

WASTEWATER TREATMENT PLANT AND MARINE OUTFALL OF LA CHIRA - PERU



Figure 01: General view, construction process/ Source: Proinversion

Manuela Guzman prepared this case study under the supervision of Cristina Contreras ENV-SP And Hatzav Yoffe, ENV-SP as part of the Harvard-Zofnass program directed by Dr. Andreas Georgoulas by initiative of IDB. The authors would like to thank Ana Maria Vidaurre-Roche member of IDB and Mario Alfredo Tejada from Proinversion for their continuous support in developing this case. Editing and Proofing: Julie Mercier

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1. 1. PROJECT INTRODUCTION

This case study outlines the evaluation of the Wastewater Treatment Plant (WTP) and Marine Outfall of La Chira, Peru. The WTP of La Chira will be designed, built, operated and financed by Consorcio La Chira S.A. through an initial 25-year concession contract with the National Government of Peru, specifically the Ministerio de Vivienda, Construcción y Saneamiento (SEDEPAL). The concession was awarded on November 18, 2010 by the Private Investment Promotion Agency (PROINVERSION in Spanish) after a competition process. Consorcio La Chira S.A. is a partnership between Acciona Agua S.A.U. and Graña Montero S.A. The partnership will invest PEN\$450,500,372 for the design, construction and beginning of operation activities of the 11.3 m³/s water treatment plant. The plant will benefit approximately 2,655,220 people located in Lima's southern neighborhoods of Villa el Salvador, Miraflores, Barranco, Chorrillos, Santiago de Surco and San Isidro. According to SEDEPAL, Peru has 17 wastewater treatment plants and two water chamber collectors. La Chira will add another WTP that will complement the water chamber collector of Surco and Chorrillos.

Consorcio La Chira will be in charge of the project's three periods: construction, operation and dismantling. Construction started in June 2013 and is estimated to take 24 months. Operation is contracted for 25 years, with the possibility of extending the concession up to but no longer than 60 years. The abandonment and dismantling has also been taken into consideration once the project lifespan finish. Consorcio La Chira will invest in the three project phases. Annually, SEDEPAL will return the cost of the initial investment, maintenance and operation (RPMO in Spanish) through a collection trust fund. The anticipated return on investment (ROI) will be PEN\$24,203,165. The return on operation and maintenance will be PEN\$6,778,060. The WTP expects to emit a maximum of 150 µg/m³ PM10 of air particles per day and 30,000 µg/m³ CO per hour. Additionally, it will reduce water contamination by achieving the Environmental Quality Standards for water quality, (ECA in Spanish), once the Plant starts to operate.

2. PROJECT DESCRIPTION & LOCATION

The WTP project was conceived in May 2006 when the Supreme Resolution No. 024-2006-EP agreed to incorporate the private investment promotion corporation into a project known as the Waste Water Treatment Plant of Taboada. Such a project would be undertaken through a concession contract following the mechanisms and procedures established in the Supreme Decree No. 059-96-PCM and Supreme Decree No. 060-96-PCM. In November of the same year, PROINVERSION's Board of Directors agreed to include all projects that would contribute to the integrated solution of wastewater treatment for Lima and Callao. After a 3 year process, the WTP of La Chira was planned and approved by the private investment promotion corporation. In 2009, PROINVERSION's Board of Directors approved the framework document for the Integrated Projects Competition in order to provide the design, financing, construction, and operation of La Chira WTP through a concession contract. On November 18, 2010, PROINVERSION awarded Consorcio La Chira as the concessionaire of the Plant.

The WTP of La Chira is located in the district of Chorillos, which is in the southern part of the province of Lima, Peru. The Plant is situated adjacent to the largest wastewater collector of Lima (Proyecto Interceptor Norte), which merges the wastewater from two other collectors (Surco and Circunvalacion) and unloads it into the sea approximately 200 meters off the coast of Chorillos. Thus, the project is critical to Chorillos and the other districts it will serve (San Borja, San Isidro, Miraflores and Barranco), because it will implement a pre-treatment system for wastewater before it is deposited offshore, which will reduce the amount of contamination to the sea and to the beaches of Chorillos, Barranco and Miraflores. The Plant includes construction of the following: an 830 meter tunnel between the existing water collection chambers and the new Plant, a new water collector chamber, an elevated collector channel, a wastewater treatment plant and a 3.6 km marine outfall. All the construction works have been designed to manage a maximum volume of 11.3m³/s.

The project will be constructed on a publicly-owned site of 21.87 hectares (ha) in the Chorrillos District of Lima. SEDEPAL and the Peruvian National Government will give use rights to the La Chira S.A. Concession. Currently, the land is predominantly flat and barren. It has been designated for industrial use by the city of Lima and is surrounded by the human settlements of Victor Raul Haya de la Torre and Pacifico de Villa. It is also very close to the Marquez de Villa, Villa Nacional, Viviendas Radio Nacional del Peru and Marquez de Corpac resident associations. Located near the shoreline of Chorrillos, the Plant and the marine outfall will improve sanitary conditions for the residential areas by increasing the distance between discharge of treated water and the communities, and by improving the water quality. In addition to improving the water quality, La Chira WTP expects to reduce greenhouse gas emissions, lower energy consumption, and follow environmental management best practices certified by international standards such as ISO 14001.

Throughout this process several environmental challenges are faced. Noise, odors and water quality are the major challenges. La Chira presents a plan to control the impacts of this assets in addition to the consideration of social impacts during the design, construction and operation of the plant.

Wastewater Treatment Plant and Marine Outfall of La Chira, Peru

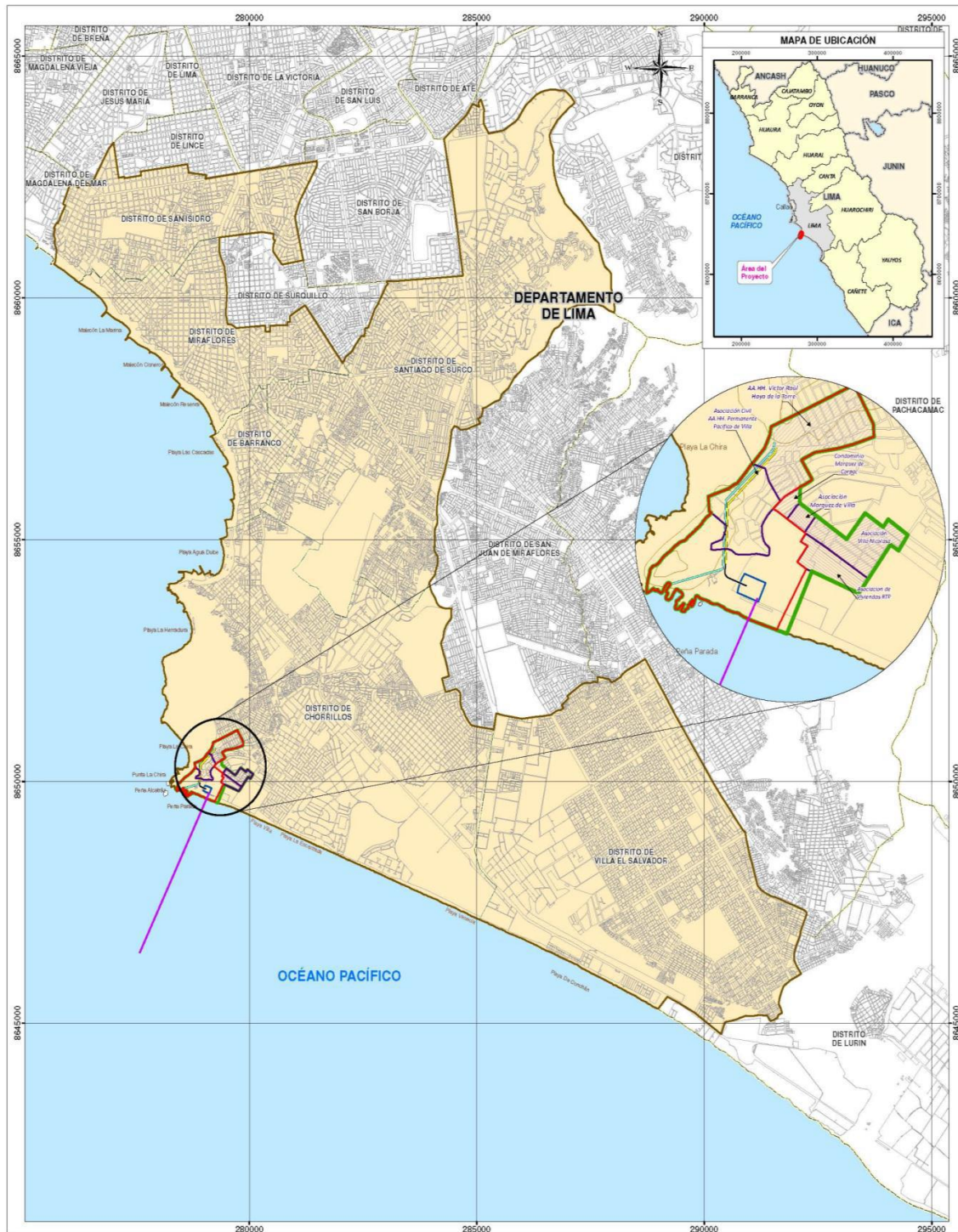


Figure 02: Location of La Chira WTP and Areas for Social Study. Source: Walsh. 2011. Resumen Ejecutivo.R-21.

3. APPLICATION OF THE ENVISION RATING SYSTEM¹

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 Wastewater Treatment Plant and Marine Outfall of La Chira. The main intent of this rating is to evaluate the construction, operation and dismantling phases of the Wastewater Treatment Plant and Marine Outfall of La Chira managed by Consorcio La Chira.

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 ISI² and Zofnass Program³ websites.

Appendix C provides a table with the detailed project assessment, specifications for each of the credits, and recommendations for the Wastewater Treatment Plant and Marine Outfall of La Chira project.

¹ Anthony Kane, Zofnass program research director, and Salmaan Khan, research assistant, wrote most parts of this section.

² www.sustainableinfrastructure.org

³ 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.”⁴ 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	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	QUALITY OF LIFE	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	QUALITY OF LIFE	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 03: Quality of Life category credits distribution.

4.1.1. Purpose

In the **Purpose subcategory**, La Chira WTP has an excellent performance, with two credits evaluated as Restorative (QL1.1 Improve Community Quality of Life and QL1.2 Stimulate sustainable growth and development) and one credit evaluated as Superior (QL1.3 Develop Local Skills and Capabilities).

Community quality of life of various communities will be improved by the construction of the WTP of La Chira. By reducing water contamination of the watershore, the WTP will directly influence the quality of life of Pacifico de Villa and Victor Raúl Haya de las Torres. It will indirectly influence Villa Nicolasa, Márquez de Corpac, Marqués de Villa and the Asociación de Vivienda de Radio y Televisión Peruana. In addition water quality improvement, the project team has developed a systematic plan to communicate community members the activities that may affect them during the construction, operation and dismantling phases. There are a set of Community Relationship Plans (PRCs) that explain the scope, duration, risks, benefits and disadvantages of the activities performed by the Plant.

The La Chira WTP project will improve the local economy by creating diverse types of jobs. In addition, it will bring a new population to the area that will enhance local commercial activities. According to the

⁴ *Envision* Guidance Manual, p.30

documentation provided, La Chira WTP will prioritize the local population when hiring its required labor force.

Local skills and Capabilities will be enhanced with the hiring processes implemented by the Plant's construction firm (Graña y Montero S.A.) and La Chira WTP contractors. Positions related to labor will be 100% filled directly from the project's area of influence population. Additionally recruitment and training will take place in community space. People from the Pacifico de Villa and Victor Raúl Haya de la Torre communities will be trained in masonry, metal works and carpentry and will be evaluated and selected to be part of the La Chira WTP labor force. However, minority/disadvantaged groups can be considered as part of the labor force of the plant. Hiring and educational program emphasis can shift from specific project needs to local capacity development. Community educational and employment needs and shortfalls could be better identified.

4.1.2 Community:

In the **Community subcategory**, La Chira WTP has the challenge to improve two credits that were evaluated as No score (QL2.1 Enhance Public Health And Safety and QL2.5 Encourage Alternative Modes of Transportation). It was also evaluated with two credits as Conserving (QL2.2 Minimize Noise And Vibration and QL2.3 Minimize Light Pollution). One credit evaluated as Improved (QL2.4 Improve Community Mobility And Access) and another one as Enhanced (QL2.6 Improve Site Accessibility, Safety & Wayfinding).

