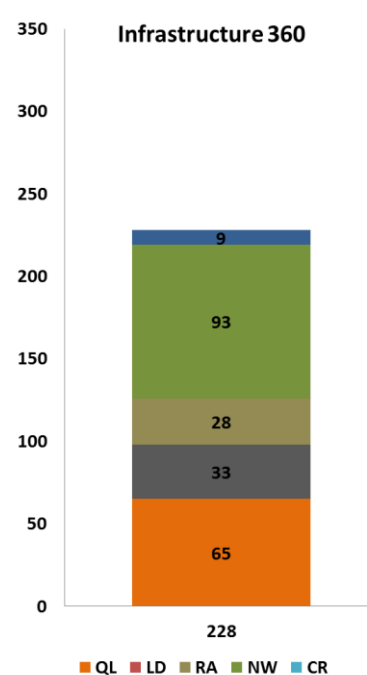


Figure 45: Infrastructure 360. Score distribution



APPENDIX A: PROJECT PICTURES AND DRAWINGS



Figure 46 (left) and 47 (right). Flu vaccination of the workers of Nuevo Necaxa-Ávila Camacho Highway (26 January 2012).
Source: CONNET. *Campaña de Vacunación contra Influenza*. Photo report, n.d.



Figure 48 (left) Sound monitoring in front of a tunnel. Figure 49 (right). Sound monitoring of a terracing site.
Source: CONNET. *Monitoreo de Ruido*. Photo report, n.d.



Figure 50 (left) and Figure 51 (right). Solar powered signs and lights are used for highway operations.
Source: CONNET. *Señalamiento Solar*. Photo report, n.d.



Figure 52 (left). Evacuation route signs are placed in communities as part of the emergency evacuation workshops.

Figure 53 (right). Traffic-calming signage is installed in urban areas./Source: CONNET. *Señalamiento Urbano Y Rural*. Photo report, n.d.

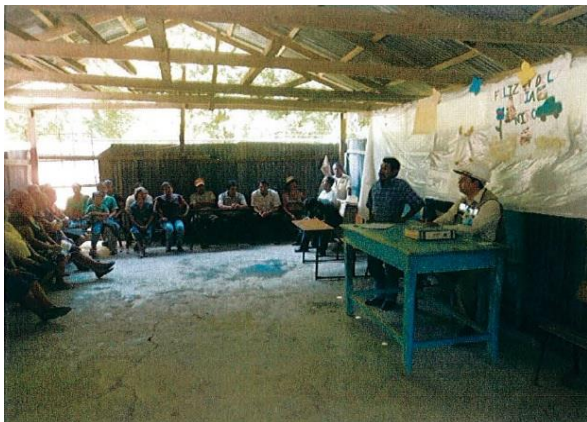


Figure 54 (left) and Figure 55 (right). Residents of Teteloloya, Puebla, raise concerns over the project's impacts on community (18 Oct.11).

Source: "Atenta nota informativa relativa a la asistencia a la comunidad de Teteloloya el dia 18 octubre 2011." Secretaria de Comunicaciones y Transportes, n.d., 2.



Figure 56 (left). A member of the flora rescue brigade saves a tree fern for later re-planting.

Figure 57 (right). Rescued tree ferns are gathered and taken care of until later re-vegetation./ Source: Ojo de Agua. "Programa de acciones de proteccion y conservacion de flora silvestre," n.d., 8.



Figure 58 (left) and Figure 59 (right). A gravel crusher uses the extracted rock material to be reused in the project.
Source: CONNET. *Planta Trituradora*. Photo report, n.d.

APPENDIX B: ENVISION POINTS TABLE

CREDIT SCORING

| | | | IMPROVED | ENHANCED | SUPERIOR | CONSERVING | RESTORATIVE | |
|----|-----------------------------------|-------------------------|---|----------|----------|------------|-------------|----|
| 1 | QUALITY OF LIFE | PURPOSE | QL1.1 Improve community quality of life | 2 | 5 | 10 | 20 | 25 |
| 2 | | | QL1.2 Stimulate sustainable growth and development | 1 | 2 | 5 | 13 | 16 |
| 3 | | | QL1.3 Develop local skills and capabilities | 1 | 2 | 5 | 12 | 15 |
| 4 | | COMMUNITY | QL2.1 Enhance public health and safety | 2 | | | 16 | |
| 5 | | | QL2.2 Minimize noise and vibration | 1 | | | 8 | 11 |
| 6 | | | QL2.3 Minimize light pollution | 1 | 2 | 4 | 8 | 11 |
| 7 | | | QL2.4 Improve community mobility and access | 1 | 4 | 7 | 14 | |
| 8 | | | QL2.5 Encourage alternative modes of transportation | 1 | 3 | 6 | 12 | 15 |
| 9 | | | QL2.6 Improve site accessibility, safety and wayfinding | | 3 | 6 | 12 | 15 |
| 10 | | WELLBEING | QL3.1 Preserve historic and cultural resources | 1 | | 7 | 13 | 16 |
| 11 | | | QL3.2 Preserve views and local character | 1 | 3 | 6 | 11 | 14 |
| 12 | | | QL3.3 Enhance public space | 1 | 3 | 6 | 11 | 13 |
| | | | Maximum points possible: | | | | 181 | |
| 13 | LEADERSHIP | COLLABORATION | LD1.1 Provide effective leadership and commitment | 2 | 4 | 9 | 17 | |
| 14 | | | LD1.2 Establish a sustainability management system | 1 | 4 | 7 | 14 | |
| 15 | | | LD1.3 Foster collaboration and teamwork | 1 | 4 | 8 | 15 | |
| 16 | | | LD1.4 Provide for stakeholder involvement | 1 | 5 | 9 | 14 | |
| 17 | | MANAGEMENT | LD2.1 Pursue by-product synergy opportunities | 1 | 3 | 6 | 12 | 15 |
| 18 | | | LD2.2 Improve infrastructure integration | 1 | 3 | 7 | 13 | 16 |
| 19 | | | LD3.1 Plan for long-term monitoring and maintenance | 1 | 3 | | 10 | |
| 20 | | PLANNING | LD3.2 Address conflicting regulations and policies | 1 | 2 | 4 | 8 | |
| 21 | | | LD3.3 Extend useful life | 1 | 3 | 6 | 12 | |
| | | | Maximum points possible: | | | | 121 | |
| 22 | RESOURCE ALLOCATION | MATERIALS | RA1.1 Reduce net embodied energy | 2 | 6 | 12 | 18 | |
| 23 | | | RA1.2 Support sustainable procurement practices | 2 | 3 | 6 | 9 | |
| 24 | | | RA1.3 Use recycled materials | 2 | 5 | 11 | 14 | |
| 25 | | | RA1.4 Use regional materials | 3 | 6 | 9 | 10 | |
| 26 | | | RA1.5 Divert waste from landfills | 3 | 6 | 8 | 11 | |
| 27 | | | RA1.6 Reduce excavated materials taken off site | 2 | 4 | 5 | 6 | |
| 28 | | | RA1.7 Provide for deconstruction and recycling | 1 | 4 | 8 | 12 | |
| 29 | | ENERGY | RA2.1 Reduce energy consumption | 3 | 7 | 12 | 18 | |
| 30 | | | RA2.2 Use renewable energy | 4 | 6 | 13 | 16 | 20 |
| 31 | | | RA2.3 Commission and monitor energy systems | | 3 | | 11 | |
| 32 | | WATER | RA3.1 Protect fresh water availability | 2 | 4 | 9 | 17 | 21 |
| 33 | | | RA3.2 Reduce potable water consumption | 4 | 9 | 13 | 17 | 21 |
| 34 | RA3.3 Monitor water systems | | 1 | 3 | 6 | 11 | | |
| | | | Maximum points possible: | | | | 182 | |
| 35 | NATURAL WORLD | SITING | NW1.1 Preserve prime habitat | | | 9 | 14 | 18 |
| 36 | | | NW1.2 Protect wetlands and surface water | 1 | 4 | 9 | 14 | 18 |
| 37 | | | NW1.3 Preserve prime farmland | | | 6 | 12 | 15 |
| 38 | | | NW1.4 Avoid adverse geology | 1 | 2 | 3 | 5 | |
| 39 | | | NW1.5 Preserve floodplain functions | 2 | 5 | 8 | 14 | |
| 40 | | | NW1.6 Avoid unsuitable development on steep slopes | 1 | | 4 | 6 | |
| 41 | | | NW1.7 Preserve greenfields | 3 | 6 | 10 | 15 | 23 |
| 42 | | LAND & WATER | NW2.1 Manage stormwater | | 4 | 9 | 17 | 21 |
| 43 | | | NW2.2 Reduce pesticide and fertilizer impacts | 1 | 2 | 5 | 9 | |
| 44 | | | NW2.3 Prevent surface and groundwater contamination | 1 | 4 | 9 | 14 | 18 |
| 45 | | BIODIVERSITY | NW3.1 Preserve species biodiversity | 2 | | | 13 | 16 |
| 46 | | | NW3.2 Control invasive species | | | 5 | 9 | 11 |
| 47 | | | NW3.3 Restore disturbed soils | | | | 8 | 10 |
| 48 | | | NW3.4 Maintain wetland and surface water functions | 3 | 6 | 9 | 15 | 19 |
| | | | Maximum points possible: | | | | 203 | |
| 49 | CLIMATE & RISK | EMISSIONS | CR1.1 Reduce greenhouse gas emissions | 4 | 7 | 13 | 18 | 25 |
| 50 | | | CR1.2 Reduce air pollutant emissions | 2 | 6 | | 12 | 15 |
| 51 | | | CR2.1 Assess climate threat | | | | 15 | |
| 52 | | RESILIENCE | CR2.2 Avoid traps and vulnerabilities | 2 | 6 | 12 | 16 | 20 |
| 53 | | | CR2.3 Prepare for long-term adaptability | | | | 16 | 20 |
| 54 | | | CR2.4 Prepare for short-term hazards | 3 | | 10 | 17 | 21 |
| 55 | CR2.5 Manage heat islands effects | 1 | 2 | 4 | 6 | | | |
| | | | Maximum points possible: | | | | 116 | |
| | | | *The five innovation credits are bonus points and not included in total point tallies | | | | 803 | |

APPENDIX C: CREDIT DETAILS

| CATEGORY I, PEOPLE AND LEADERSHIP (PL) | | |
|---|--|---|
| SUB CATEGORY: QUALITY OF LIFE | | |
| | NUEVO NECAXA-AVILA CAMACHO HIGHWAY, MEXICO | RECOMMENDATIONS |
| PL1.1 Improve Community Quality of Life | <p>Enhanced</p> <p>The project qualifies for the Enhanced level for communicating and addressing the needs of local communities. The Manual for Implementing Social Responsibility in Projects outlines steps to address various educational, health, and environmental issues in the community, suggesting programmatic activities and solutions. The neighboring localities include: Cuautlita, Patoltecoya, Cuaxicala, Cuahueyatla, San Agustín, Las Pilas, Tepapatlaxco, Teteloloya, Tacubaya, La Esperanza San Pedro Petlacotla, Nuevo Tenancingo, and Plan de Ayala, which were all represented by the auxiliary President and the corresponding Justice of the Peace. Various minutes and photo reports confirm communication and remediation between community members and the project team. According to a photo report, the locality Plan de Ayala received improved roads, while Teteloloya also secured paths across the highway to connect to the agricultural fields and other localities. The municipal Mayor of Xicotepec negotiated the relocation of a community due to eminent domain; temporary shelter and the reconstruction of their homes in a similar environment was secured. In another instance, the municipalities of Xicotepec, Tlacuilotepec, and Huauchinango brought forth demands to the project managers that the deteriorated condition of the road to San Agustín be improved, particularly because the project itself overused the road. The project team agreed to install a water drainage system, improve the roads, and reinforce the deteriorating slopes.</p> | <p>To qualify for the Superior level, please submit documentation evidencing that the project engaged the community in collecting, evaluating and incorporating their input into the project designs.</p> |
| | <p>5</p> <p><u>Source:</u> Minuta sobre la visita de Proteccion Civil a la zona de trabajo denominada "Corte 3-ochó" ubicada en el cadenamamiento 860+630, in Tepapatlaxco, Meeting of 4 September 2009. // Minuta de acuerdos para el mejoramiento de la circulacion del camino a San Agustin zonas afectadas por llluvias, in Xicotepec de Juarez, Puebla, Meeting of 25 July 2008. // Minuta de acuerdos, in the Cabildo of the Municipal Presidency in Xicotepec de Juarez, Puebla, meeting of 25 September 2009, 2. // "Atenta nota informativa relativa a la asistencia a la comunidad de Teteloloya el dia 18 octubre 2011." Secretaria de Comunicaciones y Transportes, n.d. // Consultoria Especializada en Estudios Ambientales. Manifestacion de impacto ambiental modalidad regional para bancos y caminos de acceso de la carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho del km140+123 al km178+500 en el estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d., 26-34. // ICA. "Manual Para Implementar Responsabilidad Social En Los Proyectos," n.d. // CONNET. Camino de Acceso Comunidad Plan de Ayala. Photo report, n.d. //Biologia Integral en Impacto Ambiental. Modificacion: Manifestacion de Impacto Ambiental Modalidad Para: Bancos de Préstamo Y de Tiro de La Carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho Del km140+123 Al km178+500 En El Estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d, 77. //Santamaria, Ariana. "Atencion a Partes Interesadas: CONNET-RS-PRO-001 r0." CONNET, November 11, 2010.</p> | |