Noise, vibration are major concerns for the La Chira WTP project team. Regarding Noise, the project team will use the National Standard of Environmental Noise Quality N° 085-2003-PCM and the Mining Security and Hygiene Regulation N° 046-2001-EM as baselines for the noise exposure of workers and the surrounding community. Regarding vibration the project team will follow the ISO 2631-1(1997) Mechanical Vibration and SOC Evaluation of human exposure to whole body vibration standards. To achieve appropriate standards in residential areas, noise levels must be under 60dB during the day and 50dB during the night. Noise monitoring will be done in construction, operation and dismantling periods.

Light pollution will be controlled by managing exterior lighting during the construction, operation and dismantling periods. Lighting zones will be controlled with appropriate equipment such as asymmetrical searchlights and lighting wings. Additionally, working hours will be planned to maximize daylight time.

Mobility and access improvement is managed through avoidances of vehicle circulations during congested times, control of maximum speed limits and some parking provision. However, beyond measures to reduce negative impacts, no documentation has been provided regarding an external analysis of the transportation impacts generated by WTP activities. There is also no documentation about contact with decision makers or availability of additional modes of transport. There is also no monitoring associated with the transportation activities. A broader view of the potential impacts of the constructed works on community mobility and access can be done. Additionally, better long-term access and mobility improvement for walkability and livability could be addressed.

The credit QL2.1 Enhance Public Health And Safety was evaluated as No score because no

documentation has been provided regarding the use of new technologies and how they are addressed in the project's health and safety plans. According to Envision Manual "new health and safety issues [that] may arise because of the use of new materials and/or the application of new technologies and methodologies."⁵ Therefore the project team is recommended to perform a risk assessment analysis of the use of new technologies in the construction and operation phases of the plant, to provide analysis of other projects that have successfully used the same new technologies or materials and to provide evidence of how changes to the methodologies and protocols are to be passed on to the construction contractor.

4.1.3 Wellbeing:

In the **Wellbeing subcategory**, La Chira WTP was evaluated with two credits as Conserving (QL3.1 Preserve Historic And Cultural Resources and QL3.2 Preserve Views And Local Character). One credit was evaluated as No score (QL3.3 Enhance Public Space).

During construction, the La Chira WTP team will investigate and preserve potential archaeological remains found in the area of the Plant and the tunnel. Preservation measures will be done according to the Peruvian General Cultural Heritage Law No 28296. If anything is found, the team will report and collaborate with the General Direction of Cultural Heritage and Museums of Peru.

Local character, views and landscape preservation are considered during both the construction and operation periods. The Environmental Management System SGMA will be in charge of managing landfill areas, the disposition of earth and building materials, and the location of material storage. Restoration of the original topography of disturbed sites will be done. Additionally, periodic inspections of visual impacts are planned during the construction and operation stages. Vegetative growth will be monitored at days 60 and 120 after planting. Areas of new soil will also be monitored.

Credit QL3.3 was evaluated as No score because no information has been provided regarding identification of existing public spaces that could be improved or enhanced. Creation of new public space or inclusion of spaces like parks, plazas, recreational facilities or wildlife refuges to enhance community livability, could be considered by La Chira's project team.

⁵ *Envision* Guidance Manual, p.26

4.1.4 Summary of results for the Quality of Life Category.

The table below shows the distribution of credits as well as the level of achievement reached in each credit (figure 4).

WASTEWATER TREATMENT PLANT AND MARINE OUTFALL OF LA CHIRA, PERU			PT.	Performance	% Total	max	
1	QUALITY OF LIFE	PURPOSE	QL1.1 Improve Community Quality of Life	25	Restorative	100.0%	25
2			QL1.2 Stimulate Sustainable Growth & Development	16	Restorative	100.0%	16
3			QL1.3 Develop Local Skills And Capabilities	5	Superior	33.3%	15
4		COMMUNITY	QL2.1 Enhance Public Health And Safety	0	No Score	0.0%	16
5			QL2.2 Minimize Noise And Vibration	8	Conserving	72.7%	11
6			QL2.3 Minimize Light Pollution	8	Conserving	72.7%	11
7			QL2.4 Improve Community Mobility And Access	1	Improved	7.1%	14
8			QL2.5 Encourage Alternative Modes of Transportation	0	No Score	0.0%	15
9			QL2.6 Improve Site Accessibility, Safety & Wayfinding	3	Enhanced	20.0%	15
10		WELLBEING	QL3.1 Preserve Historic And Cultural Resources	13	Conserving	81.3%	16
11			QL3.2 Preserve Views And Local Character	11	Conserving	78.6%	14
12			QL3.3 Enhance Public Space	0	No Score	0.0%	13
QL0.0 Innovate Or Exceed Credit Requirements			0	N/A			
QL			90		49.7%	181	

Figure 04: Summary of results in Quality of Life category

The project’s performance in the Quality of Life (QL) category can be improved. The project received 90 out of 181 possible points, which represent 49.7% of the total score. The biggest opportunities for improvement are found within the Community subcategory.

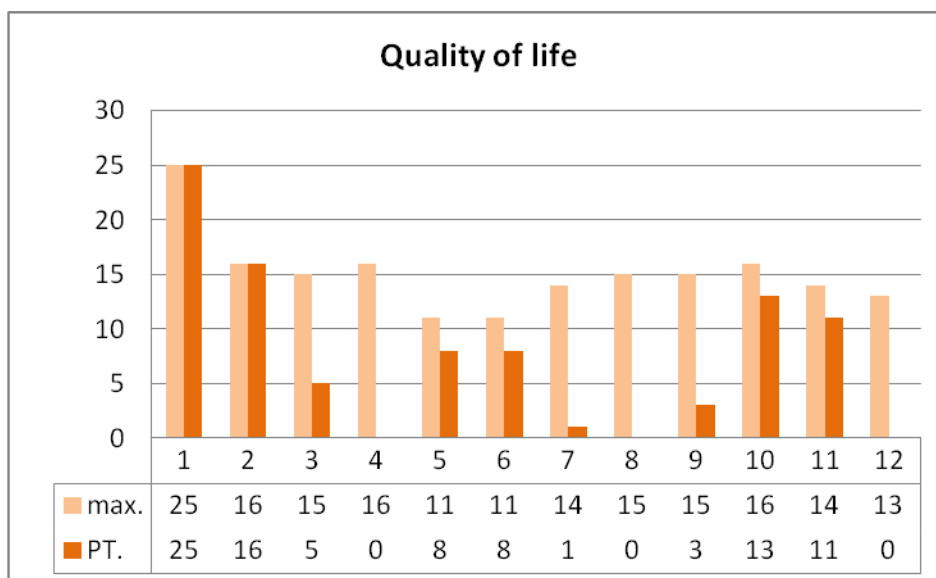


Figure 05: Summary of results in Quality of Life category

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.”⁶

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 06: Leadership category, credits distribution.

4.2.1. Collaboration

In the **Collaboration subcategory**, La Chira WTP was evaluated with two credits as Conserving (LD1.1 Provide Effective Leadership And Commitment And Cultural Resources and LD1.2 Establish A Sustainability Management System). Two credits were evaluated as Enhanced (LD1.3 Foster Collaboration And Teamwork and LD1.4 Provide For Stakeholder Involvement).

The La Chira WTP team is not only committed to applying sustainable practices inside the plant but also to disseminating sustainable practices throughout the larger community related to the company’s activities. Its environmental policies include training and publishing sustainable practices applied within the plant as well as information about the potential environmental impacts of bad practices from a global perspective. Employers, contractors and suppliers are encouraged to adopt sustainable practices inside and outside the La Chira WTP project. Training courses regarding energy consumption reduction, recycling and waste reduction, emissions reduction, reduced water consumption, and earth-friendly products and processes will be offered internally and externally.

The Environmental Management System (SGMA) of La Chira WTP was created to assure that activities, products and process of the Plant follow good environmental practices during the planning, construction, operation and dismantling periods. Additionally, Acciona Agua S.A.U., a member of the Temporal Union in charge of the construction, operation and dismantling of La Chira WTP, has been certified for the ISO 14001 by the International Certification Network. The system is robust enough to identify and measure vulnerabilities and weaknesses related to the environment in order to address

⁶ Envision Guidance Manual, p.60

changing conditions. Additional foreseeable changing conditions are assessed in the final self-evaluation process.

Encouragement of collaboration and teamwork is part of the duties of the SGMA team. Interrelationships are encouraged between internal and external groups to ensure better performance on activities that affect the environment. Hierarchy, responsibilities and interrelationships among the staff members who manage, perform and monitor activities with potential impacts on the environment are well established. However, no documentation is provided about analyses of conflicting design elements, optimization of integrated design, or an analysis of meaningful shared risk and reward. Inclusion of a meaningful risk and reward sharing between the project owner and the project team would increase the credit score. It would also increase if a better multi-disciplinary approach is taken into account for the project's operation activities.

Stakeholders from the community and the project team have been identified, and periodic meetings are held with a strong emphasis on communication. Among the PRCs, the Information and Communication Program is the one that involves the largest number of stakeholders. However, no information was found about the implementation of feedback from the community. The identified project-side stakeholders include SEDEPAL and the La Chira Temporary Union. Community stakeholders include leaders from the towns of Pacífico de Vila, Ilustre Maestro Victor Raul Haya de la Torre and residential associations of Radio y Televisión del Perú and Villa Nicolasa. In addition, local authorities, local agencies, artisanal fishermen, and surrounding private companies are also included. Better opportunities for incorporating stakeholder input into project plans and decision-making would improve credit's score.

4.2.2. Management:

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

Although La Chira WTP improves the water quality of Lima's shoreline and seeks to use renewable resources whenever they are available, there are no synergies among the infrastructural components of the Plant. Although the WTP has a robust water management system, it is not integrated with water recycling or energy generating infrastructure. Efforts for project-wide system integration could be taken. Additionally, related community wide infrastructure can be efficiently integrated or restored.

Credit LD2.1 was evaluated as No score because no information has been provided regarding the identification of unwanted byproducts or discarded materials from nearby facilities. Unwanted byproducts could be searched and identified. Opportunities for byproduct synergy may emerge from the research effort.

4.2.3. Planning:

In the **Planning subcategory**, La Chira WTP was evaluated with one credit as Conserving (LD3.1 Plan For Long-Term Monitoring & Maintenance). One credit was evaluated as Superior (LD3.2 Address Conflicting Regulations & Policies) and one credit was evaluated as Improved (LD3.3 Extend Useful Life).

Monitoring is a core part of the operations of La Chira WTP. The project team has a designated monitoring plan with designated operators and periodic reports. The Environmental, Safety and Health Chief Office will be in charge of the environmental monitoring of air quality, noise, seawater quality, and soil contamination during the construction, operation and dismantling periods. This office will: verify correct implementation and efficiency of measures listed in the Environmental Management Strategy document; achieve applicable environmental regulations whether local or international; and establish frequency of and locations for monitoring. Periodic reports will be provided to the project directors and owners, including SEDAPAL. The first operation year reports will be produced monthly; following year reports will be produced annually.

The La Chira WTP team has provided an extensive analysis and description of the environmental regulations applicable within the Environmental Impact Assessment. The analysis includes a broad range of institutions concerned with improvement of the environment. The goals, functions and applicable documentation of local and national government agencies, neighborhood associations and NGOs have all been analyzed. However, there is no evidence that any assessment identifying conflicts between the laws, regulations and policies was performed. Structural change consideration will improve the assessment analysis. Identification of conflicts over current laws, regulations, policies and standards; will improve the sustainable performance of the project.

The projected useful life of the WTP is 100 years; however, no evidence was provided regarding efforts that would enable this period to be extended. Reuse of the Plant infrastructure has not really been considered, rather, the Plant will be abandoned or demolished if it cannot be sold or repurposed. Consideration of a way that makes the completed project more durable and resilient to extend its useful life, may improve the evaluation of this credit. Additionally an increase in flexibility may enable the project's refurbishment and reconfiguration.

4.2.4. Summary of results for the Leadership category.

The table below shows the distribution of credits as well as the level of achievement reached in each credit (figure 7).