| | | | |
|--|-----------|---|---|
| <p>PL1.2 Stimulate Sustainable Growth & Development</p> | <p>2</p> | <p>Improved</p> <p>A list of all of the employees illustrates that local labor was used in the construction of the Nuevo Necaxa-Ávila Camacho highway section, thus qualifying the project for the “Improved” level. It is unclear whether the project explicitly intended to create jobs for the local community as a result of the highway connection. Because the provided documentation does not clearly demonstrate that intention, it does not qualify for the Enhanced level.</p> <p><u>Source :</u> “Base de Datos,” n.d. // Biología Integral en Impacto Ambiental. Modificación: Manifestación de Impacto Ambiental Modalidad Para: Bancos de Préstamo Y de Tiro de La Carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho Del km140+123 Al km178+500 En El Estado de Puebla. Manifestación de impacto ambiental modalidad regional, n.d.</p> | <p>Please provide reports showing how the delivered work expands the economic opportunities of the community or increases the quality of operational, recreational or cultural capacity for the community.</p> |
| <p>PL1.3 Develop Local Skills and Capabilities</p> | <p>12</p> | <p>Conserving</p> <p>The project provides support for its workers to be certified at the primary and secondary education level. According to the documentation, at least one worker (Pedro Tapia Gonzalez) was certified for achieving the primary level of education. A photo report evidences some workers taking the certification tests. Because the hiring and educational program emphasis shifts from the highway’s needs to local capacity development, the project receives the Conserving level. A list of all of the hired workers confirms that local labor was contracted for the development of the project. The “Manual for Implementing Social Responsibility during the Project” (Manual para Implementar Responsabilidad Social en los Proyectos) lists technical training as one of its strategies for bettering the local community’s education level. The manual further outlines a procedure whereby a local school will be adopted by the project and the school will be physically improved. The school is to be repainted; it will receive book donations; sustainability lectures will be held for the parents and students, an adult education program (INEA—Instituto Nacional para la Educación de los Adultos) will be instituted during the evenings or on Saturdays.</p> <p><u>Source:</u> ICA. “Manual Para Implementar Responsabilidad Social En Los Proyectos,” n.d. // “Aplicación de Exámenes de INEA,” n.d. // “Base de Datos,” n.d. // Santamaría, Ariana. “Atención a Partes Interesadas: CONNET-RS-PRO-001 r0.” CONNET, November 11, 2010.</p> | <p>To receive the Restorative level, please provide documentation that demonstrates educational programs shifting emphasis from local capacity development to community competitiveness. Documents identifying the community’s educational and employment needs and shortfalls would help qualify for this level.</p> |

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|--|----------|--|---|
| <p>PL2.1 Enhance Public Health And Safety</p> | <p>2</p> | <p>Improved</p> <p>The “Manual for Implementing Social Responsibility during the Project” (Manual para Implementar Responsabilidad Social en los Proyectos) outlines a program of health and education, including vaccination programs and health campaigns and technical capacitation for the worker community. A registry of the health campaign records all of the workers and project personnel. For the Flu virus, 221 individuals were vaccinated, 72 individuals for intestinal parasites (Albendazole), 148 individuals for Tetanus, and 82 for the Tetanus Viral Influenza. Forty-six individuals were tested for their blood glucose level.</p> <p>The locality of Teteloloya requested the construction of a retention wall to protect the community from floods. The project team also trained the community in fighting fires with fire extinguishers, as well as donating first aid kits, fire extinguishers, and walkie-talkies. Evacuation signs were donated and evacuation procedures and routes were established for the community of Teteloloya.</p> <p>Furthermore, risk assessments were conducted for Teteloloya. Erosion-prone areas that might affect the community were identified and steps, such as an emergency communication system, were outlined to address the risk areas.</p> <p><u>Source</u> : ICA. “Manual Para Implementar Responsabilidad Social En Los Proyectos,” n.d., 2. // “Campañas SMO,” January 1, 2013. // CONNET. Campaña de Vacunacion Contra Influenza 26/01/12. Photo report, n.d. // CONNET. “Vinculos Con Comunidades: Teteloloya, Tlacuilotepec, Puebla,” n.d. // CONNET. Senalizacion Urbana Y Rural. Photo report, n.d. // CONNET. “Programa Interno de Proteccion Civil: Tabla de Identificacion Y Evaluacion de Riesgos Del Inmueble,” n.d. // Rodriguez, Alberto, and Quirino Angeles. “Plan Operativo de Seguridad Tramo 4, Zona de Teteloloya,” October 29, 2009.</p> | <p>To qualify for the Conserving level, the appropriate environmental, public health and safety officials must sign off on the project designs and the risk assessments. More detailed health assessments would also be helpful in the evaluation of this credit.</p> |
| <p>PL2.2 Minimize Noise And Vibration</p> | <p>8</p> | <p>Conserving</p> <p>Mexican environmental standard NOM-080-SEMARNAT-1994 establishes noise limits for the machinery used during construction, and NOM-081-SEMARNAT-1994 limits stationary sources of noise pollution. According to the former, machines are permitted to emit 86-99 dB depending on their size and weight. The latter limits the noise levels from 6am to 10pm at 68 dB, and from 10pm to 6am at 65 dB. Furthermore, activities are prohibited during the night, thereby ensuring silence. Noise levels are regularly monitored during construction; noise-reducing equipment was installed in areas that produced more than 85 dB, reducing noise pollution by 50%, according to a photo report. Regular monitoring and noise reduction measures qualify the project for the Conserving level.</p> <p><u>Source</u> : CONNET. Disminucion de Ruido. Photo report, n.d. // “Evaluacion de Cumplimiento Legal,” n.d, sheet: R.1680 MIA-CONNET. // Consultoria Especializada en Estudios Ambientales. Manifestacion de impacto ambiental modalidad regional para bancos y caminos de acceso de la carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho del km140+123 al km178+500 en el estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d., 140. // CONNET. Toma de Lecturas ABC. Photo report, n.d. // CONNET. Monitoreo de Ruido. Photo report, n.d.</p> | <p>Please provide documentation that demonstrates that analyses and documentation of estimates of ambient noise and vibration levels will be substantially lower than previous levels, creating quieter communities.</p> |

| | | | |
|---|----------|---|--|
| <p>PL2.3 Minimize Light Pollution</p> | <p>1</p> | <p>Improved</p> <p>The environmental impact statement states that any activity is prohibited during the night, thereby ensuring that nighttime lighting would be kept at a minimum during construction. Electrical engineering studies of the highway’s sections (Ingetec, 8) indicate that the project managers will apply the “IEEE 739 (Institute of Electrical and Electronics Engineers) Standards—Recommended Practice for Energy Conservation and Cost Effective Planning in Industrial Facilities” when it meets the technical standards and does not increase the costs. A Photographic Report also illustrates the use of solar panels powering lighted detour signs, thus relying on renewable energy, thus qualifying the project for the Improved level.</p> <p>Source : Consultoria Especializada en Estudios Ambientales. Manifestacion de impacto ambiental modalidad regional para bancos y caminos de acceso de la carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho del km140+123 al km178+500 en el estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d. // CONNET. Soporte Fotografico de Senalamineo Solar. Photo report, n.d. // Ingetec. Memorias de calculo electrico Tunel Xicotepec II rev.2, August 2010, 8.</p> | <p>Please provide documentation demonstrating that lighting components were designed to reduce lighting energy requirements or light spillage in the night. Any documentation indicating that the lighting zone levels were developed appropriately for the needs of the project. Signage for the constructed work should meet the following criteria: at all times, there shall be no display movement such as twirls, swirls, blinking, video clips or other forms of animation. Sign copy cannot change more than once per hour. During daylight hours between sunrise and sunset, luminance shall be no greater than 2000 candelas per square meter. At all other times, luminance shall be no greater than 250 candelas per square meter.</p> |
| <p>QL2.4 Improve Community Mobility And Access</p> | <p>7</p> | <p>Conserving</p> <p>The project qualifies for the Conserving level through addressing the mobility needs of local communities. Various minutes and photo reports confirm communication and remediation between community members and the project team. According to one photo report, the locality Plan de Ayala received road improvements, while the community of Teteloloya secured paths transversing the highway to access agricultural fields and other towns. The municipalities of Xicotepec, Tlacuilotepec, and Huauchinango requested that project managers improve the deteriorated road to San Agustín, particularly because the project contributed to its poor condition. The project team agreed to install a drainage system, improve the roads, and reinforce deteriorating slopes. The project workers also cleared debris from the path connecting Ula to Teteloloya caused by heavy rainfall. Road signs for urban and rural areas were installed to control and calm traffic in the local region. In addition, it was determined that roads would be provided to connect Teteloloya to Itzatlán, Tlapehualita and Palo Blanco, and Techalotla. Vehicle underpasses (pasos inferiores vehiculares—PIV) were also constructed to ensure pedestrian access in some areas.</p> <p>Lastly, as a major highway project that integrates itself into a larger system of highways, it is planned to dramatically reduce travel time by a half from Mexico City to Tuxpan. Thus, it will improve the lives of communities on a national scale.</p> | <p>Please provide additional documentation showing how long-term access and mobility improves efficiency, walkability and livability in the local communities.</p> |

| | | |
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| | <p><u>Source</u> : “Planeacion integral: construccion tramo carretero I.” Secretaria de Comunicaciones y Transportes, n.d., 8-9. // CONNET. Evidencia Fotografica PIVs. Photo report, n.d. // CONNET. Senalizacion Urbana Y Rural. Photo report, n.d. // Solis Sampayo, Daniel. “Oficio de Agradecimiento: Camino ULA,” July 26, 2011. // Minuta sobre la visita de Proteccion Civil a la zona de trabajo denominada "Corte 3-ocho" ubicada en el cadenamiento 860+630, in Tepapatlaxco, Meeting of 4 September 2009. // Minuta de acuerdos para el mejoramiento de la circulacion del camino a San Agustin zonas afectadas por llluvias, in Xicotepec de Juarez, Puebla, Meeting of 25 July 2008. // Minuta de acuerdos, in the Cabildo of the Municipal Presidency in Xicotepec de Juarez, Puebla, meeting of 25 September 2009, 2. // “Atenta nota informativa relativa a la asistencia a la comunidad de Teteloloya el dia 18 octubre 2011.” Secretaria de Comunicaciones y Transportes, n.d. // Consultoria Especializada en Estudios Ambientales. Manifestacion de impacto ambiental modalidad regional para bancos y caminos de acceso de la carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho del km140+123 al km178+500 en el estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d., 26-34. // ICA. “Manual Para Implementar Responsabilidad Social En Los Proyectos,” n.d. // CONNET. Camino de Acceso Comunidad Plan de Ayala. Photo report, n.d. // Biologia Integral en Impacto Ambiental. Modificacion: Manifestacion de Impacto Ambiental Modalidad Para: Bancos de Préstamo Y de Tiro de La Carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho Del km140+123 Al km178+500 En El Estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d., 77. // Santamaria, Ariana. “Atencion a Partes Interesadas: CONNET-RS-PRO-001 r0.” CONNET, November 11, 2010.</p> | |
| <p>QL2.5 Encourage Alternative Modes of Transportation</p> | <p>3</p> <p>Enhanced</p> <p>The Nuevo Necaxa-Àvila Camacho highway section receives the Enhanced level for providing pedestrian access across the highway, in the form of vehicle underpasses or pedestrian overpasses, to connect the neighboring communities. The local communities also requested that the project improve the conditions of local roads so that pedestrians and other modes of transportation could have easier access.</p> <p><u>Source</u> : CONNET. Evidencia Fotografica PIVs. Photo report, n.d. // Minuta de acuerdos, in the Cabildo of the Municipal Presidency in Xicotepec de Juarez, Puebla, meeting of 25 September 2009, 2. // “Atenta nota informativa relativa a la asistencia a la comunidad de Teteloloya el dia 18 octubre 2011.” Secretaria de Comunicaciones y Transportes, n.d. // Consultoria Especializada en Estudios Ambientales. Manifestacion de impacto ambiental modalidad regional para bancos y caminos de acceso de la carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho del km140+123 al km178+500 en el estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d., 26-34. // ICA. “Manual Para Implementar Responsabilidad Social En Los Proyectos,” n.d. // CONNET. Camino de Acceso Comunidad Plan de Ayala. Photo report, n.d.</p> | <p>To receive the Superior level, provide documentation that shows that the project design encourages residents to use non-motorized transportation.</p> |

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| <p>QL2.6 Improve Site Accessibility, Safety & Wayfinding</p> | <p>3</p> | <p>Enhanced</p> <p>The project qualifies for the Enhanced level for the installation of traffic-calming and evacuation route signage. Signs indicating the maximum speed along certain rural and urban routes help control traffic and improve road safety. A photo report illustrates the various signs and precautionary measures within the construction site to ensure worker safety. Within the community, evacuation routes and procedures were installed and an Internal Program of Civil Protection was outlined for the project, which included a Response and Emergency Plan for the highway section. An Operational Safety Plan for the Community of Teteloloya also outlined an emergency plan for landslides and evacuation procedures.</p> <p><u>Source</u> : Rodriguez, Alberto, and Quirino Angeles. "Plan Operativo de Seguridad Tramo 4, Zona de Teteloloya," October 29, 2009. // CONNET. "Programa Interno de Proteccion Civil: Tabla de Identificacion Y Evaluacion de Riesgos Del Inmueble," n.d., 5. // Barrera, Leonardo. "Procedimiento de Atencion Y Respuesta a Emergencias." CONNET, July 27, 2012, 4. // CONNET. Senalamiento Informativo Conforme a La NOM-026-STPS: Colores Y Senales de Seguridad. Photo report, n.d. // CONNET. Senalamientos. Photo report, n.d. // CONNET. Senalizacion Urbana Y Rural. Photo report, n.d.</p> | <p>To achieve the Superior level, provide documentation showing plans for protection of and accessibility to nearby environmentally or historically sensitive areas or cultural sites.</p> |
| <p>QL3.1 Preserve Historic And Cultural Resources</p> | <p>13</p> | <p>Conserving</p> <p>During the construction of the Nuevo Necaxa-Àvila Camacho highway section, the project workers encountered two archeological sites known as La Esperanza and La Joya, which necessitated professional evaluation by the National Institute of Anthropology and History (Instituto Nacional de Antropologia e Historia – INAH) and authorization of the Mexican government to continue construction. With the discovery, the project siting was modified to avoid the archeological areas, changing the path as well as the location of a terrace over the road to Plan de Ayala. Due to its efforts to preserve the historical heritage, the project receives the Conserving level.</p> <p><u>Source</u> : CONNET. "Desvio de Trazo Por Hallazgo de Zona Arqueologica," n.d., 4. // AUNETI, CONNET, ICA, and FCC Construccion. "Desvio de Trazo Por Hallazgo de Vestigios Arqueologicos," August 2011.</p> | <p>To qualify for the Restorative level, provide documentation demonstrating that the project attempted to enhance and restore the cultural sites with cultural preservationists.</p> |
| <p>QL3.2 Preserve Views And Local Character</p> | <p>1</p> | <p>Improved</p> <p>The project was conscious of the region’s natural views and endeavored to preserve panoramas and natural scenery by carefully siting bridges and tunnels through the Sierra Occidental Mountains. Borrow pits and earthworks were reforested and local fauna and flora were saved and released into the wild after remediation.</p> <p><u>Source</u> : CONNET. Fotos Panoramicas Nuevo Necaxa-Avila Camacho. Photo report, n.d. // CONNET. "Programa de Acciones de Rescate Y Reubicacion de Flora Y Fauna Silvestre," n.d. // CONNET. "Programa de Reforestacion Como Medida de Compensacion Ambiental Y Programa de Restauracion de suelos:Municipios de Huachinango, Xicotepec Y Tlacuilotepec En El Estado de Puebla," July 2010.</p> | <p>To qualify for the Enhanced level, provide documentation demonstrating that an inventory of natural landscape features was created and that the sites were protected.</p> |

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| QL3.3 Enhance Public Space | 0 | No Score | Provide documentation assessing the impact of the project on existing public space in order to qualify for the Improved level. |
| | | The project did not identify or improve any public spaces and thus does not qualify for this credit. The project does, however, include a flood retention wall that attempts to enhance the community livability of the Teteloloya, which could count towards the innovation credit. | |
| | | Source : N/A | |
| QL0.0 Innovate Or Exceed Credit Requirements | 8 | <p>The “Manual for Implementing Social Responsibility during the Project” (06-036, p. 2) outlines a program of health and education, including vaccination programs and health campaigns and technical capacitation for the worker community. A registry of the health campaign records all of the workers and project personnel. For the Flu virus, 221 individuals were vaccinated, 72 individuals for intestinal parasites (Albendazole), 148 individuals for Tetanus, and 82 for the Tetanus Viral Influenza. Forty-six individuals were tested for their blood glucose level.</p> <p>The locality of Teteloloya has requested the construction of a retention wall to protect the community from floods. The project team also trained the community in fighting fires with fire extinguishers, as well as donating first aid kits, fire extinguishers, and walkie-talkies. In addition, the project has donated 80 emergency food packages to the residents of Teteloloya who were affected by Hurricane Arlene. Engineering students from the local University de la Sierra were given a tour of the project to further their experiences in the field.</p> | |
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| SUB CATEGORY: LEADERSHIP | | | |
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| | NUEVO NECAXA-AVILA CAMACHO HIGHWAY, MEXICO | | RECOMMENDATIONS |
| LD1.1 Provide Effective Leadership And Commitment | 17 | Conserving | To qualify for a higher score, provide evidence that a charter document was agreed to and signed by the project owner, the designer, contractors, and operators. The documents should demonstrate that sustainability is a core value of the project. |
| | | <p>The Manual for Implementing Social Responsibility in the Project outlines a commitment by ICA, a partner company, to implement programs created by the company’s Commission of Social Sustainability within the communities located near the project. The manual outlines key issues for the community, such as health, education, and the environment, and strategies for identifying and addressing each respective issue. The company recognizes that “the actions targeting social responsibility are a commitment that we have to encourage in our workers, more than for economic benefit but for personal satisfaction” (ICA, 1: translated from: “Las acciones encaminadas a responsabilidad social son un compromiso que tenemos que fomentar en nuestros trabajadores, más que por un beneficio económico, por una satisfacción personal”).</p> <p>Steps are identified at the beginning and during the execution of the project to address the company’s social responsibility. Consequently, the project achieves the Superior level because project leadership demonstrates a high level of commitment on the part of the project team and owner to implement a sustainability program in the community. As elaborated in the prior Quality of Life credits, the project team made various efforts to improve deteriorating road conditions in the region, to vaccinate local workers, and to design a civil emergency response system through donations for evacuation signs, fire extinguishers, and first aid kits. A reforestation program for the Jicaro tree was implemented with help from the local primary and secondary schools in Cuaxicala.</p> | |

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| | | <p>Source: ICA. "Manual Para Implementar Responsabilidad Social En Los Proyectos," n.d., 1. //</p> <p>"Entrega Del Arbol Del Jicaro a Todo El Alumnado de Escuela Secundaria El Vivero Ojo de Agua." October 2012. //</p> <p>"Entrega Del Arbol Del Jicaro a Todo El Alumnado de Escuela Primaria Y Padres de Familia En Un Evento Especial 'Adopta Un Arbol.'" November 2012.</p> | |
| <p>LD1.2 Establish A Sustainability Management System</p> | <p>4</p> | <p>Enhanced</p> <p>A document outlining the management of security, quality and social responsibility identified appropriate mechanisms and entities responsible for addressing specific issues. A committee in charge of quality, security, the environment, and social responsibility was created to ensure the implementation of a sustainability management system. The Manual for Implementing Social Responsibility in the Project outlines key issues for the local communities, such as health, education, and the environment, and strategies for identifying and addressing each respective issue.</p> | <p>To qualify for the Superior level, please submit more detailed documents showing the individuals responsible for project sustainability issues, their position in the organization, and their authority to make project decisions and affect change. Please also provide documentation of the project's business processes and management controls (such as procedures, flow charts, checklists, and other documented control measures).</p> |
| | | <p>Source: ICA. "Manual Para Implementar Responsabilidad Social En Los Proyectos," n.d., 1. //</p> <p>"Entrega Del Arbol Del Jicaro a Todo El Alumnado de Escuela Secundaria El Vivero Ojo de Agua." October 2012. //</p> <p>"Entrega Del Arbol Del Jicaro a Todo El Alumnado de Escuela Primaria Y Padres de Familia En Un Evento Especial 'Adopta Un Arbol.'" November 2012. //</p> <p>Santamaria, Ariana. "Atencion a Partes Interesadas: CONNET-RS-PRO-001 r0." CONNET, November 11, 2010.</p> | |
| <p>LD1.3 Foster Collaboration And Teamwork</p> | <p>0</p> | <p>No Score</p> <p>Little evidence was provided as to design collaboration and teamwork in integrating design and delivery methodologies and management controls. Basic mechanisms were established for submittal of complaints, and surveys were to administered to understand the working conditions. However, because no demonstrated evidence of design charettes or the use of whole systems design processes to optimize project performance was planned or provided, the Nuevo Necaxa-Àvila Camacho highway section did not qualify for this credit.</p> | <p>Provide evidence of a multi-disciplinary project team process or of design charettes that identify opportunities for improving sustainable performance and reducing design conflicts. Any further evidence of the planned use of whole systems design processes to optimize project performance would also be helpful in the evaluation of this credit.</p> |
| | | <p>Source: N/A</p> | |

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| <p>LD1.4 Provide For Stakeholder Involvement</p> | <p>4</p> | <p>Enhanced</p> <p>The project has identified the following communities in proximity of the development: Cuautlita, Patoltecoya, Cuaxicala, Cuahueyatla, San Agustín, Las Pilas, Tapatlatlaxco, Teteloloya, Tacubaya, La Esperanza San Pedro Petlacotla, Nuevo Tenancingo y Plan de Ayala. Of these communities, impacts and risks have been identified, and communities have had the opportunity to voice their concerns about the project's effects in the region.</p> <p>The communities noted the following concerns: deterioration of local roads (from heavy use by the project's machinery), contamination of springs, relocation of the Tepapatlaxco community, disruption of Nuevo Tenancingo's two power lines, and the obstruction of local roads due to the new highway. According to the provided minutes and reports, the project managers considered each issue and responded in a variety of ways, which included channelization of water and runoff, clearing of roads, stabilization of slopes, careful relocation of the Tepapatlaxco community, and provision of footpaths and roads for the local community and animals. Based on the documentation submitted, however, it appears that stakeholders were not given the opportunity to provide input on the project plans or the decision-making processes. Consequently, the project only qualifies for the Enhanced level and not the Superior level.</p> | <p>To qualify for the Superior level, please provide documentation demonstrating that stakeholder input was gathered and considered in the decision-making process.</p> |
| | | <p><u>Source</u></p> <p>Minuta de acuerdos, in the Cabildo of the Municipal Presidency in Xicotepec de Juarez, Puebla, meeting of 25 September 2009. // Recorrido de Patoltecoya, Minuta del Recorrido de Obra con el presidente auxiliar de Patoltecoya, DDV del a SCT, et al., Meeting of 16 October 2008. // Minuta de la solicitud de la comunidad de Cuaxicala, in the on-site office in Xicotepec de Juarez, Puebla, Meeting of 25 August 2011. // Minuta sobre la visita de Proteccion Civil a la zona de trabajo denominada "Corte 3-ocho" ubicada en el cadenamiento 860+630, in Tepapatlaxco, Meeting of 4 September 2009. // Minuta del recorrido, con motivo de los cruces y la Liberacion de Derecho de Via, in the on-site office in Xicotepec de Juarez, Puebla, Meeting of 24 August 2010. // Minuta de acuerdos para el mejoramiento de la circulacion del camino a San Agustin zonas afectadas por lluvias, in Xicotepec de Juarez, Puebla, Meeting of 25 July 2008. // ICA. "Manual Para Implementar Responsabilidad Social En Los Proyectos," n.d. // "Entrega Del Arbol Del Jicaro a Todo El Alumnado de Escuela Secundaria El Vivero Ojo de Agua." October 2012. // "Entrega Del Arbol Del Jicaro a Todo El Alumnado de Escuela Primaria Y Padres de Familia En Un Evento Especial 'Adopta Un Arbol.'" November 2012. // Santamaria, Ariana. "Atencion a Partes Interesadas: CONNET-RS-PRO-001 r0." CONNET, November 11, 2010, 3. Minuta de acuerdos para la liberacion de derecho de via, Meeting of 14 February 2013, 6. "Atenta nota informativa relativa a la asistencia a la comunidad de Teteloloya el dia 18 octubre 2011." Secretaria de Comunicaciones y Transportes, n.d. // CONNET. "Programa Interno de Proteccion Civil: Tabla de Identificacion Y Evaluacion de Riesgos Del Inmueble," n.d., 4-5.</p> | |