WASTEWATER TREATMENT PLANT AND MARINE OUTFALL OF LA CHIRA, PERU				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	14	Conserving	100.0%	14
15			LD1.3 Foster Collaboration And Teamwork	4	Enhanced	26.7%	15
16			LD1.4 Provide For Stakeholder Involvement	5	Enhanced	35.7%	14
17		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		PLANNING	LD3.1 Plan For Long-Term Monitoring & Maintenance	10	Conserving	100.0%	10
20			LD3.2 Address Conflicting Regulations & Policies	4	Superior	50.0%	8
21			LD3.3 Extend Useful Life	1	Improved	8.3%	12
LD0.0 Innovate Or Exceed Credit Requirements				0	N/A		
LD				56		46.3%	121

Figure 07: Summary of results in Leadership category

The project’s performance in the Quality of Life (QL) category can be improved. The project received 56 out of 121 possible points, which represent 46.3% of the total score. The biggest opportunities for improvement are found within the Management subcategory.

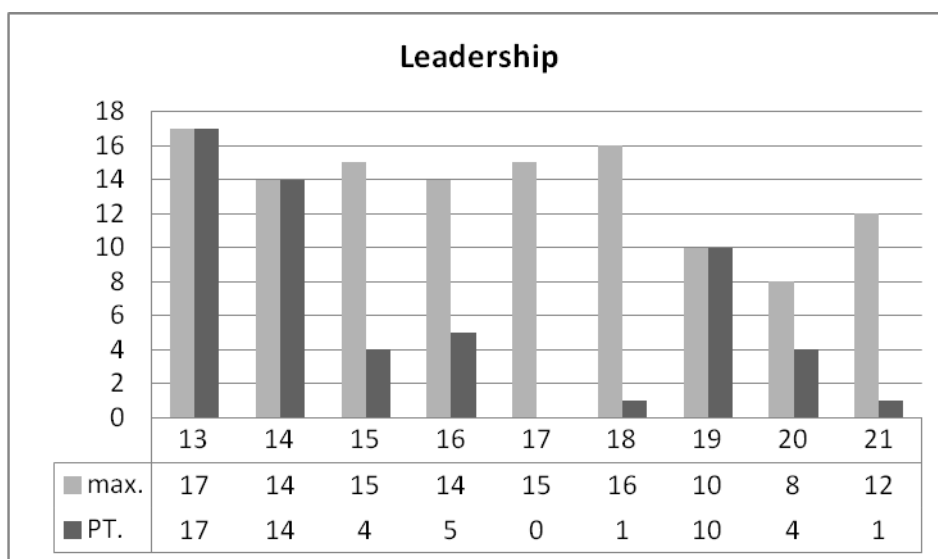


Figure 08: Summary of results in Leadership category

4.3 RESOURCE ALLOCATION

The Resource Allocation (RA) category deals with the quality and source of materials used in the project during its construction and operation phases. The use and allocation of materials and other resources have 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	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	

Figure 09: Resource Allocation category, credits distribution.

4.3.1. Materials:

In the **Materials subcategory**, La Chira WTP improves material allocation efforts according to the documentation provided. There are four credits evaluated as Improved (RA 1.1 Reduce Net Embodied Energy, RA 1.5 Divert Waste From Landfills, RA 1.6 Reduce Excavated Materials Taken Off Site, and RA 1.7 Provide for Deconstruction & Recycling), two credits evaluated as Superior (RA 1.2 Support Sustainable Procurement Practices, RA 1.3 Used Recycled Materials), and one No Score credit (RA 1.4 Use Regional Materials).

The La Chira WTP handles the allocation of materials by taking into consideration a Life Cycle Analysis (LCA) of the construction materials. Additionally, it supports sustainable practices of contractors by requiring specific percentages of reused materials, and by giving priority to companies, suppliers and contractors that have implemented environmental management systems in their production plants and processes. The team is highly receptive to the use of sustainable products in everyday consumption, such as paper, refrigerators, washing machines and electronic devices.

The majority of the efforts to better allocate materials were done during the construction period. Life Cycle Analyses of the different materials used in the Plant have been done to mitigate environmental impacts. Plant materials are analyzed for: greenhouse gas emissions, atmospheric acidification and contamination, emissions of heavy metals, energy used for extraction, and waste produced. However, better measurements of the percentages of the materials used in the project could be taken in order to provide evidence that the analyses have been applied accordingly. Similarly, better measurements of the percentages of potential recycled components and waste reduced, as well as quantification of the balance between cut and fill, would allow for better management of resource allocation.

The RA 1.4 Use Regional Materials credit was evaluated as No Score because no information regarding consideration of possible suppliers near the site was provided. Considering that the La Chira WTP is located in an urban area, an inventory of nearby materials, plants, aggregates, and soils for construction could improve the use of regional materials during the construction and operation periods.

4.3.2. Energy:

In the **Energy subcategory**, one credit was evaluated as Improved (RA 2.1 Reduce Energy Consumption) and two credits were evaluated as No Score (RA 2.2 Use Renewable Energy, and RA 2.3 Commission & Monitor Energy Systems).

Energy consumption is addressed in terms of conscious practices for reduction, regular maintenance and periodic monitoring. Renewable energy equipment, such as solar panels or similar devices do not exist within the Plant. Only small measures such as automatic lighting will be implemented. However, the La Chira WTP will collect energy consumption data by zone to determine appropriate levels of reductions. The use of biodiesel fuel will be prioritized over diesel and gasoline to reduce CO₂ emissions.

Credits RA 2.2 Use Renewable Energy and RA 2.3 Commission & Monitor Energy Systems, were evaluated as No Score because no evidence was provided regarding gains achieved from the use of renewable energy (like biofuels for trucks and machinery engines), and no external monitoring will be done to manage the efficiency of energy systems.

4.3.3. Water:

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

Credit RA 3.1 was evaluated as Enhanced because the project will protect fresh water availability through reuse and purification of water during the construction period. Actions like constructing waterproof floors to protect cement, clay and other particles from making contact with fresh water, as well as implementation of a drainage system, will be taken. In addition, a water collector network will be built inside the plant to collect stormwater and wastewater from concrete machinery and washing. After a depuration process, the remaining water will be collected in a tanker truck and used in construction processes such as pavement irrigation or concrete watering.

Since the major purpose of the WTP is to reduce seawater pollution, several monitoring processes will occur during the construction, dredging and dismantling phases of the project. Therefore, the RA 3.3 credit was evaluated as Conserving. Moreover, fountain fixtures and pipes will be inspected for leaks, and water meters will be distributed by production zone. Groundwater contamination is a major concern. During the construction phase, groundwater contamination will be prevented through periodic verification that equipment and machinery is functioning correctly. Additionally, a traditional water well

located in the area will be used as a source through which samples of groundwater are collected in accordance with the Standard Methods of Water and Wastewater.⁷

Credit RA 3.3 received No Score because no documentation about the percentage reduction of water consumption was provided.

4.3.4. Summary of results for the Resource Allocation category.

The table below shows the distribution of credits as well as the level of achievement reached in each credit (figure 10).

WASTEWATER TREATMENT PLANT AND MARINE OUTFALL OF LA CHIRA, PERU				PT.	Performance	% Total	max.
22	RESOURCE ALLOCATION	MATERIALS	RA1.1 Reduce Net Embodied Energy	2	Improved	11.1%	18
23			RA1.2 Support Sustainable Procurement Practices	6	Superior	66.7%	9
24			RA1.3 Used Recycled Materials	11	Superior	78.6%	14
25			RA1.4 Use Regional Materials	0	No Score	0.0%	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	1	Improved	8.3%	12
29	ENERGY	RA2.1 Reduce Energy Consumption	3	Improved	16.7%	18	
30		RA2.2 Use Renewable Energy	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	4	Enhanced	19.0%	21	
33		RA3.2 Reduce Potable Water Consumption	0	No Score	0.0%	21	
34		RA3.3 Monitor Water Systems	11	Conserving	100.0%	11	
RA0.0 Innovate Or Exceed Credit Requirements				0	N/A		
RA				43		23.6%	182

Figure 10: Summary of results in Resource Allocation category

The project's performance in the Resource Allocation (RA) category can be improved. The project received 43 out of 182 possible points, which represent 23.6% of the total score. The biggest opportunities for improvement are found within Materials and Energy subcategories.

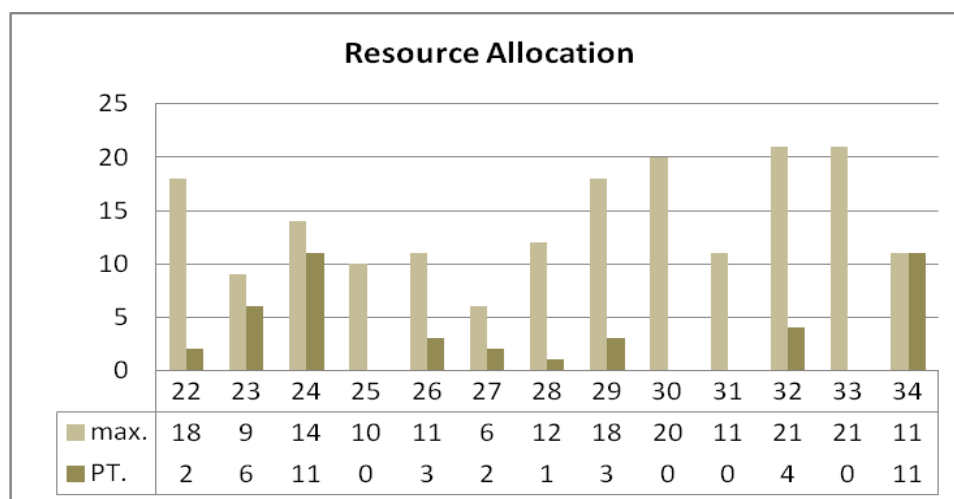


Figure 11: Summary of results in Resource Allocation category

⁷ "Standard Methods of Water and Wastewater", 21th Edition 2005.

4.4. NATURAL WORLD

The Natural World category addresses “how to understand and minimize negative impacts while considering methods in which the infrastructure can interact with natural systems in a synergistic, positive way.”⁸ 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, and NW 2.3), and biodiversity (NW 3.1, NW 3.2, NW 3.3, and 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	NATURAL WORLD	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	NATURAL WORLD	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 12: Natural World credit distribution

4.4.1. Siting:

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

Since La Chira WTP is located in Chorillos, an urbanized area of the city of Lima, prime farmland is not being compromised. The specific area of the Plant was designated for industrial use by Lima’s government. The current project site is flat and is mainly comprised of barren soil without vegetation. Additionally, the site did not contain any previous development.

According to the seismic analysis of 42 districts of Lima and Callao⁹, the WTP has been categorized as having a high to medium risk for natural hazards. In response, the project team convened a contingency team to explore ways to preserve and minimize alteration or damage to areas that affect adjacent populations. However, the team has not created contingency plans for earthquake faults, low lying coastal areas or karst formations.

The WTP is located near the seashore where coastal wetlands and coastal desert vegetation have been found. Since these ecosystems can be considered fragile, intense mitigation practices should be

⁸ Envision Guidance Manual, p.116

⁹ UNI - CISMID. Estudio de Vulnerabilidad y Riesgo Sísmico en 42 distritos de Lima y Callao. 2005.

undertaken to protect prime habitats.¹⁰ Since LA Chira WTP did neither depicted the locations of these fragile ecosystems on plans, nor considered any buffer zone around them, credit NW 1.1 was evaluated as No Score.

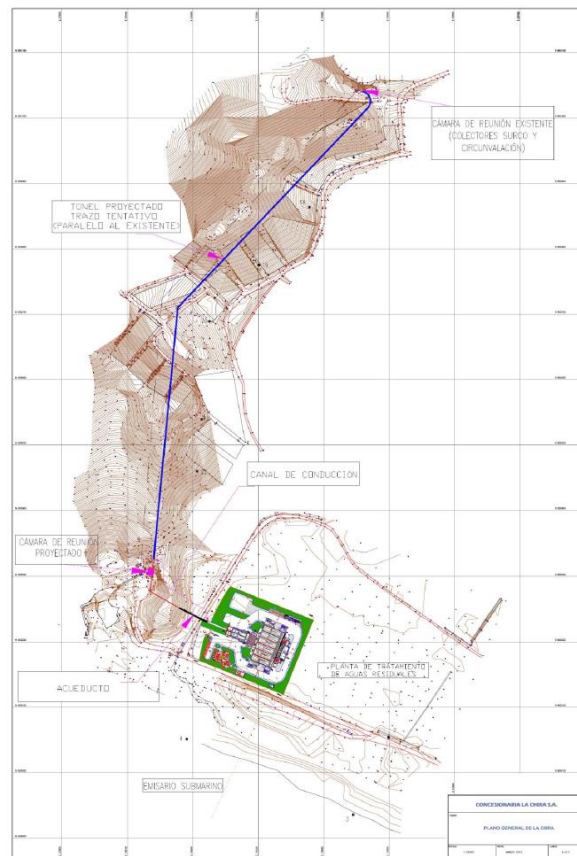


Figure 13: General plan of La Chira WTP. Source: Walsh Consulting Services. Resumen Ejecutivo. R-7.

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 was evaluated as Superior (NW 2.3 Prevent Surface and Groundwater Contamination) and one credit was evaluated as No Score (NW 2.2 Reduce Pesticides and Fertilizer Impacts).

A system for stormwater treatment will be provided during the construction period. However, no evidence has been provided that stormwater management will occur during operation or that water storage capacity will be improved. It is advisable that stormwater storage capacity is measured and enlarged in order to collect and repurpose as much as possible.

Spills of contaminated solids and liquids into the ocean will be prevented through the strategic location of potentially-contaminating activities at a distance from the shore, as well as construction of dams and periodic maintenance of boat engines. Surface and groundwater contamination will be prevented

¹⁰ Prime Habitat. The most ideal habitats for protecting wildlife biodiversity due to their size, location, diversity of habitat types, or presence of a particular type of habitat for plant or animal species. Envision Guidance Manual, Glossary. p.159

through treatment of toilet water and construction of waterproof surfaces in areas where spills may occur.

As described in credit NW 3.1, restoring the project’s landscape will require planting new vegetation. However, use of pesticides and fertilizers is not addressed within the project documents related to environmental impacts. Therefore, credit NW 2.2 has been evaluated as No Score.

4.4.3. Biodiversity:

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

Preservation and restoration of habitat areas is a goal for both the marine outfall and Plant construction phases. Identification and monitoring of existing vegetation and animal species, as well as collaboration with external agencies, is planned in order to preserve and restore the vegetative and animal habitats in the area. According to the documentation provided, La Chira is located mainly on uncultivated plains and beaches and does not disturb important vegetated soil. However, monitoring and testing of soil quality will be done during the construction, operation and dismantling phases.

Cuadro 7.3-7 Estaciones de Monitoreo de calidad de suelo.

Estación de muestreo	Descripción	Coordenadas UTM (WGS 84)		Frecuencia
		Este	Norte	
SU-02	Propiedad de SEDAPAL – Zona Sur	279 426	8 649 688	Trimestral
SU-03	Propiedad de SEDAPAL – Zona Centro	279 281	8 649 949	
SU-05	Planta de Tratamiento - Proyectada	279 057	8 649 814	

Fuente: Walsh Perú S.A

Figure 14: Soil Quality Monitoring bases. Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. Pág. 7-78.

Cuadro 7.3-8 Criterios para la evaluación del suelo.

Medio	Parámetros**	Suelos Residencial PCL (mg/kg) *	Suelos Industriales PCL (mg/kg) *
Suelo	HTP C6 – C12	1 600	3 900
	HTP C12 – C28 o C12 – C35	2 300	12 000

HTP – Hidrocarburos Totales de Petróleo

* Concentración Límite de Protección (PCL) para suelos superficiales y áreas menores a 0.5 ha

** Sobre la base de los lineamientos TNRCC RG-366/TRRP-27 de Junio del 2000

Figure 15: Soil Quality Evaluation Criteria. Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. Pág. 7-79.

Ecosystem functions related to water will be enhanced by the project in three areas: water quality, habitat, and sediment transport. Periodic monitoring practices will be implemented to evaluate the impacts that the Plant may have on water quality; samples will be taken and sent to external agencies that will evaluate them according to existing quality standards. Once the results of the evaluations are

received by the WTP Environmental Impact Team, corrective measures will be taken as needed. Additionally, native vegetation in the project area will be restored after the construction period.

Valores referenciales de evaluación de sedimentos marinos.

Norma Referencial	Arsénico	Cadmio	Cromo	Cobre	Plomo	Zinc	Mercurio	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
CEQG	ISQG	7,24	0,7	52,3	18,7	30,2	124	0,13
	PEL	41,6	4,2	160	108	112	271	0,70

CEQG: Canadian Environmental Quality Guidelines, 2003 (Valores Estándares de Calidad Ambiental Canadiense – sedimentos de cuerpos de agua marinos).
 ISQG: "Interim Sediment Quality Guideline", Valor estándar interino de la calidad de sedimento: concentración por debajo el cual no se presenta efecto biológico adverso.
 PEL "Probable Effect Level", Nivel de efecto probable: concentración sobre la cual se encuentran efectos biológicos adversos con frecuencia.
 Elaborado por: Walsh Perú S.A.

Figure 16: Marine Sediment Quality Parameters. Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. Pág. 7-86.

4.4.4. Summary of results, Natural World category:

The table below shows the distribution of credits as well as the level of achievement reached in each credit (figure 17).

WASTEWATER TREATMENT PLANT AND MARINE OUTFALL OF LA CHIRA, PERU			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	1	Improved	5.6%	18
37			NW1.3 Preserve Prime Farmland	12	Conserving	80.0%	15
38			NW1.4 Avoid Adverse Geology	1	Improved	20.0%	5
39			NW1.5 Preserve Floodplain Functions	2	Improved	14.3%	14
40			NW1.6 Avoid Unsuitable Development on Steep Slopes	6	Conserving	100.0%	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	0	No Score	0.0%	9	
44		NW2.3 Prevent Surface and Groundwater Contamination	9	Superior	50.0%	18	
45	BIODIVERSITY	NW3.1 Preserve Species Biodiversity	13	Conserving	81.3%	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	9	Superior	47.4%	19	
		NW0.0 Innovate or Exceed Credit Requirements	0	N/A			
		NW	70		34.5%	203	

Figure 17: Summary of results in Natural World category

The project's performance in the Natural World (NW) category can be improved. The project received only 70 out of 203 possible points, which represent 34.5% of the total score. The biggest opportunities for improvement are found within the siting subcategory.

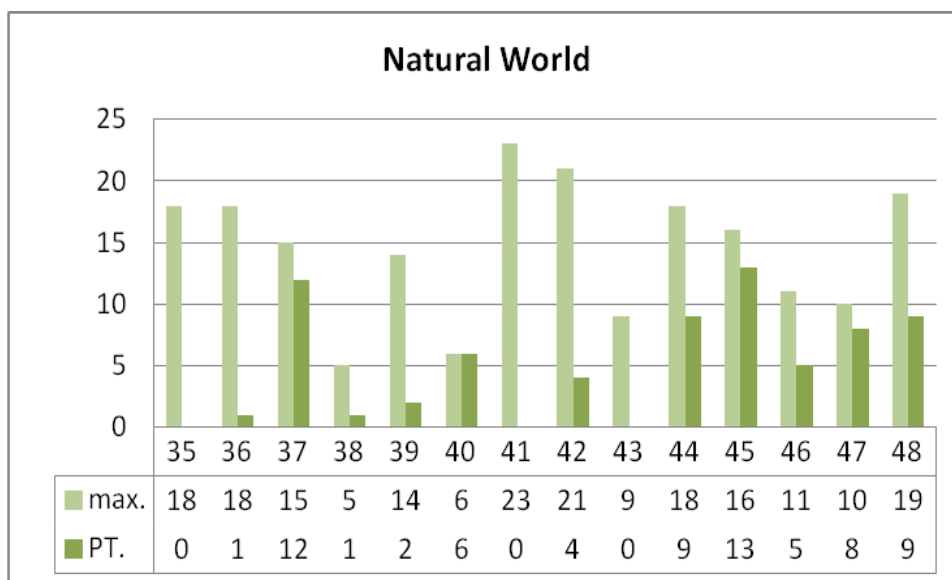


Figure 18: Summary of results in Natural World category

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.”¹¹ The credits are distributed as: Emissions (CR 1.1 and CR 1.2) Resilience (CR 2.1, CR 2.2, CR 2.3, CR 2.4, and CR 2.5).

CREDIT SCORING

			IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE	
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	RESILIENCE		CR2.1 Assess climate threat				15	
52			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	

Figure 19: Climate and Risk credit distribution.

¹¹ Envision Guidance Manual, p.150

4.5.1 Emissions

Both credits within the **Emissions subcategory** were evaluated as Improved (CR 1.1 Reduce Greenhouse Gas Emissions, and CR 1.2 Reduce Air Pollutant Emissions).

The project will generate greenhouse gas emissions during the construction, operation and dismantling periods. Emissions will be more intensive during construction and dismantling due to the heavy use of trucks and machinery, but less intensive during operation when the primary vehicles entering the site will be waste removal trucks.

Carbon lifecycle monitoring and analyses will be performed during construction and operations. An Environmental Management System Team (SGMA in Spanish) will evaluate and register greenhouse gas emissions based on ISO 14001 standards for organization of the overall environmental management program. Specifically, the Team will follow the 2002/88/C E Directive and the D.S. 047-2001-MTC Agreement on Peruvian national targets for reducing automobile emissions. There is an overall awareness that proper maintenance of machinery and engines can reduce greenhouse gas emissions.

The following table displays the Ambient Air Quality Standards followed by the WTP of La Chira:

Parámetro	Periodo	Forma del estándar		Método de análisis
		Valor ⁽¹⁾ ($\mu\text{g}/\text{m}^3$)	Formato	
Material particulado con diámetro menor a 10 micras (PM10)	24 horas	150 ⁽¹⁾	NE más de 3 veces / año	Separación inercial / Filtración (Gravimetría)
Monóxido de carbono (CO)	1 hora	30 000 ⁽¹⁾	NE más de 1 vez/año	Infrarrojo no dispersivo (NDIR) (Método automático)
Dióxido de nitrógeno (NO ₂)	1 hora	200 ⁽¹⁾	NE más de 24 veces / año	Quimiluminiscencia (Método automático)
Ozono (O ₃)	8 horas	120 ⁽¹⁾	NE más de 24 veces / año	Fotometría UV (Método Automático)
Plomo (Pb)	Mensual	1,5 ⁽¹⁾	NE más de 4 veces / año	Método para PM10 (Espectrofotometría de absorción atómica)
Material particulado con diámetro menor a 2,5 micras (PM2,5)	24 horas	50 ⁽²⁾	Media Aritmética	Separación inercial / Filtración (Gravimetría)
Dióxido de azufre (SO ₂)	24 horas	80 ⁽²⁾	Media Aritmética	Fluorescencia UV (Método Automático)
Hidrógeno sulfurado (H ₂ S)		150 ⁽²⁾		
Hidrocarburo totales (H.T) expresado como hexano	24 horas	100 ⁽²⁾	Media Aritmética	Ionización de la llama de hidrógeno
Benceno (COV)	Anual	4 ⁽²⁾	Media Aritmética	Cromatografía de gases

Fuente: Walsh Perú S.A.

(1) Según D.S. N° 074-2001-PCM

(2) Según D.S. N° 003-2008-MINAM

Figure 20: Ambient Air Quality Standards. Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-74

4.5.2 Resilience

In the **Resilience subcategory**, two credits were evaluated as Conserving (CR 2.2 Avoid Traps and Vulnerabilities, and CR 2.4 Prepare For Short-Term Hazards), and three credits were evaluated 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).

Prior to development of the La Chira WTP, the collected wastewater from all districts of Lima was diverted into the sea adjacent to residential neighborhoods. Considering the public health threat from discharging untreated wastewater offshore near urbanized areas, the La Chira WTP will significantly reduce the long-term threat of epidemics and pandemics. Additionally, a community relations plan will be adopted in order to generate development opportunities beyond the WTP.

Earthquakes and tsunamis are considered to be the main natural hazards that could affect the project’s area of influence. A specialized Contingency Committee consisting of a coordinator, an emergency brigade, and external support institutions (police, firefighters, ambulances), will be present during the construction and operation periods and will hold periodic meetings and information sessions. Contingency measures for pre- and post-hazard situations are planned for 100 years. The Contingency Committee will be tasked with adjusting measures to better accommodate possible changes that develop during the 100-year period. To this end, the Contingency Committee will meet once a year to re-evaluate the plan.