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| <p>LD2.1 Pursue By-Product Synergy Opportunities</p> | <p>0</p> | <p>No Score</p> <p>The project does not qualify for points under this credit because the documents provided do not demonstrate that unwanted byproducts or discarded materials from nearby facilities were sought out for use by the project.</p> <p><i>Source:</i> N/A</p> | <p>To qualify for the Improved level, please submit documentation identifying and characterizing a limited set of nearby facilities or waste streams, with the possible intention of reusing discarded byproducts from these facilities.</p> |
| <p>LD2.2 Improve Infrastructure Integration</p> | <p>1</p> | <p>Improved</p> <p>The Nuevo Necaxa-Àvila Camacho highway section receives the Improved level for its efforts to integrate community infrastructure into its project design and functions. According to the provided reports and minutes from community meetings, many of the improvements to the local paths and roads were not integrated into the design from the outset of the project. Instead, improvement in footpaths and roads were implemented after the local communities voiced their concerns about the project’s impacts. For example, parts of the highway obstructed old pathways used by the local population and their animals, and so new paths had to be created in response to their needs. In one case, a vehicle underpass (paso inferior vehicular—PIV) was also constructed to ensure pedestrian access (located on km 141+480 of the highway section).</p> <p><i>Source:</i> CONNET. Evidencia Fotografica PIVs. Photo report, n.d. // Grupo Selome. Manifestacion de Impacto Ambiental. Secretaria de Comunicaciones y Transportes, n.d., 24. Minuta de acuerdos, in the Cabildo of the Municipal Presidency in Xicotepec de Juarez, Puebla, meeting of 25 September 2009. // Recorrido de Patoltecoya, Minuta del Recorrido de Obra con el presidente auxiliar de Patoltecoya, DDV del a SCT, et al., Meeting of 16 October 2008. Minuta de la solicitud de la comunidad de Cuaxicala, in the on-site office in Xicotepec de Juarez, Puebla, Meeting of 25 August 2011. // Minuta sobre la visita de Proteccion Civil a la zona de trabajo denominada "Corte 3-ocho" ubicada en el cadenamiento 860+630, in Tepapatlaxco, Meeting of 4 September 2009. // Minuta del recorrido, con motivo de los cruces y la Liberacion de Derecho de Via, in the on-site office in Xicotepec de Juarez, Puebla, Meeting of 24 August 2010. // Minuta de acuerdos para el mejoramiento de la circulacion del camino a San Agustin zonas afectadas por lluvias, in Xicotepec de Juarez, Puebla, Meeting of 25 July 2008. // ICA. “Manual Para Implementar Responsabilidad Social En Los Proyectos,” n.d. // “Entrega Del Arbol Del Jicaro a Todo El Alumnado de Escuela Secundaria El Vivero Ojo de Agua.” October 2012. // “Entrega Del Arbol Del Jicaro a Todo El Alumnado de Escuela Primaria Y Padres de Familia En Un Evento Especial “Adopta Un Arbol.”” November 2012. // Santamaria, Ariana. “Atencion a Partes Interesadas: CONNET-RS-PRO-001 r0.” CONNET, November 11, 2010, 3. // Minuta de acuerdos para la liberacion de derecho de via, Meeting of 14 February 2013, 6. // “Atenta nota informativa relativa a la asistencia a la comunidad de Teteloloya el dia 18 octubre 2011.” Secretaria de Comunicaciones y Transportes, n.d. //</p> | <p>To achieve a higher score, please provide evidence of design improvements and the degree to which these improvements were integrated with other community infrastructure elements. Further documentation demonstrating increasing degrees of performance optimization in environmental, economic and social factors and across multiple infrastructure elements would help in the re-evaluation of this credit.</p> |

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| | | CONNET. "Programa Interno de Proteccion Civil: Tabla de Identificacion Y Evaluacion de Riesgos Del Inmueble," n.d., 4-5. // | |
| LD3.1 Plan For Long-Term Monitoring & Maintenance | 1 | Improved The Program of Maintenance and Conservation of Highway Section 1 presents a maintenance checklist until the year 2037 that includes maintenance provisions for pavement, the drainage system, slopes, reforestation efforts, lateral zones, signals, and bridges, among others. <u>Source:</u> "Programa de Mantenimiento." Secretaria de Comunicaciones y Transportes, n.d. // "Programa de Mantimiento Y Conservacion Del Tramo Carretero 1." Secretaria de Comunicaciones y Transportes, n.d. | To qualify for a higher score, provide documents detailing the personnel, skills or resources needed to implement the plan. Explanations of how funding will be allocated to maintain and monitor the highway will be helpful in the evaluation of the project. |
| | | No Score Although the project had to wait for the change in land use to be approved by municipal governments, no other significant regulations or policies that would unintentionally impede implementation of the project were identified in the documents provided. Consequently, the project does not qualify for this credit. <u>Source:</u> Minuta del recorrido, con motivo de los cruces y la Liberacion de Derecho de Via, in the on-site office in Xicotepec de Juarez, Puebla, Meeting of 24 August 2010, 2. Minuta de acuerdos, in the Cabildo of the Municipal Presidency in Xicotepec de Juarez, Puebla, meeting of 25 September 2009, 2. | To qualify for the Improved level, please submit documents demonstrating an assessment of negative impacts resulting from conflicting regulations and policies. Evidence of a search for applicable laws, standards, regulations and/or policies with requirements that hinder sustainable practices would be helpful in the evaluation of this credit. |
| LD3.3 Extend Useful Life | 6 | Enhanced Superior The project qualifies for the Improved level for its efforts in extending the useful life of the highway. Originally planned as two to three lanes for most of the length of the project, it was later changed to a four-lane design to accommodate future increases in highway use. Fortunately, the original design allowed for the expansion of the highway width. Furthermore, around 80% of the retaining walls were made with geosynthetic materials (geotextiles, geomesh, geodrains), which are flexible compared to traditional concrete and steel retaining walls. Geosynthetic retaining walls are able to tolerate more movement and are able to accommodate seismic movement without losing structural soundness. <u>Source:</u> CONNET. "Entrega de Estudio Tecnico Justificativo de Cambios Al Proyecto: Documento Conciliado Con AUNETI," August 12, 2010, 10-13. ICA, Globalvia, FCC Construccion, AUNETI, and CONNET. Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 123. (125 in pdf) | To qualify for a higher score, provide documents demonstrating how changes in the design add durability, flexibility and resilience throughout the useful life of the project. The inclusion of a life cycle assessment or specifications for durable materials (better than industry norms) would also be useful for the evaluation of this credit. |
| LD0.0 Innovate Or Exceed Credit Requirements | | | |
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| CATEGORY II: CLIMATE AND ENVIRONMENT (CE) | | | |
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| RESOURCE ALLOCATION | | | |
| | NUEVO NECAXA-AVILA CAMACHO HIGHWAY, MEXICO | | RECOMMENDATIONS |
| RA1.1 Reduce Net Embodied Energy | 0 | No Score | The document submission of any life cycle assessments would qualify the project for an "Improved" (2 points) or above. |
| | | This credit requires that the project was evaluated by a life cycle assessment (LCA). Because there was no specific documentation provided evidencing a life cycle assessment, this project does not receive any points. | |
| | | Source: N/A | |
| RA1.2 Support Sustainable Procurement Practices | 0 | No Score | It is recommended that any documentation regarding the selection of suppliers with sustainable procurement practices be submitted for the reevaluation of this credit. |
| | | According to the Subcontracting Procedures document (Procedimiento de Licitación Subcontratos), there was no identification and selection process for firms/suppliers with sustainable procurement practices. Subcontractors were chosen based on common practice selection methods; firms would bid for a subcontract and estimated project prices would be compared among the competing firms. Typically, the subcontract would be awarded to the firm with the lowest price. It is prohibited to subcontract to firms that are not included in the Subcontracting Plan unless authorized beforehand by the administration board of CONNET (CONNET is the consortium that won the contract to build Nuevo Necaxa-Àvila Camacho highway section). Although the Subcontracting Procedures document does outline specific environmental procedures required by each subcontractor (such as the maintenance of harmful waste on site), because this credit addresses the procurement practices of the materials supplied and the suppliers, the project does not achieve any points for this credit. | |
| | | Source: CONNET. "Procedmimiento de licitacion subcontratos," November 26, 2010, 4-8. // CONNET. "Evaluacion mensual tecnica de desempeno de subcontratistas," n.d., 1. | |
| RA1.3 Used Recycled Materials | 2 | Improved | Please submit an inventory of the remaining materials with calculations of what percent were reused. Materials with recycled content also qualifies for this credit. "calculations do not include plants or soils" as they are addressed in following credits. |
| | | No precise inventory of the existing materials or structures and their reuse potential was provided. A Photographic Report documented the reuse of steel drum cases for the storage of organic and inorganic waste, as well as the donation of used lumber to the local community. Some materials have also been reused several times for scaffolding during the construction process. | |
| | | Source: CONNET. Identificacion de aspectos ambientales. Photo report, n.d. // ICA, Globalvia, FCC Construccion, AUNETI, and CONNET. Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 132. | |
| RA1.4 Use Regional Materials | 3 | Improved | To qualify for the "Enhanced" level, the project must have at least 60% of its materials locally sourced. |
| | | According to a Photographic Report, the project was able to reuse around 20-30% of the excavated materials from the borrow pits or from through cuts* for the construction of terraces, in consideration of the fact that the project has high specifications for the quality of materials used. Moreover, the project recovered and reused runoff and residual water from agricultural use to hose down the sites during construction to reduce the amount of dust in the air. Plants were also removed during the creation of earthworks or borrow pits, stored, and later replanted during the mitigation processes of the excavated zones. | |

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| | | <p>The project also hired two local suppliers for construction materials. According to a legal agreement, Casa Don Gil of Xicotepec de Juarez, Puebla provided 100,000 kg of grey cement and 4,000 kg of gypsum. Grupo Calero, also a local supplier, provided quicklime.</p> | |
| | | <p><u>Source:</u> CONNET. Reduccion de polvos. Photo report, n.d. // ICA. Bancos de Tiro, Bancos de Prestamo Y Caminos de Acceso de La Autopista Mexico-Tuxpan Del km140+123 Al km178+500. Manifestacion de impacto ambiental modalidad regional, n.d., 52. // CONNET. El Proyecto Mantendra La Calidad Del Agua. Photo report, n.d. // CONNET. "Programa de Reforestacion Como Medida de Compensacion Ambiental Y Programa de Restauracion de suelos:Municipios de Huachinango, Xicotepec Y Tlacuilotepec En El Estado de Puebla," July 2010, 55. // CONNET. "Contrato de suministro celebrado entre CONNET y Grupo Calero," August 1, 2010. // CONNET. "Seguimiento Historico de Proveedores de Servicios," July 1, 2013. // CONNET. "Contrato de suministro celebrado entre CONNET y Casa Don Gil," July 15, 2009.</p> | |
| <p>RA1.5 Divert Waste From Landfills</p> | <p>3</p> | <p>Improved</p> <p>The project achieves the Improved rating through the recycling and reuse of various materials. Some scaffolding materials were reused several times before they were discarded, while each construction site was responsible for separating its waste. Mexican environmental law mandates that each contract contain a set of guidelines for the discarding of solid and toxic waste. Consequently, all contractors, subcontractors and operators are conscious of waste sorting requirements. Recyclables are to be separated from non-recyclables, and industrial wastes are to be classified and disposed of appropriately. The recycling of scrap metal and metal wire was also managed to reduce the amount of waste generated by the project. Considering that 138.75 metric tons of non-recyclable and non-toxic waste was generated in 2012, over 48,000 kg of recyclable plastics and scrap metal were separated and recycled, which amounted to 25.7% of the non-toxic solid waste being recycled.</p> <p><u>Source:</u> CONNET. <i>El equipo del proyecto estudiará la adecuada reutilización de materiales y estructuras existentes.</i> Photo report, n.d.// CONNET. "Procedimiento de licitacion subcontratos," November 26, 2010, 39. // Lopez, Diana. "Plan de gestion ambiental." Edited by Leonardo Barrera and Jorge Albornoz. CONNET, August 11, 2010, 16. // CONNET. "Volumen Generado: Residuos Reciclables," 2012. CONNET. "Bitacora de Residuos," 2012.</p> | <p>To receive the "Enhanced" level, the project must recycle or reuse at least 50% of its waste.</p> |

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| <p>RA1.6 Reduce Excavated Materials Taken Off Site</p> | <p>2</p> | <p>Improved</p> <p>Crushers located on site take advantage of the excavated materials (rocks, earth) by processing and reusing them for terracing affected slopes along the highway. According to a Photographic Report, the project was able to reuse around 20-30% of the excavated materials from the borrow pits or from through cuts* for the construction of terraces, in consideration of the fact that the project has high specifications for the quality of materials used. The Environmental Impact Statement Regarding Borrow Pits, Earthworks, and Access Roads (MIA Bancos de Tiro, Bancos de Préstamo y Caminos de Acceso de la Autopista Mexico-Tuxpan) identifies 29 sites for earthworks and 16 borrow pits with the corresponding volume of materials transported off site. Various design documents outline the land cut from the slopes and moved to designated sites.</p> <p>*A through cut is when a road cuts into the slope(s) of a hill.</p> <p><u>Source:</u> CONNET. Planta Trituradora. Photo report, n.d. // CONNET. Reduccion de polvos. Photo report, n.d. // ICA. Bancos de Tiro, Bancos de Prestamo Y Caminos de Acceso de La Autopista Mexico-Tuxpan Del km140+123 Al km178+500. Manifestacion de impacto ambiental modalidad regional, n.d., 23-30, 52. // CONNET. "Programa de Reforestacion Como Medida de Compensacion Ambiental Y Programa de Restauracion de suelos:Municipios de Huachinango, Xicotepec Y Tlacuilotepec En El Estado de Puebla," July 2010, 55. // CONNET. "Localizacion de Bancos de Tiro Y Caminos de Acceso Cercanos Al Derecho de via," n.d. //"Tramo 1-B," n.d. // "Curva Masa Tramo 1-A," n.d. //"Curva Masa Tramo 2.1," n.d. // "Curva Masa Tramo 2.2," n.d.</p> | <p>To qualify for the "Enhanced" level, the project must reduce or beneficially reuse at least 50% of the excavated materials on site.</p> |
| <p>RA1.7 Provide for Deconstruction & Recycling</p> | <p>0</p> | <p>No Score</p> <p>The documentation provided does not address the potential recycling of materials during future disassembly or deconstruction.</p> <p><u>Source:</u> N/A</p> | <p>Please submit any documents demonstrating that the design of the project has incorporated the reuse of any materials if and when the highway should be disassembled (considering the life-cycle assessment).</p> |
| <p>RA2.1 Reduce Energy Consumption</p> | <p>0</p> | <p>No Score</p> <p>Electrical engineering studies of the highway's sections indicate that the project managers will apply the IEEE 739 (Institute of Electrical and Electronics Engineers) Standards—Recommended Practice for Energy Conservation and Cost Effective Planning in Industrial Facilities when it meets the technical standards and does not increase the costs. The project was unable to receive any points for this credit since the proper documentation demonstrating extent of energy reduction in operation and maintenance was not provided.</p> <p><u>Source:</u> "Planeacion integral: construccion tramo carretero I." Secretaria de Comunicaciones y Transportes, n.d., 8-9. // Ingetec. Memorias de calculo electrico Tunel Xicotepec II rev.2, August 2010, 8.</p> | <p>To receive a higher score for this credit, please provide documents (reports, memoranda, minutes of meetings with project team and owner) regarding energy reduction strategies and evaluations of the percentage of reductions achieved.</p> |