Although the long-term weather patterns of tsunamis and earthquakes have been considered, the La Chira WTP team has neither considered a comprehensive assessment of climate threat, nor adaptability to possible long-term climate change. Considering that the Plant is located within a coastal area, a possible rise in sea level could drastically affect Plant operations. Moreover, no documentation regarding reduction in paved surfaces, solar reflectance indices, or mitigation of heat island effects was provided.

4.5.3 Summary of results, Climate and Risk category:

The table below shows the distribution of credits as well as the level of achievement reached in each credit (**figure 21**).

WASTEWATER TREATMENT PLANT AND MARINE OUTFALL OF LA CHIRA, PERU			PT.	Performance	% Total	max.	
49	CLIMATE	EMISSION	CR1.1 Reduce Greenhouse Gas Emissions	4	Improved	16.0%	25
50			CR1.2 Reduce Air Pollutant Emissions	2	Improved	13.3%	15
51		RESILIENCE	CR2.1 Assess Climate Threat	0	No Score	0.0%	15
52			CR2.2 Avoid Traps And Vulnerabilities	16	Conserving	80.0%	20
53			CR2.3 Prepare For Long-Term Adaptability	0	No Score	0.0%	20
54			CR2.4 Prepare For Short-Term Hazards	17	Conserving	81.0%	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	39		32.0%	122	

Figure 21: Summary of results in Climate and Risk category

The project's performance in the Climate and Risk (CR) category can be improved. The project received 39 out of 122 possible points, which represents only 32% of the total score. The biggest opportunities for improvement are within the Resilience subcategory.

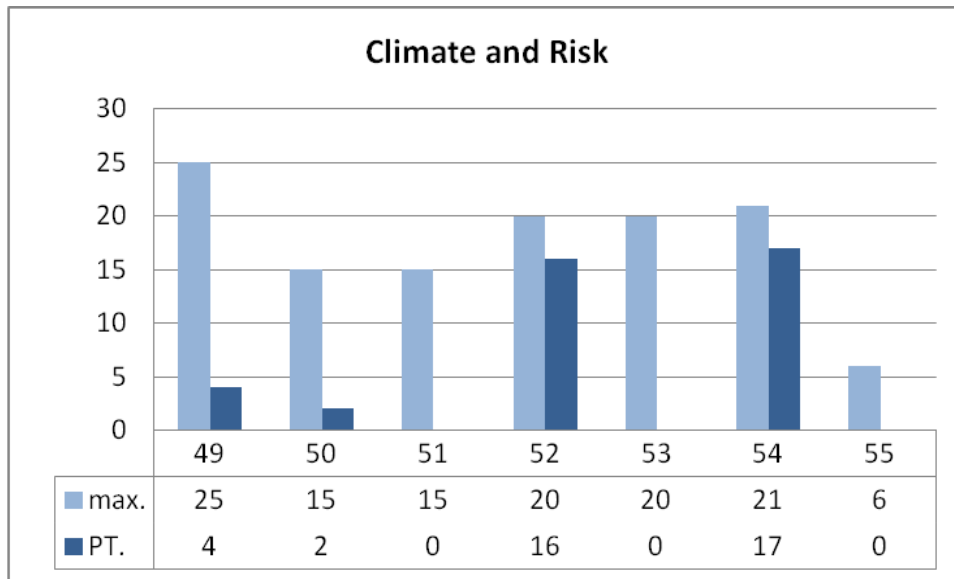


Figure 22: Summary of results in Climate and Risk category

5. RESULTS AND CONCLUSION

The La Chira WTP evaluation reveals the strengths of the project and its significant contribution to Peru's sustainable development. It also identifies challenges for the project team to overcome in order to enhance the sustainability of the project. The most relevant aspects in each category are:

In the **Quality of Life category (QL)**, La Chira scored 90 points out of the possible 181, or 49.7%, which was the project's best performance in any of the five categories of the *Envision* rating system. The project will make a major contribution to improving sanitary conditions for the residents of Chorillos in Lima, and will thus positively impact their quality of life. Additionally, the Plant will help prevent further contamination of other parts of Lima's coastline. In general, improvements to water quality will stimulate sustainable growth and development and encourage new economic activities such as artisanal fishing. The project team has designated a Local Development Support Program dedicated to promoting activities that will improve the social and economic conditions of the local population. A number of Community Relationship Plans foster consistent communication with the community, and encourage participation in programs related to education, recruitment of non-qualified labor, and community monitoring. Each program has identified specific tasks that will involve the community in Plant activities and repair any negative impacts the WTP might have on the community.

Performance in the credits related to transportation, mobility and access could be improved to enhance the project's overall score. The project team could consider a broader view of the potential impacts of the project on transportation infrastructure. Beyond avoiding transportation during congested times, the project could better address long-term access and mobility improvements.

In the **Leadership category (LD)**, the project received 56 points out of the possible 121, or 46.3%. This was the project's second best performance in any category. The project team has demonstrated their commitment to sustainable practices inside and outside of the Plant through the creation of an Environmental Management System (SGMA). This system will ensure that activities, products and processes of the Plant follow good environmental practices during the planning, construction, operation and dismantling periods. Sustainable environmental practices will also be employed when selecting contractors and suppliers, and will be disseminated to Plant staff and the surrounding community.

La Chira's monitoring process exemplifies the project's strength in leadership. The Environmental, Safety and Health Chief Office will be in charge of a comprehensive slate of tasks relating to environmental monitoring during the construction, operation and dismantling periods. Periodic reports will be provided to the project directors and owners, including SEDAPAL. Additionally, a program for environmental monitoring by the community will be implemented. The program will include 6 to 8 community members who will be trained to collaborate on the monitoring of activities within the Plant.

Although the project performs well in the environmental management credits, there is room for improvement in the Leadership category. La Chira faces the challenges of increasing multi-disciplinary approaches to sustainable performance, creating credible programs for soliciting feedback from the

public and key stakeholders, and incorporating stakeholder inputs into project planning and decision-making processes. Additional improvements could be made in identifying potential by-product synergies and integrating infrastructure systems.

In the **Natural Word category (NW)**, La Chira scored 70 points out of the possible 203, or 34.5%, which was the project's third best performance in the *Envision* rating system categories. One credit out of the 14 credits achieved the maximum possible score for avoiding unsuitable development on steep slopes. High scores were also achieved for preservation of prime farmland, restoration of disturbed soils and biodiversity preservation. As the bird population was identified as the most vulnerable population in the area of the project, efforts for monitoring and protecting nesting and breeding habitats have been prioritized. Vegetative species have also been considered, but no efforts to enhance connections between fragile ecosystems or between coastal and wetland habitats have been taken into account. Although the Plant is located 25 to 40 meters from the shore, a more extensive buffer zone could have been established.

Since water treatment is the core purpose of the project, sea water quality will be improved and strictly monitored. Moreover, surface and groundwater contamination will be prevented through periodic machinery maintenance and system monitoring, as well as strategically locating potential contamination sources off-shore in spaces with waterproof floors. The project could improve its performance by implementing better floodplain functions and stormwater management through the establishment of a larger natural buffer to protect coastal vegetation and soil. Procedures to restore previously degraded zones to a more natural state or to stabilize the shoreline with additional native plants could be considered. Stormwater storage capacity and reuse could also be considered.

In the **Climate and Risk category (CR)**, the project scored 39 points out of the possible 122, or 32%. Despite the relatively poor performance in this category, the project implements direct measures to prevent future epidemics and pandemics derived from proximity to contaminated water, and reduces greenhouse gas and other air pollutant emissions. However, the project could improve its performance in this category by providing better calculations of emissions reductions, by addressing heat island effects, and by assessing and preparing for the long-term threats of climate change such as extreme weather events or natural hazards.

In the **Resource Allocation category (RA)**, La Chira scored 43 points out of the possible 182, or 23.6%, which represents the project's worst performance in any category. This performance is primarily due to the fact that the project did not prioritize use of regional materials, does not rely on renewable energy, does not outsource commissioning and monitoring of energy systems, and does not have a plan to reduce potable water consumption. Furthermore, the lack of quantifiable evidence resulted in a low score. However, La Chira does implement a couple of good performance measures within this category, namely periodic system monitoring and community inclusion in the monitoring process.

A detailed life cycle analysis of the materials used in the project should be prepared and integrated into the selection process for construction materials. Measurements and documentation of the percentage of each material used in the construction of the plant could improve performance. Moreover, considering that the Plant will be dismantled, selection of materials and construction processes that facilitate the disassembly and recycling of used materials should be considered. Water reuse for irrigation of vegetation, toilet water or other systems could also enhance the project. Renewable energy

sources should be considered. The documentation describes the benefits of these kind of technologies but does not indicate if and how they are used in the WTP.

In general, better measurements about reduction percentages could improve the project’s evaluation within the Resource Allocation category. To this end, details should be provided regarding the amount of excavated material taken off site, waste and water use reduction, and the percentage of regional materials used in the project.

The graphs below demonstrate the project’s performance under the three Infrastructure 360° Awards. The **People and Leadership Award** (figure 23) represents the QL and LD categories from the Envision™ Rating System. The project received a score of 146 points out of a total of 302 combined points within these categories, which equates to a 48.3% level of achievement. The **Climate and Environment Award** (figure 24) represents the RA, NW and CR categories within the Envision™ Rating System. The project received a score of 152 points out of a total of 507 combined points within these categories, which equates to a 30.0% level of achievement. Thus, the overall achievement of the Lima metro Line 1 project under the **Infrastructure 360 Award** (figure 25) is 298 out of 809 points, or 36.8% of the total score.

This report evaluates the sustainability performance of the La Chira WTP 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.

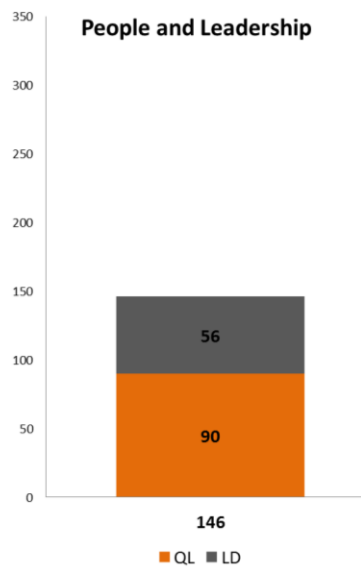


Figure 23: People and Leadership.

Score distribution

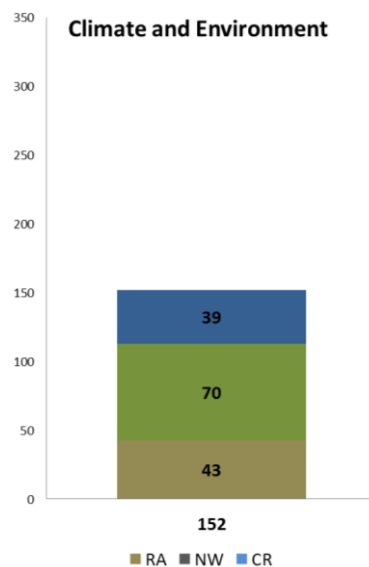


Figure 24: Climate and Environmental.

Score distribution

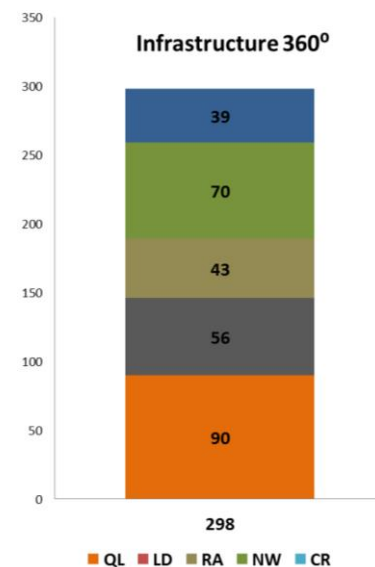


Figure 25: Infrastructure 360.

Score distribution



APPENDIX A: PROJECT PICTURES AND DRAWINGS

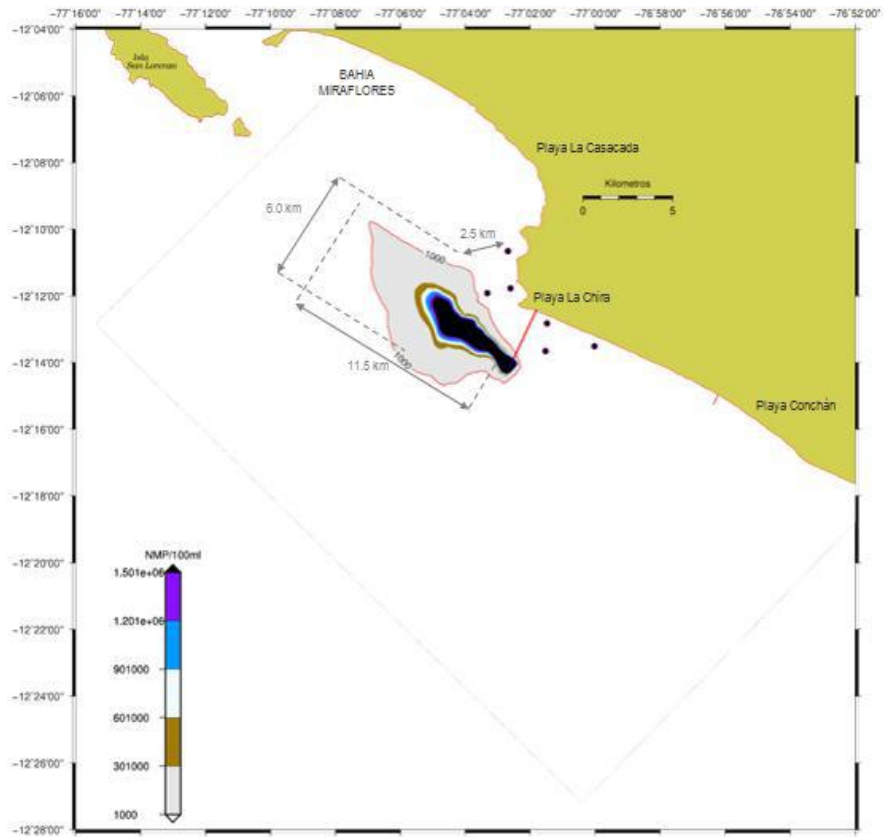


Figure 26: Wastewater dispersion at 24 hours of shedding. Source: Walsh. 2011. Descripción del Proyecto. 3-88. 2011

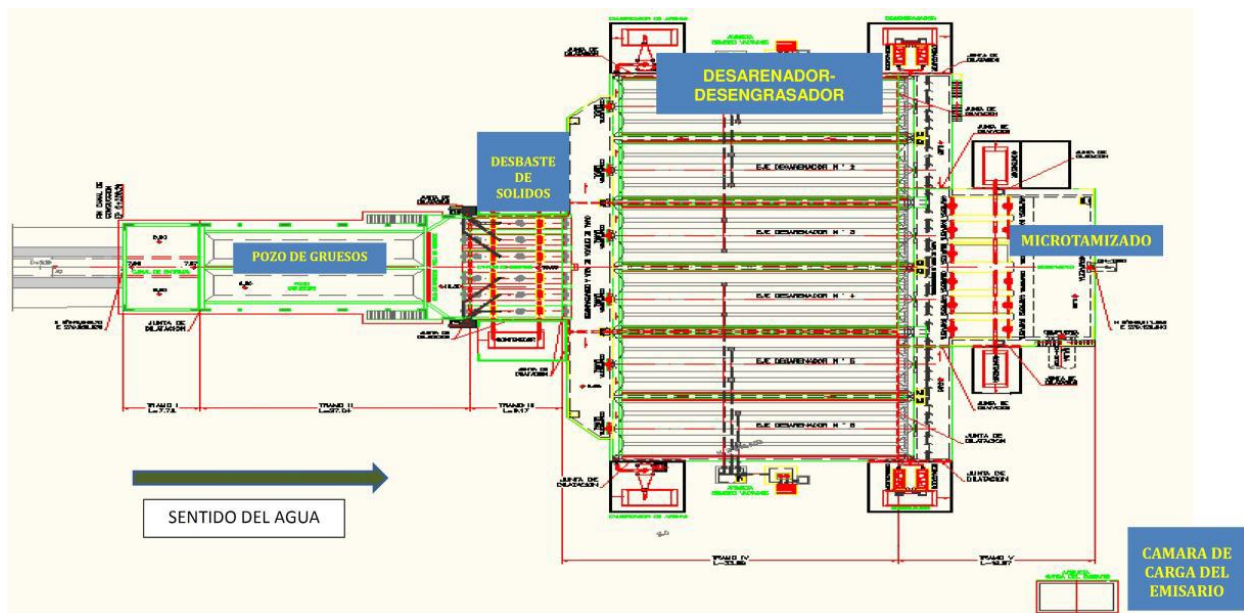


Figure 27: General scheme of the Wastewater Treatment Plant. Source: Engineering team of La Chira WTP. Walsh. 2011. Resumen Ejecutivo.R-9.



Figure 28: General view of the construction site/ Source: Proinversion



Figure 29: General view of the construction site/ Source: Proinversion



Figure 30: General view of the construction site/ Source: Proinversion



Figure 31: General view of the construction site/ Source: Proinversion



Figure 32: Informative workshop. Source: Walsh. 2011. Anexo 08 Plan de participación ciudadana. 5-2.



Figure 33: Informative workshop. Source: Walsh. 2011. Anexo 08 Plan de participación ciudadana. 5-1.



Figure 34: Public hearing. Source: Walsh. 2011. Anexo 08 Plan de participación ciudadana. 3.2-6.



Figure 35: Public hearing. Source: Walsh. 2011. Anexo 08 Plan de participación ciudadana. 3.2-6.



Figure 36: Informative workshop. Source: Walsh. 2011. Anexo 08 Plan de participación ciudadana. 18.



Figure 37: Informative workshop. Source: Walsh. 2011. Anexo 08 Plan de participación ciudadana. 20.

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
							<i>*The five innovation credits are bonus points and not included in total point tallies</i>	803

APPENDIX C: CREDIT DETAILS

CATEGORY I, PEOPLE AND LEADERSHIP (PL)			
SUB CATEGORY: QUALITY OF LIFE			
	WASTEWATER TREATMENT PLANT AND MARINE OUTFALL OF LA CHIRA, PERU	RECOMMENDATIONS	
<p>QL1.1 Improve Community Quality of Life</p>	<p>25</p>	<p>Continue the efforts for restoring and improving the economic and social conditions of the community during construction, operation and dismantling.</p>	
			<p>Restorative</p> <p>The La Chira WTP project will improve the quality of life of the surrounding communities of Pacifico de Villa and Victor Raúl Haya de las Torres, which it directly influences. In addition, the project seeks to improve the quality of life for Villa Nicolasa, Márquez de Corpac, Marqués de Villa and the Asociación de Vivienda de Radio y Televisión Peruana, which it indirectly influences. The most direct impact is the improvement the WTP will have on community health conditions due to reduced contamination along the seashore abutting the community. During the contamination reduction process, water quality results will be periodically disseminated to the community.</p>
			<p>La Chira WTP has developed a systematic plan to communicate to community members the activities that may affect them during the construction, operation and dismantling phases. There are a set of Community Relationship Plans (PRCs) that explain the scope, duration, risks, benefits and disadvantages of the activities performed by the Plant. Actions are divided into the following programs: Information and Communication Program, Environmental Education Program, Temporary Recruitment of Non-Qualified Local Labor Program, Community Environmental Monitoring Program, Local Development Support Program and Compensation for Negative Influence Program. Each program has identified specific tasks that will involve the community in Plant activities and repair any negative impacts the WTP might have on the community.</p>
			<p>This comprehensive program started before construction of the WTP began. According to the documentation provided, at least three meetings occurred during 2011 in which the community had the opportunity to present their ideas, fears and concerns about the WTP. The outcome of these meetings led to a high percentage of acceptance of the project.</p>
	<p>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-122 - 7-134. Walsh Consulting Services. Anexo 08 Plan de Participación Ciudadana. p. 1-4.</p>		

<p>QL1.2 Stimulate Sustainable Growth & Development</p>	<p>16</p>	<p>Restorative</p> <p>The La Chira WTP project will improve the local economy by creating diverse types of jobs. In addition, it will bring a new population to the area that will enhance local commercial activities. According to the documentation provided, when hiring its required labor force, La Chira WTP will prioritize the local population.</p> <p>The Local Development Support Program of the La Chira WTP project is specifically dedicated to enhancing the social and economic improvement of the Plant’s area of influence. The program will exhibit sustainable growth by promoting environmental conservancy through the coordination of annual awards in painting, folklore, sports and literature with local educational organizations. It will support existing social organizations dedicated to improving health conditions within the local population, and it will support cultural and recreational activities in order to reduce delinquency and drug addiction. The La Chira WTP will also contribute to the recovery and maintenance of beach areas.</p> <p>In the long-term, new economic activities will emerge as a result of the cleaned up seashore such as the emergence of artisanal fishing encouraged by the Local Development Support Program.</p> <p>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-122 - 7-134.</p>	<p>La Chira WTP team can also improve cultural and recreational assets that make communities more livable, collaborate in restoring infrastructure assets and enhance overall attractiveness through improvements in the things that attract compatible industries and businesses.</p>
<p>QL1.3 Develop Local Skills and Capabilities</p>	<p>5</p>	<p>Superior</p> <p>According to the social responsibility policies of the Plant’s construction firm (Graña y Montero S.A.), the Temporary Recruitment of Non-Qualified Local Labor Program will prioritize local labor in workforce hiring processes with the aim of filling 100% of the non-qualified labor vacancies with local residents. Similarly, La Chira WTP contractors will seek to fill positions with labor directly from the project’s area of influence.</p> <p>During construction, operation and dismantling, La Chira WTP will follow a recruitment process for the local population. Labor will be classified as semi-qualified or non-qualified, and the community will be informed of the exact number of vacancies available. In order to apply for the positions, aspirants will have to prove their local residency. This part of the recruitment process will be done in collaboration with the local authorities; recruitment and training will take place in a community space. People from the Pacífico de Villa and Víctor Raúl Haya de la Torre communities will be trained in masonry, metal works and carpentry and will be evaluated and selected to be part of the La Chira WTP labor force.</p> <p>In addition to job creation, the La Chira WTP project will provide environmental education to the local population which will focus on preventative and protective measures to preserve a healthy natural environment.</p> <p>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-122 - 7-134.</p>	<p>Minority/disadvantaged groups can be considered as part of the labor force of the plant. Hiring and educational program emphasis can shift from specific project needs to local capacity development. Community educational and employment needs and shortfalls could be better identified.</p>

<p>QL2.1 Enhance Public Health And Safety</p>	<p>0</p>	<p>No Score</p> <p>No documentation has been provided regarding the use of new technologies and how they are addressed in the project’s health and safety plans. Although the La Chira WTP team intends to follow the Peruvian Work Health and Security Regulation D.S. 009-2005-TR, and contractors will have to implement a security and health plan according to the Peruvian Law No 29783, no consideration has been given to safety and health protection for staff involved with the use of new technologies. For these reasons, the credit is considered to be No Score .</p> <p>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-171.</p>	<p>Systematically identify and assess any new or non-standard technologies, materials or methodologies used by the project. Systematically document significant risks identified, changes instituted and appropriate sign-offs received. Perform a risk assessment analysis of the use of new technologies in the construction and operation phases of the plant. Provide analysis of other projects that have successfully used the same new technologies or materials. Identify potential problems and solutions. Provide evidence of how changes to the methodologies and protocols are to be passed on to the construction contractor.</p>
<p>QL2.2 Minimize Noise And Vibration</p>	<p>8</p>	<p>Conserving</p> <p>Noise is a major concern for the La Chira WTP project team. The National Standard of Environmental Noise Quality N° 085-2003-PCM and the Mining Security and Hygiene Regulation N° 046-2001-EM will be used as baselines for the noise exposure of workers and the surrounding community. During construction, operation and dismantling, the La Chira WTP team emphasizes quieter practices in machinery use and vehicle operation. Contractors are required to maintain machinery and mechanical equipment in excellent condition in order to minimize noise. Vehicle transit will be reduced to established routes. Additionally, use of horns will be limited to emergency situations. In case of nighttime labor, surrounding communities and local authorities will be informed about the time and duration of activities. During the construction period, additional measures will be implemented that specifically relate to the explosions required to build the communication tunnel between the new WTP and the existing La Chira Collector. Only two explosions will be allowed per day and they will be restricted to the 12:00 - 18:00 time period. Night explosions will be prohibited. Monitoring will be done in the three periods. Six monitoring bases located in the surrounding neighborhoods will measure and evaluate noise every three months during construction and dismantling. During operation, three monitoring bases will measure noise levels every six months. To achieve appropriate standards in residential areas, noise levels must be under 60dB during the day and 50dB during the night. Vibration will also be monitored and managed during tunnel construction. Machinery activities will be restricted to specific areas and work will be done during the day. Regarding explosions, controlled charged explosives will be used in order to reduce the amplitude of vibrations. Additionally, the number of explosions will be reduced through the use of larger shots. Seven monitoring bases will be located near the tunnel between the existing La Chira water collector and the new La Chira WTP. Measurements will be done every three months. The results obtained will be compared to the ISO 2631-1(1997) Mechanical Vibration and SOC Evaluation of human exposure to whole body vibration standards.</p> <p>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-80.</p>	<p>Measure and document how resulting noise and vibration levels will be substantially below previous levels.</p>