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| <p>RA2.2 Use Renewable Energy</p> | <p>0</p> | <p>No Score</p> <p>Although the documents provided do not anticipate the annual operational energy consumption broken down by source type, the Environmental Impact Statement Regarding Borrow Pits, Earthworks and Access Roads (Manifestacion de Impacto Ambiental Modalidad Regional, 36) estimated the amount of diesel needed (around 3,000 liters daily) for the various construction machines.</p> <p>A Photographic Report illustrates the use of solar panels powering lighted detour signs, thus relying on renewable energy. Nevertheless, the lack of specific details regarding the anticipated annual output of all renewable sources prevents the project from receiving any points for this credit.</p> <p><i>Source:</i> ICA. Bancos de Tiro, Bancos de Prestamo Y Caminos de Acceso de La Autopista Mexico-Tuxpan Del km140+123 Al km178+500. Manifestacion de impacto ambiental modalidad regional, n.d., 36. // CONNET. Soporte Fotografico de Señalamiento Solar. Photo report, n.d.</p> | <p>To qualify for this credit, the project will need to demonstrate that at least 10% of the total annual energy sources used for construction were renewable (i.e. wind, solar, etc). These efforts may be considered as an innovation credit.</p> |
| <p>RA 2.3 Commission & Monitor Energy Systems</p> | <p>0</p> | <p>No Score</p> <p>The documentation provided does not demonstrate that any energy monitoring system has been commissioned, let alone by a third party evaluator.</p> <p><i>Source:</i> N/A</p> | <p>Please provide documentation evidencing that some sort of energy monitoring and evaluating system has been set up by a third party.</p> |
| <p>RA3.1 Protect Fresh Water Availability</p> | <p>0</p> | <p>No Score</p> <p>Various Mexican environmental statutes control the contamination of water. NOM-001-ECOL-1996 establishes limits on the maximum permitted level of contaminants discharged into national bodies of water. Consequently, the Nuevo Necaxa-Ávila Camacho highway section had to comply with these standards, preventing the amount of soil erosion and contaminants created during and after construction from entering water bodies. Estimations of average water needs during the construction process were presented. The Environmental Impact Statement estimates that the project requires around 40 cubic meters of water per day during the general construction stage (including water for human consumption and construction use). During the construction of terracing, around 3,246 cubic meters of water per day will be needed to control the dust and compact and form the terraces. For this project raw water will be procured. A comprehensive assessment of the project’s long-term water needs was not available among the provided documents, given that after the completion of the project, the operation of the highway should not consume a significant amount of water.</p> <p>The majority of the water assessments provided concerned the change in water quality and flow due to construction of the highway project. Studies delineating the geohydrology of the project site have been carried out and identify the catchment basins and runoff patterns. During the construction phase, waste was carefully separated and contained for safe removal and to avoid water contamination. Nevertheless, because no documents proved that a water availability assessment was done for the project, it fails to achieve any points for this credit.</p> <p><i>Source:</i> N/A</p> | <p>To qualify for this credit, please provide any documents or designs indicating the location, type, quality, rate of recharge and quality of water resources available to the project. This will help determine if the rate of water used was replenishable.</p> |

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| <p>RA3.2 Reduce Potable Water Consumption</p> | <p>17</p> | <p>Conserving</p> <p>Raw water, defined as natural water found in the environment, was a major source of water for the construction of the project. Water catchment areas were excavated to capture runoff and rainwater, and surface water from the local rivers was piped to the construction sites. An inventory of the water extracted from waterbodies during the whole construction period verifies the amount of raw water that was used instead of potable water for the project; consequently, the project achieves the Conserving level for a 100% reduction in potable water consumption.</p> <p><u>Source:</u> Source: CONNET. El Proyecto Mantendra La Calidad Del Agua. Photo report, n.d. // Grupo Selome. Manifestacion de Impacto Ambiental. Secretaria de Comunicaciones y Transportes, n.d., 21, 39. // CONNET. "Control de Agua Superficial: Mensual Desde Junio 2008 a Julio 2013," July 2013.</p> | <p>To qualify for the "Restorative" level, the project must demonstrate a water purification program that allows for water reuse by the community to offset the project's own water needs.</p> |
| <p>RA3.3 Monitor Water Systems</p> | <p>1</p> | <p>Improved</p> <p>Ojo de Agua Ambiente y Paisajismo, a third party environmental evaluator, was hired to implement an environmental monitoring program during the construction process. After completion, a final, one-time evaluation of the major bodies of water was administered to validate the design. The velocity of the San Marcos River was found to be unchanged. No other documentation was found indicating that a long-term water monitoring system would be administered by a third party.</p> <p><u>Source:</u> 06-085: Ojo de Agua. "Programa de Manejo Y Monitoreo Ambiental: Bancos de Tiro, Bancos de Prestamo Y Caminos de Acceso de La Autopista Mexico-Tuxpan Del km140+123 Al km178+500," n.d., 12-16, 38. CONNET. El Proyecto Mantendra El Transporte de Sedimentos. Photo report, n.d. Ojo de Agua. "Informe de Actividades Correspondiente Al Mes de Junio de 2012: Bancos de Tiro, Bancos de Prestamo Y Caminos de Acceso de La Autopista Mexico-Tuxpan Del 140_243 Al 178+500," June 2012.</p> | <p>Please submit additional documents that demonstrate a long-term water monitoring strategy/system in place once the project is operational. Although extensive monitoring has been illustrated during the construction process, very little documents address whether any water monitoring system will be instituted during operation. Documents to submit include: design documents and specifications identifying the installation of easily accessible and clearly labeled water sub-meters capable of monitoring the water flow. If the project manager believes that this credit is not applicable to the highway project, please provide some level of reasoning.</p> |
| <p>RA0.0 Innovate Or Exceed Credit Requirements</p> | <p>0</p> | <p>N/A</p> | |
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| | NUEVO NECAXA-AVILA CAMACHO HIGHWAY, MEXICO | | RECOMMENDATIONS |
| NW1.1 Preserve Prime Habitat | 0 | <p>No Score</p> <p>The Nuevo Necaxa—Ávila Camacho highway section runs approximately four kilometers through the Necaxa River watershed (Cuenca Hidrográfica del Río Necaxa); consequently the Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT, translated from Spanish as the Mexican Environmental and Natural Resources Agency) has declared the area as a protected ecological reserve (“reserve ecológica protegida”). According to the documentation, the highway section maintains a 250 m buffer strip between the road and the natural habitat, to serve as an ecological buffer and reduce potential slope erosion. Although the concessionaires have agreed to include restorative measures to decrease the impact to the area, no points were awarded for this category because the project traverses a prime habitat area.</p> <p><u>Source:</u> CONNET. “Entrega de Estudio Tecnico Justificativo de Cambios Al Proyecto: Documento Conciliado Con AUNETI,” August 12, 2010, 26. // “SGPA/DGIRA.DEI.0554.03.” Subsecretaria de Gestion para la Proteccion Ambiental, October 17, 2003, 24, 27. Biologia Integral en Impacto Ambiental. Modificacion: Manifestacion de Impacto Ambiental Modalidad Para: Bancos de Préstamo Y de Tiro de La Carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho Del km140+123 Al km178+500 En El Estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d., 23, 33, 102, 217. Grupo Selome. Manifestacion de Impacto Ambiental. Secretaria de Comunicaciones y Transportes, n.d., 24. // CONNET. “Entrega de Estudio Tecnico Justificativo de Cambios Al Proyecto: Documento Conciliado Con AUNETI,” August 12, 2010, 18, 154.</p> | <p>To qualify for this credit, the project must not traverse any prime habitat.</p> |
| | | <p>No Score</p> <p>The Nuevo Necaxa—Ávila Camacho section includes two bridges that span over two bodies of water. The Texcapa II Bridge, located at the start of the highway section (from 141+270km to 141+480km), crosses the Texcapa River, while the San Marcos Bridge spans across the San Marcos River. Although the project made conscious efforts to restore and conserve the vegetation of the surrounding riverbanks (06-095: Zonas de proteccion de vegetación cercanas a la Riberas), because the project is within at least fifty feet of a body of water, it does not achieve any points for this credit.</p> <p><u>Source:</u> ICA, Globalvia, FCC Construccion, AUNETI, and CONNET. Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 137-138. // CONNET. Zonas de Proteccion de Vegetacion Cercanas a La Riberas. Photo report, n.d. // CONNET. “Entrega de Estudio Tecnico Justificativo de Cambios Al Proyecto: Documento Conciliado Con AUNETI,” August 12, 2010, 275.</p> | |
| NW1.2 Preserve Wetlands and Surface Water | 0 | <p>No Score</p> <p>The Nuevo Necaxa—Ávila Camacho section includes two bridges that span over two bodies of water. The Texcapa II Bridge, located at the start of the highway section (from 141+270km to 141+480km), crosses the Texcapa River, while the San Marcos Bridge spans across the San Marcos River. Although the project made conscious efforts to restore and conserve the vegetation of the surrounding riverbanks (06-095: Zonas de proteccion de vegetación cercanas a la Riberas), because the project is within at least fifty feet of a body of water, it does not achieve any points for this credit.</p> <p><u>Source:</u> ICA, Globalvia, FCC Construccion, AUNETI, and CONNET. Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 137-138. // CONNET. Zonas de Proteccion de Vegetacion Cercanas a La Riberas. Photo report, n.d. // CONNET. “Entrega de Estudio Tecnico Justificativo de Cambios Al Proyecto: Documento Conciliado Con AUNETI,” August 12, 2010, 275.</p> | <p>This credit evaluates the project based on its proximity to a “wetland, vernal pool, shoreline, or water body or other aquatic sources.” Consequently, if a project contains or is within a specified distance of the listed water entities, the credit is not achievable. For future reference, it is recommended that the projects avoid development along or near water bodies to qualify for this credit.</p> |
| | | <p>No Score</p> <p>The Nuevo Necaxa—Ávila Camacho section includes two bridges that span over two bodies of water. The Texcapa II Bridge, located at the start of the highway section (from 141+270km to 141+480km), crosses the Texcapa River, while the San Marcos Bridge spans across the San Marcos River. Although the project made conscious efforts to restore and conserve the vegetation of the surrounding riverbanks (06-095: Zonas de proteccion de vegetación cercanas a la Riberas), because the project is within at least fifty feet of a body of water, it does not achieve any points for this credit.</p> <p><u>Source:</u> ICA, Globalvia, FCC Construccion, AUNETI, and CONNET. Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 137-138. // CONNET. Zonas de Proteccion de Vegetacion Cercanas a La Riberas. Photo report, n.d. // CONNET. “Entrega de Estudio Tecnico Justificativo de Cambios Al Proyecto: Documento Conciliado Con AUNETI,” August 12, 2010, 275.</p> | |

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| <p>NW1.3 Preserve Prime Farmland</p> | <p>6</p> | <p>Conserving</p> <p>Based on the Environmental Impact Statement (Manifestación de Impacto Ambiental Modalidad Regional Para: Bancos de Préstamo, 18), approximately 101 hectares of forested land have been converted for the proposed highway land use, while some of the nearby lands are used for dryland farming, pastures for livestock, and for urban settlement (ibid., 60). However, the lands are not suitable for farming due to the possibility of erosion, the scarcity of water, and soil defertilization. Soil surveys have been conducted and soils compositions have been identified.</p> <p><u>Source:</u> Consultoria Especializada en Estudios Ambientales. Manifestacion de impacto ambiental modalidad regional para bancos y caminos de acceso de la carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho del km140+123 al km178+500 en el estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d., 18, 60.</p> | <p>Please provide documentation indicating whether there is any prime farmland located close to the project and whether the siting of the highway project has avoided traversing identified prime farmland. To be considered for the Superior level, please submit government studies of soil surveys that do not identify any of the project’s siting on any prime farmland. Please identify if the project is located on prime farmland or if prime farmland has been avoided.</p> |
| <p>NW1.4 Avoid Adverse Geology</p> | <p>3</p> | <p>Superior</p> <p>Although the project area is known to have the highest potential for landslides in all of Mexico, the current path taken by Nuevo Necaxa-Ávila Camacho does not traverse any of the landslide zones or unstable areas, according to the Geological Study conducted by third party engineers. Moreover, according to maps provided by the concessionaires, the current path has been changed to avoid any geological faults. Studies have been carried out at the site of each major project component, such as a tunnel or bridge, to ensure that the underlying materials are stable enough to support the projects and not cause erosion of the site. For example, to accommodate the construction of a four-lane highway, the concessionaires chose to build twin tunnels instead of one tunnel to minimize the complexity and risk. The design of the San Marcos Bridge also demonstrates the use of best strategies to avoid damaging a high-risk geological zone. The current design optimized the placement of the bridge supports within the high-risk geological high zone near the river. The grades and paths of all of the riverbeds, streams, and runoff will be analyzed to determine whether a minor drainage system (obras de drenaje menor) is required, thus minimizing runoff near the sites. Ultrasonic tests, as well as rock perforation sampling, were carried out during the construction of the San Marcos Bridge in order to confirm the structural base of the site’s underlying geology.</p> <p><u>Source:</u> CONNET. “Entrega de Estudio Tecnico Justificativo de Cambios Al Proyecto: Documento Conciliado Con AUNETI,” August 12, 2010, 31, 151. // CONNET. “Presentacion Cambio de Trazo TZ,” n.d. // CONNET. “Entrega de Estudio Tecnico Justificativo de Cambios Al Proyecto: Documento Conciliado Con AUNETI,” August 12, 2010, 31-32. // ICA, Globalvia, FCC Construccion, AUNETI, and CONNET. Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 101, 135.</p> | <p>To qualify for the Conserving level, the project must be located in a safe area with no adverse geologic features and no negative effects on aquifers. Documentation must evidence that there are no faults or karst features existing on the site.</p> |

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| <p>NW1.5 Preserve Floodplain Functions</p> | <p>14</p> | <p>Conserving</p> | <p>N/A</p> |
| | | <p>The project is not located within a floodplain but rather above it since the highway section extends through the Sierra Oriental Mountains. The primary concern for the project is the possible reduction of the ground’s infiltration capacity due to the steep slopes and land compaction from the heavy equipment, which would consequently affect the floodplain below. The three bridges that span rivers were the only type of development near the floodplain. The San Marcos Bridge has been redesigned to decrease the impacts near the San Marcos River.</p> <p>Although the project is not situated on a floodplain per se, its upstream location will affect the floodplain functions downstream in the mountains’ water catchment basin. Consequently, any efforts to reduce slope erosion and maintain water infiltration upstream invariably mitigate any negative effects in the floodplain. Environmental impact studies show that the pre-development floodplain infiltration has not changed from the post-development infiltration. Because the project does not disturb aquatic habitat connectivity, it qualifies for the Conserving level.</p> | |
| | | <p>Emergency evacuation plans have been outlined for the the San Marcos Bridge and the nearby communities of Tepapatlaxco and Teteloloya, who face the threat of landslides on their communities.</p> <p><u>Source:</u> CONNET. “Programa de Monitoreo Y Vigilancia Ambiental,” n.d., 21. // Biologia Integral en Impacto Ambiental. Modificacion: Manifestacion de Impacto Ambiental Modalidad Para: Bancos de Préstamo Y de Tiro de La Carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho Del km140+123 Al km178+500 En El Estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d., 89 // Ingetec. “Puente Alseseca k149+326,52: Planta General - Perfil Eje Central - Corte A,” April 30, 2008. // NVA Consultores. “Puente Alseseca II: Plano General,” December 10, 2011. // NVA Consultores. “Puente Texcapa II k841+279,78: Plano General,” September 5, 2008. // FCC Construccion. “Puente San Marcos Km 863+500: Definicion General,” September 30, 2008. // ICA, Globalvia, FCC Construccion, AUNETI, and CONNET. Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 135. // CONNET. “Programa Interno de Proteccion Civil: Tabla de Identificacion Y Evaluacion de Riesgos Del Inmueble,” n.d., 5.</p> | |

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| <p>NW1.6 Avoid Unsuitable Development on Steep Slopes</p> | <p>4</p> | <p>Superior</p> | <p>To receive the Conserving level, please provide documentation showing that no hillsides or steep slopes are selected for the siting of the project.</p> |
| | | <p>Because the Nuevo Necaxa—Ávila Camacho highway section passes through the Sierra Oriental Mountains, it runs along many slopes and hillsides. Nevertheless, many best management practices were followed, such as construction of canals that manage the rainwater down the slopes to avoid major erosion, and the terracing and structural reinforcement of the slopes to prevent erosion of the hillside. The affected slopes were re-vegetated to avoid the desertification of the soils and further deterioration. Alternatives will be considered for each cut and/or slope, including the use and treatment of the materials resulting from excavations, the stabilization of slopes, etc. Specific guidelines outline the basic designs of borrow pits and the creation of earthworks to avoid hills that are prone to erosion. Furthermore, according to an outline of procedures regarding the possible riverbed diversion of the San Marcos River, the concerned property owners will participate in determining the location of material excavation sites, ensuring local participation in the siting. Minutes submitted from local community meetings demonstrate that local stakeholders were included in the siting of specific construction projects. Furthermore, property owners were included during the site selection for borrow pits.</p> <p><u>Source:</u> CONNET. “Entrega Del Estudio Tecnico Economico Y Procedimiento de Acciones Para El Desvio Del Cauce En El Rio San Marcos En Cumplimiento Del Oficio Resolutivo S.G.P.A./D.G.I.R.A./D.G./8811,” May 3, 2013, 7. // Recorrido de Patoltecoya, Minuta del Recorrido de Obra con el presidente auxiliar de Patoltecoya, DDV del a SCT, et al., Meeting of 16 October 2008, 2. // CONNET. El Proyecto Mantendra La Conexion Hidrologica de La Zona. Photo report, n.d. // CONNET. Estabilizacion de Taludes. Photo report, n.d. // CONNET. “Programa de Reforestacion Como Medida de Compensacion Ambiental Y Programa de Restauracion de suelos:Municipios de Huachinango, Xicotepec Y Tlacuilotepec En El Estado de Puebla,” July 2010, 43. // CONNET. Arrope de Taludes. Photo report, n.d. // CONNET. “Entrega de Estudio Tecnico Justificativo de Cambios Al Proyecto: Documento Conciliado Con AUNETI,” August 12, 2010, 22. //</p> | |
| <p>NW1.7 Preserve Greenfields</p> | <p>0</p> | <p>No Score</p> | <p>Please provide documentation detailing whether the highway utilizes any greyfield or brownfield sites to qualify for this credit. To be considered for the “Improved” level, the 25% of the project must be located on a greyfield or brownfield site.</p> |
| | | <p>No documentation has been provided in regards to development on greyfields or brownfields. Because the Nuevo Necaxa—Ávila Camacho highway section runs through a non-urban, mountainous area, it does not seem to run through any greyfields or brownfields according to the documentation provided.</p> <p><u>Source:</u> N/A</p> | |
| <p>NW2.1 Manage Stormwater</p> | <p>4</p> | <p>Enhanced</p> | <p>To qualify for the Superior level, please submit TR-55 CNs or other continuous simulation modeling methods to describe the site's water conditions.</p> |
| <p>This project achieves the Enhanced level because the post-construction water storage capacity matched the pre-development capacity for the greenfield sites. Mexican environmental statute mandates that an environmental monitoring plan that outlined a hydrological and water quality test twice every six months during the two-year construction period.</p> <p>A monitoring test recorded the same flow velocity (velocidad de</p> | | | |

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| | | <p>arrastre) in June 2013.</p> <p><u>Source:</u> CONNET. El Proyecto Mantendra El Transporte de Sedimentos. Photo report, n.d. //</p> <p>Ojo de Agua. "Programa de Manejo Y Monitoreo Ambiental: Bancos de Tiro, Bancos de Prestamo Y Caminos de Acceso de La Autopista Mexico-Tuxpan Del km140+123 Al km178+500," n.d., 38. //</p> <p>Grupo Selome. Manifestacion de Impacto Ambiental. Secretaria de Comunicaciones y Transportes, n.d., 42-43. //</p> | |
| <p>NW2.2 Reduce Pesticides and Fertilizer Impacts</p> | <p>9</p> | <p>Conserving</p> <p>The project has replanted turf on the surfaces of borrow pits and earthworks to reduce erosion, while drainage systems have been implemented to control runoff. In areas designated for reforestation, land with pre-existing secondary vegetation was manually prepared and cleared. Native species were chosen to increase the probability of successful reforestation (reduced need for fertilizers and pesticides for maintenance). According to the Reforestation Program as a Medium of Environmental Compensation and the Restoration of Soils (Programa de Reforestación como medida de compensación ambiental y Programa de Restauración de suelos), the use of fertilizers is justified under certain circumstances and purposes. Specific recommendations are given to the types of fertilizers (Triple 17 or 19) and methods of application that can be used within 30 days of planting to minimize overtreatment.</p> <p>To minimize the use of herbicides, the land will be manually cleared between the months of November and December during the reforestation process, leaving a buffer of one meter around each tree to provide protection from the wind. Possible methods of pest control include the collection and distribution of eggs, larvae or pupae, as well as the restricted use of insecticides in serious cases. The type of insecticide, as well as the specific moment and method of application are all to be carefully determined to maximize benefits while minimizing harms. The trees are to be monitored for the presence of pests, weeds and disease—optimizing the use of pesticides, fungicides, and herbicides when needed for effective treatment. Plans for how to properly replant the native species were provided.</p> <p><u>Source:</u> CONNET. "Programa de Reforestacion Como Medida de Compensacion Ambiental Y Programa de Restauracion de suelos:Municipios de Huachinango, Xicotepec Y Tlacuilotepec En El Estado de Puebla," July 2010, 19-20, 26, 43-44.</p> | |
| <p>NW2.3 Prevent Surface and Groundwater Contamination</p> | <p>9</p> | <p>Superior</p> <p>Studies delineating the geohydrology of the project sites have been carried out to identify the catchment basins and runoff patterns. The project follows the procedures for containment and management of possible pollutants during construction outlined by the Undersecretary of Environmental Protection and Management (Subsecretaría de Gestión para la Protección Ambiental). For example, recyclables should be separated, and potentially harmful waste should be capped and safely stored for a timely removal from the site to prevent contamination. A Preventative Plan for any spillage is also to be developed according to a document outlining the major procedures for emergency response (Procedimiento de Atención y Respuesta a Emergencias).</p> <p>No documentation was provided to address whether the project impacted any local drinking wells and their water quality. However, photos show that the project stored runoff and raw water in retention pools for reuse during construction, such as for spraying to reduce the amount of dust. Furthermore, the construction of cofferdams near the</p> | <p>To qualify for the Conserving level, please provide documentation showing that demonstrates that designers focused on source pollution elimination continuously during the design and construction phase.</p> |

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| | | <p>San Marcos River during material excavation for the project will protect the slopes and avoid flow diversion during the rainy season. Because the project was consciously designed to prevent local water contamination, it achieves the Superior level.</p> <p><u>Source:</u> CONNET. El Proyecto Mantendra La Calidad Del Agua. Photo report, n.d. // "SGPA/DGIRA.DEI.0554.03." Subsecretaria de Gestion para la Proteccion Ambiental, October 17, 2003, 27-29. // ICA. Bancos de Tiro, Bancos de Prestamo Y Caminos de Acceso de La Autopista Mexico-Tuxpan Del km140+123 Al km178+500. Manifestacion de impacto ambiental modalidad regional, n.d., 10-11. // Ojo de Agua. "Programa de Manejo Y Monitoreo Ambiental: Bancos de Tiro, Bancos de Prestamo Y Caminos de Acceso de La Autopista Mexico-Tuxpan Del km140+123 Al km178+500," n.d., 38. // Proser Proyectos y Servicios. "Cambio de Trazo Por Hallazgos Arqueologicos: Estudio Hidrologico E Hidraulico Rev.02," February 2011, 26-30. // Ingetec. "Estudio Hidrologico E Hidraulico Tramo k857+000-k867+000 Rv.0," July 2009, 18-32. // Ingetec. "Estudio Hidrologico E Hidraulico Tramo k850+000-k857+000 Rv.0," February 2009, 19-23. // Barrera, Leonardo. "Procedimiento de Atencion Y Respuesta a Emergencias," July 27, 2012, 6.</p> | |
| <p>NW3.1 Preserve Species Biodiversity</p> | <p>16</p> | <p>Restorative</p> <p>The Nuevo Necaxa-Àvila Camacho Highway section achieves the highest score of Restorative for this credit for its efforts in mitigating the negative effects of construction and in creating new habitat. Two hundred hectares were selected by specific criteria and were donated to the National Commission of Natural Protected Areas (Comision Nacional de Areas Naturales Protegidas, CONANP). Of the landscapes preserved, two types are significant: cloud forests and tropical forests, which contribute to the local hydrological system as well as other ecosystem services. The 200 hectares are to be perpetually conserved as environmental compensation for the highway project.</p> <p>In addition, two wildlife bridges act as ecological corridors for wild animals to traverse from one habitat to another, while native plants have been selected for the re-vegetation of earthworks and borrow pits to improve the local habitat. For example, the orchid and the bromeliaceae plant families were specifically selected for re-vegetation activities. Mexican environmental laws have enforced mitigation and restoration efforts. For example, the local regulation NOM-059-SEMARNAT-2001 requires that plants protected under a specific category need to be saved before vegetation is removed from of a site. Similarly, before the creation of an earthwork, search brigades will save the animals categorized for protection. The methodologies for saving and transplanting both the identified fauna and flora are identified in the documents: "Programa de Acciones de Protección y Conservación de Flora Silvestre" and "Programa de Acciones de Protección y Conservación de Fauna Silvestre."</p> <p>The Ministry of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales, SEMARNAT) as well as the National Commission for the Recognition and Use of Biodiversity (Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, CONABIO), have worked in conjunction with the project managers to identify and mitigate potential harms to the site's biodiversity. The submission of an Environmental Impact Statement (Manifestación de Impacto Ambiental) has been critical to the legal verification process.</p> | <p>N/A</p> |