<p>QL2.3 Minimize Light Pollution</p>	<p>8</p>	<p>Conserving</p> <p>La Chira WTP plans to manage exterior lighting during the construction, operation and dismantling periods. According to the documentation provided, “use of lighting elements that project light upward should be avoided.” Lighting zones will be controlled with appropriate equipment such as asymmetrical searchlights and lighting wings. Photometry levels will be adjusted in accordance with the specific areas of illumination. Additionally, working hours will be planned to maximize daylight time and the light-attractiveness to birds and insects will be controlled through the installation of light screens.</p> <p>For interior spaces, lighting will be controlled by automated control systems. These systems will be monitored and inspected every three months.</p> <p>Source: Consorcio La Chira.Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. 41, 85, 90, 165.</p>	<p>Improve documentation regarding the location of existing areas where lighting is directed upward. Improve documentation of actions taken by the project team to substantially reduce or eliminate existing lighting directed upward. Improve documentation of evidence of the achievement of standard light levels. Improve documentation about digital signage use. During daylight hours, should be less than 2000 candelas/sqm, other times less than 250 candelas/sqm.</p>
<p>QL2.4 Improve Community Mobility And Access</p>	<p>1</p>	<p>Improved</p> <p>During the construction, operation and dismantling phases of the WTP, the project team will attempt to establish exclusive and differentiated access roads for transportation of building materials and waste. However, the team recognizes that this might not be possible in all cases. Therefore, local regulations for waste transportation will be followed whenever exclusive access is not possible.</p> <p>During the three periods of the project, primary access to the Plant will be via Alameda Sur Avenue. This road is a local road in the Chorillos District. To avoid negative impacts, the La Chira WTP team plans to avoid transportation during congested times (7 a.m. to 9 a.m, 12 p.m. to 2 p.m. and 7 p.m. to 9 p.m.). The use of other local roads adjacent to the Plant will be prohibited unless prior approval has been granted. The maximum speed permitted will be 35 km/h. A parking area inside the plant will be provided for freight vehicles.</p> <p>Access to the connector tunnel between the existing water collector and the new WTP will occur via Prolongación Huaylas Avenue, a principal artery of the Chorillos District. However, beyond measures to reduce negative impacts, no documentation has been provided regarding an external analysis of the transportation impacts generated by WTP activities. There is no documentation about contact with decision makers or availability of additional modes of transport. There is also no monitoring associated with the transportation activities.</p> <p>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-61. Walsh Consulting Services. Descripción del Proyecto. p. 3-8.</p>	<p>Mobility and access design decisions can expand levels of external input from operators of adjacent facilities amenities and transportation hubs. Better document contact with decision-makers. Consider other modes of transport beside roads. A broader view of the potential impacts of the constructed works on community mobility and access can be done. Better document how long-term access and mobility improves efficiency, walkability and livability.</p>

<p>QL2.5 Encourage Alternative Modes of Transportation</p>	<p>0</p>	<p>No Score</p> <p>No information has been provided regarding the encouragement of alternative modes of transportation. The Walsh Consulting team claims that pedestrian access to the project area is provided via various transit lines; however, it does not appear that these lines serve multiple transit modes. Additionally, no documentation has been provided about the encouragement of use of non-pedestrian infrastructure. For these reasons, the credit is considered to be No Score .</p> <p>Source: Walsh Consulting Services. Resumen Ejecutivo. p. R-36.</p>	<p>Provide better documentation like plans that prove a convenient walking distance to multimodal transportation facilities within the constructed works, plans that show bicycle and pedestrian walkways, trails and networks that connect to the site and constructed works. Convenience, quality and safety of those walkways, trails and networks. Location and design drawings showing the topography is relatively flat, with a network of walkways and bikeways converge on or near the constructed works. Availability of facilities and policies for the users. Evidence that parking of motorized vehicles is restricted in and around the constructed works.</p> <p>Provide sheltered and well-lit bus stops, tram stops, or transit access points. Effectively display information such as time and route of public transportation. Design for upgrading and incorporating those elements into the existing transportation infrastructure.</p>
<p>QL2.6 Improve Site Accessibility, Safety & Wayfinding</p>	<p>3</p>	<p>Enhanced</p> <p>The WTP of La Chira has a clear and intuitive signage plan for land and water transportation activities. Differentiated signs are used to communicate transportation access and egress, and wayfinding in case of emergency to Plant occupants. According to the Traffic Control Devices for Streets and Automobile Road Manual MTC RM N°210-2000-MTC/15.02 (Manual de Dispositivos de Control del Tránsito Automotor para Calles y Carreteras) and the Peruvian Technical Regulation NTP 399.010, general specifications for land signs consider day and night visibility, large letters, simple messages, legible colors and readability. Signage of the WTP will include preventive signs, restrictive signs and information signs, each of which will have a particular form, color, size and location.</p> <p>Marine signs will be used for protecting the marine outfall, and will be implemented according to the current regulations for signage of the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA). Navigation channel lateral limits, shipwrecks and any potential obstacles will be signposted during construction and operation of the marine outfall.</p> <p>No documentation has been provided about measures to calm traffic or protect nonmotorized transportation modes.</p> <p>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-115 to 7-116, 7-142 to 7-147, 7-178, 7-191.</p>	<p>Provide evidence of how the project will impact public safety. Improve evidence of plans for access and egress routes for emergency personnel, users and occupants. Include traffic calming measures in areas with heavy pedestrian or bicycle traffic. Improve evidence about how the project will integrate with the local community and its environmental and cultural resources.</p>

QL3.1 Preserve Historic And Cultural Resources	13	<p>Conserving</p> <p>During construction, the La Chira WTP team will investigate and preserve potential archaeological remains found in the area of the Plant and the tunnel. Although there are no catalogued deposits within the project area, several archaeological remains have been found in the surrounding area. To avoid possible damage of any findings, preventive measures for monitoring superficial exploration, supervising earthmoving, and clearing delimited working areas will be taken. Additionally, all construction staff will be trained in cultural heritage conservancy. These measures are in accordance with the Peruvian General Cultural Heritage Law No 28296. If anything is found, the team will report and collaborate with the General Direction of Cultural Heritage and Museums of Perú.</p>	<p>Follow all procedures for the CIRA (Certificate of Absence of Archaeological Remains) and have a monitoring plan with a qualified present during the construction phase (according to the current regulation of Archaeological Research) archaeologist should be present for any expansion or activity involving excavation or soil removal.</p> <p>Upgrade or expand associated recreational and educational facilities as desired by stakeholders</p>
		<p>Source:</p> <p>Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-32 to 7-33. Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p. 174.</p>	
QL3.2 Preserve Views And Local Character	11	<p>Conserving</p> <p>Local character, views and landscape preservation are considered during both the construction and operation periods. During construction, areas of activity will be minimized as much as possible in order to reduce negative impacts to the landscape. The Environmental Management System SGMA will be in charge of managing landfill areas, the disposition of earth and building materials, and the location of material storage.</p> <p>The La Chira WTP team also plans to restore the original topography of disturbed sites by refilling trenches and replacing material storage areas with vegetal soil. Where necessary, construction roads and paths will be maintained but will be integrated into the landscape; otherwise, they will be dismantled and restored. Once the building process is over, residual construction materials, support buildings and temporary signage will be removed from the project site. Additionally, the plant perimeter and other impacted areas will be revegetated.</p> <p>Periodic inspections of visual impacts are planned during the construction and operation stages. Vegetative growth will be monitored at days 60 and 120 after planting. Areas of new soil will also be monitored.</p>	<p>Contract could include penalties for noncompliance. Local officials and decision-makers could be involved in approval of design guidelines for views that fit with local character.</p>
		<p>Source:</p> <p>Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p.186. Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-29</p>	
QL3.3 Enhance Public Space	0	<p>No Score</p> <p>No information has been provided regarding identification of existing public spaces that could be improved or enhanced. For this reason, the credit is considered to be No Score</p> <p>Source: No sources available</p>	<p>Consider creation of new public space or inclusion of spaces like parks, plazas, recreational facilities or wildlife refuges to enhance community livability.</p>
QL0.0 Innovate Or Exceed Credit Requirements	0	N/A	
90			

SUB CATEGORY:LEADERSHIP		
	WASTEWATER TREATMENT PLANT AND MARINE OUTFALL OF LA CHIRA, PERU	RECOMMENDATIONS
LD1.1 Provide Effective Leadership And Commitment	<p>Conserving</p>	Provide examples of published periodic sustainability reports.
	<p>The La Chira WTP team is not only committed to applying sustainable practices inside the plant but also to disseminating sustainable practices throughout the larger community related to the company’s activities. Its environmental policies include training and publishing sustainable practices applied within the plant as well as information about the potential environmental impacts of bad practices from a global perspective.The Environmental Management System (SGMA) team is in charge of the implementation of these practices.</p> <p>Employers, contractors and suppliers are encouraged to adopt sustainable practices inside and outside the La Chira WTP project. Training courses regarding energy consumption reduction, recycling and waste reduction, emission reduction, reduced water consumption, and earth-friendly products and processes will be offered internally and externally. New employees will not be able to work at the plant until they are trained in these issues. Contractors are ranked according to their adherence to similar environmental practices. As described in Credit RA 1.2, suppliers are selected according to their internal sustainable practices.</p> <p>Additionally, Acciona Agua, a member of the Temporal Union (U.T.E) that will build and operate the Plant, has demonstrated its commitment to using sustainable products in Spain and other countries. This commitment to sustainability has reduced the carbon emissions of their projects at a 5.6% rate over four years. Acciona produces turbines, solar plants, biodiesel and bioethanol substances.</p>	
	<p>17</p> <p><i>Source: Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012.ps. 4-20, 42,77, 84, 90, 93, 98, 134, 153.</i></p>	

<p>LD1.2 Establish A Sustainability Management System</p>	<p>14</p>	<p>Conserving</p> <p>Acciona Agua S.A.U., a member of the Temporal Union in charge of the construction, operation and dismantling of La Chira WTP, has been certified for the ISO 14001 by the International Certification Network. This certificate corresponds to the fulfillment of requirements for the implementation and maintenance of an Environmental Management System. The Environmental Management System (SGMA) of La Chira WTP was created to assure that activities, products and process of the Plant follow good environmental practices during the planning, construction, operation and dismantling periods.</p> <p>SGMA has specific objectives, contents and policies. It also has implementation measures that include identification of the environmental issues; training of the Plant staff and contractors; programs for communication, documentation, operation monitoring, checks and measurements; plans for corrective and preventive action for nonconformities, registration and auditing; and an self-evaluation process, all under the direction of the Plant. These plans specifically address changing conditions within the Plant’s environment and the surrounding communities.</p> <p>Among SGMA’s tasks is ensuring that applicable standard regulations are being followed during the planning and implementation processes. Additionally, SGMA is in charge of enhancing staff awareness of environmental responsibility; evaluating the environmental impacts of the activities, products and processes of the Plant; implementing measures for preventing, eliminating and reducing emissions, waste and consumption; and finally, collaborating with external authorities in analyzing environmental risks.</p> <p>The system is robust enough to identify and measure vulnerabilities and weaknesses related to the environment in order to address changing conditions. Additional foreseeable changing conditions are assessed in the final self-evaluation process.</p> <p><i>Source:</i> <i>Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p. 4-17.</i></p>	<p>Additional documentation about periodic reviews and performance assessments, in comparison to established plans, could be provided to evaluate possible corrective actions.</p>
<p>LD1.3 Foster Collaboration And Teamwork</p>	<p>4</p>	<p>Enhanced</p> <p>One of the duties of the SGMA team is to define the hierarchy, responsibilities and interrelationships among the staff members who manage, perform and monitor activities with potential impacts on the environment. Teamwork is considered during the construction and operation periods. As described in Credit LD 1.1, interrelationships are encouraged between internal and external groups to ensure better performance on activities that affect the environment. However, no documentation is provided about analyses of conflicting design elements, optimization of integrated design, or an analysis of meaningful shared risk and reward.</p> <p><i>Source:</i> <i>Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Resid</i></p>	<p>Include meaningful risk and reward sharing between the project owner and the project team. Enhance the multi-disciplinary approach to find ways to improve sustainable performance commensurate with the owner’s goals and objectives, technical feasibility, costs, and tolerance for risk.</p>