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| | | <p><u>Source:</u> Ojo de Agua. "Programa de acciones de proteccion y conservacion de flora silvestre," n.d., 5-22, 67. // "SGPA/DGIRA.DEI.0554.03." Subsecretaria de Gestion para la Proteccion Ambiental, October 17, 2003, 7. CONNET. "Programa de Acciones de Rescate Y Reubicacion de Flora Y Fauna Silvestre," n.d., 31. // CONNET. "Programa de Reforestacion Como Medida de Compensacion Ambiental Y Programa de Restauracion de suelos:Municipios de Huachinango, Xicotepec Y Tlacuilotepec En El Estado de Puebla," July 2010, 30. // ICA, Globalvia, FCC Construccion, AUNETI, and CONNET. Mexico City-Tuxpan Highway: Nuevo Necaxa-Tihuatlan. 1st ed. Mexico: ICA and Global Via Infrastructures, 2011, 51-53, 75-80.</p> | |
| NW 3.2 Control Invasive Species | 5 | <p>Superior</p> <p>According to the project's reforestation and biodiversity programs, only native species will be introduced into the revegetation and mitigation procedures. The reforestation program outlines plant distribution techniques and provides a list of all of the native plants to be used. Again, collaboration with SEMARNAT and CONABIO has been critical to the species selection and identification process.</p> | To qualify for the Conserving level, please provide documentation evidencing the establishment of a comprehensive, multiyear management program to detect and control invasive species. |
| | | <p><u>Source:</u> CONNET. "Programa de Reforestacion Como Medida de Compensacion Ambiental Y Programa de Restauracion de suelos:Municipios de Huachinango, Xicotepec Y Tlacuilotepec En El Estado de Puebla," July 2010, 30. // CONNET. La Utilizacion de Especies Nativas Para La Reforestacion O Restauracion de Sitios Dentro Y Fuera Del Proyecto. Photo report, n.d.</p> | |
| NW3.3 Restore Disturbed Soils | 8 | <p>Conserving</p> <p>The Ministry of Environment and Natural Resources (SEMARNAT) has granted the creation of earthworks and borrow pits under the condition that they be reforested and restored. A specific program has been developed and approved by SEMARNAT to restore the disturbed soils in 2013. A total of about 480 hectares of land have been used for access ways, earthworks, and borrow pits and the highway itself, while about 1,400 hectares have been reforested during the whole construction process. The outlined reforestation program recommends the restoration of topsoil for the successful revegetation of the disturbed soil sites. Various native species have been carefully selected for the restoration process.</p> | To qualify for the Restorative level, the project must restore 100% of the soils disturbed as a result of a previous development project (i.e. not caused by Nuevo Necaxa-Avila Camacho highway project) |
| | | <p><u>Source:</u> CONNET. "Localizacion de Bancos de Tiro Y Caminos de Acceso Cercanos Al Derecho de via," n.d. // CONNET. "Localizacion de Sitios de Reforestacion Dentro Del ANP," n.d. // CONNET. Arrope de Taludes. Photo report, n.d. // CONNET. "Reforestacion Como Medida de Compensacion Y Restauracion." Powerpoint, n.d., 2. // CONNET. "Programa de Acciones de Reforestacion Y Restauracion," n.d., 35.</p> | |

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| NW3.4 Maintain wetland and surface water functions. | 15 | <p>Conserving</p> <p>The Nuevo Necaxa—Ávila Camacho highway section achieves four ecosystem functions; it maintains the water quality of the area, the sediment transport of the waterways, the hydrological connection, and restores disturbed habitat. The project preserves the waterways by stabilizing the mountainous slopes to prevent erosion. The above-mentioned reforestation and revegetation projects further stabilize the soil and prevent slope deterioration. Various documents demonstrate no change in the water quality or sedimentation of the rivers and streams, and a two-year monitoring plan during construction has been outlined. Lastly, the highway project does not disturb any hydrological connections in the region.</p> <p><u>Source:</u> CONNET. “Localizacion de Bancos de Tiro Y Caminos de Acceso Cercanos Al Derecho de via,” n.d. // CONNET. “Localizacion de Sitios de Reforestacion Dentro Del ANP,” n.d. // CONNET. Arrope de Taludes. Photo report, n.d. // CONNET. “Reforestacion Como Medida de Compensacion Y Restauracion.” Powerpoint, n.d., 2. // CONNET. “Programa de Acciones de Reforestacion Y Restauracion,” n.d., 35.</p> | To receive the Restorative level, the project must enhance all four ecosystem functions and fully restore disturbed functions. |
| | 0 | <p>The Nuevo Necaxa-Ávila Camacho Highway section achieves the highest score of Restorative for this credit for its efforts in mitigating the negative effects of construction and in creating new habitat. Two hundred hectares were selected by specific criteria and were donated to CONANP. Of the landscapes preserved, two types are significant: cloud forests and tropical forests, which contribute to the local hydrological system as well as other ecosystem services. The 200 hectares are to be perpetually conserved as environmental compensation for the highway project.</p> | |
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| CLIMATE AND RISK | | | |
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| | NUEVO NECAXA-AVILA CAMACHO HIGHWAY, MEXICO | | RECOMMENDATIONS |
| CR1.1 Reduce Greenhouse Gas Emissions | 0 | <p>No Score</p> <p>The documents provided did not demonstrate the completion of a comprehensive carbon Life Cycle Analysis to help reduce the anticipated amount of net greenhouse gas emissions during the life cycle of the project. Consequently, the Nuevo Necaxa-Ávila Camacho highway section does not qualify for any points under this credit.</p> <p><u>Source:</u> Consultoria Especializada en Estudios Ambientales. Manifestacion de impacto ambiental modalidad regional para bancos y caminos de acceso de la carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho del km140+123 al km178+500 en el estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d., 141. // Biologia Integral en Impacto Ambiental. Modificacion: Manifestacion de Impacto Ambiental Modalidad Para: Bancos de Préstamo Y de Tiro de La Carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho Del km140+123 Al km178+500 En El Estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d., 37.</p> | To qualify for the Improved level, please submit a life cycle carbon assessment or a carbon footprint analysis. A 10% reduction in the net carbon dioxide equivalent emissions during the life cycle of the project would qualify it for the “Enhanced” level. |
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| CR1.2 Reduce Air Pollutant Emissions | 0 | No Score | Submit documentation detailing the implementation of an air pollution program that reduces the adverse impacts on air quality beyond that which is required by regulation. |
| | | No documents have been provided regarding measures to minimize adverse impacts on air quality beyond those required by federal and state regulations. Consequently, the project does not achieve any points for this credit. | |
| | | <u>Source:</u> Consultoria Especializada en Estudios Ambientales. Manifestacion de impacto ambiental modalidad regional para bancos y caminos de acceso de la carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho del km140+123 al km178+500 en el estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d., 53. // Biologia Integral en Impacto Ambiental. Modificacion: Manifestacion de Impacto Ambiental Modalidad Para: Bancos de Préstamo Y de Tiro de La Carretera Mexico-Tuxpan, Tramo Nuevo Necaxa-Avila Camacho Del km140+123 Al km178+500 En El Estado de Puebla. Manifestacion de impacto ambiental modalidad regional, n.d., 99. | |
| CR2.1 Assess Climate Threat | 0 | No Score | Please submit any documents that detail a comprehensive climate impact assessment and adaptation plan over the lifespan of the project, as well as documentation of community outreach and local and regional consultation of emergency management. |
| | | The project does not achieve any points for this credit because the documents did not include a comprehensive Climate Impact Assessment and Adaptation Plan for the useful life of the project. | |
| | | <u>Source:</u> N/A | |
| CR2.2 Avoid Traps And Vulnerabilities | 6 | Enhanced | Please provide additional documentation that demonstrates that direct community participation was integrated during the risk assessment; minutes, reports, and photos would be appropriate for qualifying the project to the Superior level. |
| | | The "Evaluation of Risks" (Evaluación de Riesgos) document provided outlines the various traps and vulnerabilities of nine communities in proximity to the Nuevo Necaxa-Àvila Camacho project. Potential negative impacts of the highway project are anticipated to extend to the towns and villages of Patoltecoya, Cuaxicala, Cuahueyatla, San Augustin, Xicotepec, Tepapatlaxco, Teteloloya, La Esperanza, and Plan de Ayala. Among the identified community issues were deterioration of local or rural roads, rockslides, possible inundation, and sound pollution. Consequently, the project qualifies for the Enhanced level for specifying unique solutions for each location to avoid these configuration traps. | |
| | | <u>Source:</u> CONNET. "Programa Interno de Proteccion Civil: Tabla de Identificacion Y Evaluacion de Riesgos Del Inmueble," n.d. | |
| CR2.3 Prepare For Long-Term Adaptability | 0 | No Score | Please submit any documents that address the strategies for managing long-term climate change. |
| | | The Nuevo Necaxa-Àvila Camacho highway section does not achieve any points under this credit because the documents provided do not demonstrate any specific measures taken to address the potential consequences of long-term climate change. | |
| | | <u>Source:</u> N/A | |

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| CR2.4 Prepare For Short-Term Hazards | 3 | Improved | Please provide additional documentation that demonstrates the preparation for one in fifty year disaster. Any plans and designs created and implemented to prepare for this short-term hazard would qualify for the Superior level. |
| | | The Evaluation of Risks (Evaluación de Riesgos) document assesses the likelihood and gravity of various disasters and hazards that might affect the Nuevo Necaxa-Ávila Camacho highway section. Identified risks include geological, hydrological, chemical and social factors. Furthermore, for each section of the highway, localized risks are specified and further evaluated, qualifying the project for the Improved level. | |
| | | <u>Source:</u> CONNET. “Programa Interno de Protección Civil: Tabla de Identificación Y Evaluación de Riesgos Del Inmueble,” n.d. | |
| CR2.5 Manage Heat Island Effects | 0 | No Score | Please provide the proper documentation to demonstrate the management of the heat island effect for the project. |
| | | The documentation provided does not demonstrate that any strategies were implemented to reduce the heat island effect near the highway project. Consequently, the Nuevo Necaxa-Ávila Camacho highway section does not achieve any points for this credit. | |
| | | <u>Source:</u> N/A | |
| CR0.0 Innovate Or Exceed Credit Requirements | 0 | N/A | |
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| OVERALL: | 228 | NUEVO NECAXA-AVILA CAMACHO HIGHWAY, MEXICO |
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APPENDIX D: LIST OF DOCUMENTS PROVIDED

| DOCUMENTATION PROVIDED. (SPANISH) |
|---|
| Documents in category I |
| 06-01: 2012-01-09 Vinculos Teteloloya |
| 06-01: Agradecimiento (Donacion Concreto) |
| 06-01: Agracecimineto Camino ULA |
| 06-01: Agradecimiento Muro de contencion |
| 06-01: Agradecimiento Trabajos de limpieza |
| 06-01: Agradecimiento Ventiladores |
| 06-01: CONNET-RS-PRO-001 r01 |
| 06-01: Donacion de material a preescolar de Plan de Ayala |
| 06-01: Donacion de despensas |
| 06-01: Donacion de señalamiento Teteloloya |
| 06-01: Recorrido muro de contencion |
| 06-02: 2009-09-04 Minuta Tepapatlaxco |
| 06-02: Agradecimiento (Hospital Integral Xico) |
| 06-02: Agradecimiento (teteloloya) |
| 06-02: Agradecimiento Apoyo de maquinas |
| 06-02: Agradecimiento Despensas |
| 06-02: Agradecimiento Grupo ACTIVATE |
| 06-02: Agradecimiento Mazacoatlan |
| 06-02: Agradecimiento |
| 06-02: Agradecimiento b |
| 06-03: Manantial Patoltecoya |
| 06-03: Mejoramiento circulacion |
| 06-03: Minuta (San Agustin-Connet-Cuar) |
| 06-03: Minuta atencion Cuaxicala |
| 06-03: Minuta de Campo La Joya |
| 06-03: minuta de recorrido DDV (Nvo Tenancingo) |
| 06-03: Minuta la Joya Tacubaya |
| 06-03: Minuta Xicotepec-Tepapatlaxco |
| 06-04: Ayudante general |
| 06-04: Tabajador [sic] local oficial fierrero |
| 06-04: Tabajador [sic] local Operador lanzadora |
| 06-04: Tabajador [sic] local Poblador |
| 06-08: Orden de compra 17064 |
| 06-08: Orden de compra 18268 |
| 06-08: Orden de compra 18843 |
| 06-08: Orden de compra 18913 |
| 06-09: 2010-09-23 SIGE |
| 06-09: 2011-07-07 Presentacion de catedraticos (ITSH) |
| 06-09: 2012-05-21: ITSH Convoca a sesion ordinaria |

06-09: Educacion Adultos
06-09: Nombreamiento Reprenante [sic] Sector Productivo ITSH
06-010: Carga Transporte [sic] y Montaje de Trabes
06-010: CONNET-SIG-PGE-012 r02 Identificacion de Peligros y Evaluacion de Riesgos
06-010: GSI-INS-Rev.4 Trabajo Seguro en Alturas
06-011: Plan Operativo de Seugridad Teteloloya
06-012: 2012-01-26: Campaña de Vacunacion contra Influenza
06-012: 2012-06-08 Evidencia campaña de glucosa
06-012: 2013-01-03 Campañas SMO
06-012: Campañas de Salud
06-013: Calibracion Drager
06-013: Reporte Fotografico de Uso de EPP-Orejas
06-013: Reporte Fotografico Monitoreos-Ruidos
06-014: Ptografias de toma de lecturas ruidos
06-015: Disminucion de ruido, vibracion
06-017: Soporte Fotografico de la Energia Renovable
06-019: Evidencia fotografica PIVs
06-020: Caminos de acceso
06-023: Camino de acceso Plan de Ayala-Tepapatlaxco
06-024: Señalamientos
06-024: Señalamiento urbana y rural
06-024: Señalamiento rutas de evacuacion
06-027: EstudioZonaArqueológica
06-032: 201-01-11 Soporte foto teteloloya combate
06-032: 2012-12-05 capacitacion de primeros auxilios en teteloloya
06-032: Colocacion de señalamiento en teteloloya
06-033: 2011-07-04 Agradecimiento (teteloloya)
06-033: 2011-07-27 Agradecimiento Despensas
06-035: Organigramas
06-036: Manual para Implementar Iniciativas de Responsabilidad Social en los Proyectos
06-036: Reporte mensual de RS
06-037: 2013 Primer Trimestre Costos RS
06-038: Acta de comision de Seg e Hig
06-039: Minuta de obra 2
06-039: Minuta de obra 25
06-040: Acuerdo con Teteloloya (Asesoría SCT)
06-041: 2011-11-11 Nota informativa (Asesoría SCT)
06-042: 2008-07-28 Minuta San Agustin
06-042: 2008-10-16 Patoltecoya
06-042: Minuta
06-043: 2013-02-14 Minuta LDDV
06-054: 2011-01-11 Soporte foto teteloloya combate
06-054: 2011-10-11 Entrega del Arbol Alum SEC
06-054: 2012-11-13: Entrega del Arbol Alumnos [sic] Primaria

06-054: 2012-12-05 capacitacion de primeros auxilios en teteloloya
06-057: Evaluacion mensual de Subcontratistas 1
06-057: Evaluacion mensual de subcontratistas
06-058: CONNET-PRC-PRO-001 r02 Procedimiento de Licitacion de Subcontratos
06-058: CONNET-PRC-PRO-002 r02 Para la Administracion de los Subcontractos
06-100: Cambio de trazo por Hallazgos Arqueologicos
06-115: CONNET-SIG-PGE-010 r02 Atencion y respuesta a emergencias
06-134: Evaluacion de riesgos
06-142: Tableros

Documents in category II

06-03: Resolutivo 0554
06-03: Resolutivo 1680
06-013: Sismografos
06-015: Prog. Reforestacion
06-030: Acciones rescate fauna
06-030: Acciones resacte flora
06-031: Reforestacion Tec. De Huauchinango
06-044: Trituradora
06-045: Estudio de Impacto Ambiental
06-045: Localizacion de sitios de bancos de tiro, caminos de acceso [sic] y predios reforestados
06-045: Modificacion de estudios de impacto ambiental
06-052: Desglose de Requisitos RMIA y RCUS
06-052: Evaluacion de cumplimiento legal
06-053: Estudio de daños CONNET
06-054: ISO-14001-2004
06-060: El equipo del proyecto estudiara la adecuada reutilizacion de materiales y estructuras existentes
06-061: Reduccion de polvos
06-065: CONNET-MAB-PLN-001 r03 Plan de Gestion Ambiental
06-066: Bitacora de Residuos
06-070: Bitacora reciclables 2012
06-072: Trituradora
06-076: Soporte Fotografico de la Energia Renovable
06-081: MIA Bancos y Caminos
06-082: cuerpos de agua y letrinas
06-085: Programa monitoreo ambiental
06-087: Informe CONNET junio 2012
06-088: 2013-08-06: Tablero de control
06-089: 05-08-2013 Primer Informe de Cumplimiento Ambiental de Resolutivo
06-089:15-07-2013 Cumplimiento de condicionantes de resolutivo 8811
06-089: 16-08-2013 SEMARNAT
06-089: 2013-05-03 Of. SGPA-DGIRA_DG_2673
06-089: CONNET-cuarto informe de cumplimiento
06-089: CONNET - Primer Informe de Cumplimiento
06-089: CONNET- Segundo Informe de Cumplimiento

06-089: CONNET - Tercer Informe de Cumplimiento
06-089: Localizacion de sitios reforestados
06-089: R-1689 Bancos de Tiro-Prestamo-Caminos de acceso
06-089: Resolutivo de impacto ambiental 8811
06-089: Respuesta de SEMARNAT de cumplimiento a cuarto informe
06-090: Reporte fotografico Construccion de obras complementarias
06-091: Reporte fotografico Zonas de Amortguacion [sic] natural de minimo 100 metros
06-092: Reforestacion y restauracion
06-093: Archivo Fotograico Construccion de obras complementarias
06-094: Archivo Fotografico Construccion de obras adicionales para evitar modificar riberas
06-095: Zonas de proteccion de vegetacion cercanas a la Riberas
06-096: Restauracion de sitios considerados corredores biologicos
06-097: Presentacion Cambio de Trazo TZ
06-112: Produccion de planta
06-113: 2013-01-03 Programa de reforestacion y restauracion
06-113: Acer negundo
06-113: Bursera simaruba
06-113: Cecropia obtusifolia
06-113: Cedrela odorata
06-113: Ficus carica
06-113: Gliricida sepium
06-113: Guazuma ulmifolia
06-113: Inga vera
06-113: Quercus oleoides Cham
06-113: Salix bonplandiana Kunth
06-113: Salix humoltiana Willd
06-113: Swietenia macrophylla
06-113: Trema micrantha
06-114: Montaje Informe drenaje Rev4
06-114: Tramo 2-TR-HID-IN-NX-003
06-115: Estabilizacion de taludes
06-116: S.G.P.A-DGIRA.DEI.0554-03
06-118: 2013-01-03 Programa de reforestacion y restauracion
06-118: 2013-06-02 Programa de monitoreo y vigilancia ambiental
06-118: Programa de acciones de rescate y reubicacion de flora y fauna silvestre rev01
06-119: Proteccion de los habitats existentes a lo largo del proyecto
06-120: Aumenta la calidad o cantidad de habitat exitentes [sic]
06-121: 2013-01-03 Programa de reforestacion y restauracion
06-121: Plantas localmente apropiadas y no invasivas para la localizacion concreta de los trabajos
06-121: Resolutivo de impacto ambiental 8811
06-123: Programa de restauracion
06-124: Superficie a restaurar de bancos de tiros
06-125: El proyecto mantendra la coneccion hidrologico
06-125: Estudio hidrologico e hidraulico

06-126: El proyecto mantendra la calidad del agua
06-127: El proyecto mantendra el habitat
06-128: El proyecto mantendra el transporte de sedimentos
06-129: Normas y regulaciones locales subcategoria Mundo Natural
06-132: Plan de Inspeccion y Prueba Ultima Version
06-135: Cuenca-1
06-135: Cuenca-2
06-135: Cuenca-3
06-135: Cuenca-4
06-138: Arrope de taludes
06-141: Prog. Reforestacion
06-141: Reforestacion DDV Carpeta
File2
File5

Miscellaneous documents.

06-04: Base de datos
06-05: Cambio de categoria 2
06-05: Cambio de categoria 3
06-05: Cambio de categoria
06-07: Cambio de categoria RH 1
06-07: Cambio de categoria RH 2
06-07: Cambio de categoria RH 3
06-07: Constancias DC3 (1)
06-07: Constancias DC3 (2)
06-07: Constancias DC3 (3)
06-07: Constancias DC3 (4)
06-07: Convenio CONEVYT
06-07: Diplomas
06-07: Exámenes Operador 1
06-08: Convenio casa don gil
06-08: Grupo Calero
06-011: Calculo electrico TU-IP-ME-NX-XPI-004-R#
06-011: Calculo electrico TU-IP-ME-NX-XP11-004-R#
06-016: Resistencia de tierras
06-017: Sistema de iluminacion TU-IP-ME-NX-XP11-004-R3
06-017: Sistema de iluminacion TU-IP-ME-NX-HG-001-R1
06-017: Sistema de iluminacion TU-IP-ME-NX-XPI-004-R3
06-017: Sistema de iluminacion TU-IP-ME-NX-HG-001-R1
06-017: Sistema de iluminacion TU-IP-ME-NX-XPI-004-R3
06-027: Fotos panoramicas
06-034: Tendencias ICA
06-042: Obra de drenaje K842+529
06-048: Programa de Mantenimiento
06-049: Model de Contrato denominado PPS

06-049: Model de Contrato PPS
06-050: Objetivo del proyecto basico
06-053: 2012-01-16: Exp. 0079-10-178-009-4 absolucion
06-055: Calculo electrico Tunel Necaxa TU-IP-ME-NX-003-R0
06-061: Plan de Inspeccion y Prueba Ultima Version
06-077: Programa, 01-06 de Julio
06-077: Programa, 24-29 de junio
06-077: Soporte, mp3 3000 hrs M4T01880
06-077: Soporte, MP4 2000 hrs L4D00417
06-078: Exámenes operador
06-082: Convenio Marco GER014-PSE-CNV-0018
06-083: Extraccion de Agua 12
06-083: Extraccion de agua Julio 13
06-084: Extraccion de agua 12
06-089: 10-07-2013: Informe de inci de actividades de proyecto
06-089: 2012-07-23: obras relevantes con coordenadas Tci
06-099: Estudio justificativo de cambios de proyecto pro geologia adversa
06-100: Presentacion Cambio Trazo PSM
06-103: Puentes
06-114: Cunetas
06-117: CONNET-SIG-PGE-010 r02 Atencion y respuesta a emergencias
06-132: Reduccion de polvos
06-133: Programa de mantenimiento vehicular julio 13
06-134: Estudio de viento
06-136: 2011-06-07 Aprobacion PIPC 2011
06-137: EstudioJustifCambioProy_Nnec-Acam_R4.0 ok
Mexico City- Tuxpan Highway
File 3
File 4

Technical documents.

06-019: P.I.P 845+880
06-019: PIV Agostaderos
06-019: PIV El Pantano
06-019: PIV km969+482
06-019: PIV Michuca
06-019: PSV 968+689 45
06-019: PSV Boveda 847+422.24
06-022: PSPYG 863+405 00
06-046: Larguillo Av Ene 13
06-059: Orden de Compra (1)
06-059: Orden de Compra (2)
06-059: Orden de Compra (3)
06-059: Orden de Compra (4)
06-063: Carmelo Abel Lozada Edo CTA

06-063: Casa Don Gil Edo de Cuenta Tramo 1 y Tramo 2
06-067: Curva masa Tramo-2.1
06-067: Curva masa Tramo-2.2
06-067: Curva masa Tramo 1-A
06-067: TR-DGM-PL-NX-T1-PE-001-TR-DGM-PL-NX-T1-PE-001
06-067: TR-DGM-PL-NX-T1-PL-001-TR-DGM-PL-NX-T1-PL-001
06-067: Tramo1-B
06-068: TR-DGM-PL-NX-T1-PE-001-TR-DGM-PL-NX-T1-PE-001
06-068: TR-DGM-PL-NX-T1-PL-001-TR-DGM-PL-NX-T1-PL-001
06-069: TR-DGM-PL-NX-T1-PL-001-TR-DGM-PL-NX-T1-PL-001
06-069: TR-DGM-PE-NX-T1-PL-001-TR-DGM-PL-NX-T1-PE-001
06-101: Alseseca I Plano Gral. PC-EST-PL-NX-ALI01-R3c
06-101: Plano General Texcapa
06-101: Plano Gral Alseseca II Rev01- Layout 1
06-101: Plano Gral San Marcos PC-EST-PL-NX-SM-1-1-2-REV-6
06-103: Alseseca I Plano Gral. PC-EST-L-NX-ALI01-R3c
06-103: Plano General Texcapa
06-105: Corte 1.14
06-105: Corte La Ardilla_DPTO ING rev 04-1
06-105: Detalles-Lavaderos
06-105:Detalles Malla 3 torcion
06-105: Lavaderos Texcapa-Pte Texcapa II
06-106: Corte 1.17
06-106: Corte 5 AB-Corte 1.05 A B y C
06-106: Cortes 1.10, 1.11- Corte 1.10 y 1.11-SECC TR
06-106: Pte ecologico II - Pte Eco II DER
06-133: Programa de verificacion