<p>LD1.4 Provide For Stakeholder Involvement</p>	<p>5</p>	<p>Enhanced</p> <p>As explained in credit QL 1.1, La Chira WTP has developed a systematic plan to communicate to community members the activities that may affect them during the construction, operation and dismantling phases. There are a set of Community Relationship Plans (PRCs) that explain the scope, duration, risks, benefits and disadvantages of the activities performed by the Plant.</p> <p>Stakeholders from the community and the project team have been identified and periodic meetings are held with a strong emphasis on communication. Among the PRCs, the Information and Communication Program is the one that involves the largest number of stakeholders. However, no information was found about the implementation of feedback from the community. Feedback is given either via oral participation in the information sessions or via emails sent to the WTP team (buzon.de.sugerencias@consorciolachira.pe). No documentation has been provided about internal channels of communication between the WTP and internal stakeholders.</p> <p>The identified project-side stakeholders include SEDEPAL and the La Chira Temporary Union. community stakeholders include leaders from the towns of Pacifico de Vila, Ilustre Maestro Victor Raul Haya de la Torre and residential associations of Radio y Televisión del Perú and Villa Nicolasa. In addition, local authorities, local agencies, artisanal fishers, and surrounding private companies are also included.</p> <p><i>Source:</i> Walsh Consulting Services. <i>Estrategia de Manejo Ambiental</i>. p. 7-122 - 7-134. Walsh Consulting Services. <i>Anexo 08 Plan de Participación Ciudadana</i>. p. 1-4.</p>	<p>Create credible programs for soliciting feedback from the public and key stakeholders. Stakeholder feedback can be assessed and applied to project decisions if feasible. Provide better opportunities for incorporating stakeholder input into project plans and decision-making.</p>
<p>LD2.1 Pursue By-Product Synergy Opportunities</p>	<p>0</p>	<p>No Score</p> <p>No information has been provided regarding the identification of unwanted byproducts or discarded materials from nearby facilities. For this reason, the credit is considered to be non-achieving.</p> <p><i>Source: None</i></p>	<p>Search for and identify unwanted byproducts or discarded materials from nearby facilities. Assess the potential use of these byproducts in the project design, construction or operation stages. Pursue byproduct synergy opportunities.</p>
<p>LD2.2 Improve Infrastructure Integration</p>	<p>1</p>	<p>Improved</p> <p>Although La Chira WTP improves the water quality of Lima’s shoreline and seeks to use renewable resources whenever they are available, there are no synergies among the infrastructural components of the Plant. Although the WTP has a robust water management system, it is not integrated with water recycling or energy generating infrastructure.</p> <p><i>Source:</i> Walsh Consulting Services. <i>Resumen Ejecutivo</i>. p. R-4.</p>	<p>Attempt project-wide system integration. Consider related community-wide infrastructure, system integration or restoration.</p>

<p>LD3.1 Plan For Long-Term Monitoring & Maintenance</p>	<p>10</p>	<p>Conserving</p> <p>Monitoring is a core part of the operations of La Chira WTP. The project team has a designated monitoring plan with designated operators and periodic reports. The Environmental, Safety and Health Chief Office will be in charge of the environmental monitoring during the construction, operation and dismantling periods. This office will: verify correct implementation and efficiency of measures listed in the Environmental Management Strategy document; achieve applicable environmental regulations whether local or international; and establish frequency of and locations for monitoring. Periodic reports will be provided to the project directors and owners, including SEDAPAL. The first operation year reports will be produced monthly; following year reports will be produced annually.</p> <p>During the construction, operation and dismantling periods, air quality, noise, seawater quality, and soil contamination will be monitored. Additionally, during construction, water quality in dredged areas, groundwater quality, vibration levels and fauna disturbance will be monitored. During operations, quality of marine sediments, flow and effluent, sludge and diluted contaminating agents in the seawater will be monitored as well. Specific monitoring will be done after natural disasters or operation accidents.</p> <p>Additionally, a program for environmental monitoring by the community will be implemented. The program will include 6 to 8 community members who will be trained to collaborate on the monitoring of activities within the Plant. The community program will have guidelines determining how long community members can serve, functions and tasks of the committee, and possible penalties for noncompliance with specific functions.</p> <p>According to the executive summary prepared by Walsh Peru Consulting Services, the implementation cost of the Environmental Measurement Strategy (EMA in spanish) was separated for the construction and operation periods. The EMA implementation cost represents 1.25% of the total cost of constructing the Plant. An investment program has been considered.</p> <p><i>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-73 - 7-98.</i> <i>Walsh Consulting Services. Resumen Ejecutivo. p. 7-73 - 7-98.</i></p>	
<p>LD3.2 Address Conflicting Regulations & Policies</p>	<p>4</p>	<p>Superior</p> <p>The La Chira WTP team has provided an extensive analysis and description of the environmental regulations applicable within the Environmental Impact Assessment. The analysis includes a broad range of institutions concerned with improvement of the environment. The goals, functions and applicable documentation of local and national government agencies, neighborhood associations and NGOs have all been analysed. However, there is no evidence that any assessment identifying conflicts between the laws, regulations and policies was performed.</p> <p><i>Source: Walsh Consulting Services. Marco Legal. ps.2-2 - 2-36.</i></p>	<p>Improve the assessments analysis with an eye towards structural change. Better approach decision makers, in order to improve sustainable performance of identifying conflicts over current laws, regulations, policies and standards.</p>

LD3.3 Extend Useful Life	1	Improved	Consider the project design in a way that makes the completed project more durable and resilient to extend its useful life. Include flexibility within the completed project to enable refurbishment and reconfiguration to further extend its useful life. Consider designs that will allow for expansion, reconfiguration, or multiple uses. Conduct a feasibility study to determine areas for potential long-term cost savings in regards to designing for future expansion, reconfiguration, durability and reduced maintenance.
		<p>The projected useful life of the WTP is 100 years; however, no evidence was provided regarding efforts that would enable this period to be extended. Reuse of the Plant infrastructure has not really been considered, rather, the Plant will be abandoned or demolished if it cannot be sold or repurposed.</p> <p><i>Source: Walsh Consulting Services. Marco Legal. p.3-109. Walsh Consulting Services. Resumen Ejecutivo: R54,R-60,R-62, R-68</i></p>	
LD0.0 Innovate Or Exceed Credit Requirements	0	N/A	
			56

CATEGORY II: CLIMATE AND ENVIRONMENT (CE)			
RESOURCE ALLOCATION			
	WASTEWATER TREATMENT PLANT AND MARINE OUTFALL OF LA CHIRA, PERU		RECOMMENDATIONS
RA1.1 Reduce Net Embodied Energy	2	Improved	Measure and Document the percentage of each material used in the construction of the plant. The estimation must consider the materials to be used in the project's construction as well as the materials to be used for maintenance and operation during the project life.
		<p>Materials used in the construction phase are analyzed for a life cycle that starts at initial extraction and ends with the recycling process. SIMAPRO 3, from the PRÉ Consultants-Delft University Life Cycle Analysis (LCA) database, was used to analyze the construction materials of used in the project. The most utilized construction materials were divided into four categories:: Stone, Metal, Plastic and Wood.</p> <p>Materials used in the construction phase are analyzed for a life cycle that starts at initial extraction and ends with the recycling process. SIMAPRO 3, from the PRÉ Consultants-Delft University Life Cycle Analysis (LCA) database, was used to analyze the construction materials of used in the project. The most utilized construction materials were divided into four categories:: Stone, Metal, Plastic and Wood. Based on the analysis, stone and metal materials are non-renewable but can be recycled. Plastic, as a petroleum, is complicated to recycle. Wood is renewable but requires a very rigorous extraction process in order to minimize harm to existing ecosystems (i.e. rainforests). Plastic, metal and stone require the most energy to extract and cause the most harm to their surrounding environments. Ideally, stone materials should come from certified quarries, steel should contain at least 50% of recycled material, and wood should fulfill the FSC environmental qualifications. No documentation was provided to confirm the percentage of each material used in the construction of the plant. Therefore, it qualifies as Improved.</p>	

		Source: Consorcio La Chira.Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p. 118 - 130.	
RA1.2 Support Sustainable Procurement Practices	6	Superior	Register the percentages of materials purchased from suppliers that have implemented sustainable policies and practices. Increased emphasis on suppliers social and ethical performance
		The La Chira WTP gives priority to suppliers and contractors that have implemented environmental management systems in their production plants and processes. Such companies should be certified by the EMAS, the EU Eco-Management and Audit Scheme, and UNE-EN ISO 14001 international standards. The project team claims that there are no sustainable standards for industrial products; however, the team is highly receptive to the use of sustainable products in everyday consumption such as paper, refrigerators, washing machines and electronic devices.	
		The project team has identified the most-demanded products and the companies and brands that produce them under conditions with reduced environmental impacts. Products such as lubricants, laboratory supplies, and polyelectrolytes are on the list. However, these are not the only products considered; company policies also apply to the selection of suppliers of coagulants, machinery and waste management. Even though no company list has been provided, the La Chira WTP team applies specific requirements to each product.	
		Source: Consorcio La Chira.Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p. 82 - 84.	
RA1.3 Used Recycled Materials	11	Superior	Increase the percentage of recycled materials used to 80% or more. Create an Inventory of materials that includes the name of the product, the name of the manufacturer, the weight or volume of the material, and the percentage of recycled content (either post-industrial or post-consumer recycled content).
		The use of recycled materials is addressed in a comprehensive manner. La Chira WTP requires construction contractors to certify that 50% of the material used is recycled. As described in Credit RA1.1, the entire lifespan of the materials is accounted for from extraction to demolition of the plant. Therefore, the recyclable capacity of each material use is considered. In addition, an inventory of construction materials that may be reused is provided. However, no documentation about the percentages of use of these particular materials in the project is provided.	
		Source: Consorcio La Chira.Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p. 118 - 130.	
RA1.4 Use Regional Materials	0	No Score	Increase the percentage of locally sourced materials, plants, and soils. Create an inventory of materials, plants, aggregates, and soils for construction sourced near the site. Include Soils, aggregate and plants. Calculate the percentage of total project materials by cost that are sourced locally. Reuse materials, either on site or sourced within a 500- mile radius, and materials harvested on site, including retained plants count toward meeting the credit requirements.
		The Good Practices Code for the project states an intention of using locally-sourced materials. However, no documentation has been provided to confirm or deny whether this is happening during the construction phase.	
		Source: Consorcio La Chira.Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p. 259.	

<p>RA1.5 Divert Waste From Landfills</p>	<p>3</p>	<p>Improved</p> <p>According to the Peruvian law of solid waste (Ley N° 27314), a Waste Management Plan will be implemented for the construction, operation and dismantling of the plant. The Plan's purpose is to identify and classify the waste, minimize waste production, and to define alternatives for treatment, elimination and monitoring that will promote compliance with the law. Potential major waste products are identified beforehand for all the phases. During the construction phase, waste will be classified by its flammability, hazardousness and toxicity. Each contractor will register the produced waste volumes, and waste will be distributed to appropriate and approved waste managers. Additionally, all construction debris will be crushed and reused as pavement aggregates or other stone-based materials if and when possible. To achieve this, the plant will have a mineral crusher inside the building that will improve recycling of the minerals of concrete. Recycled water will also be used during building construction. Since the purpose of the WTP is to remove a degree of waste from the water, the plant produces large volumes of solid waste. The Environmental Chief of La Chira Concession S.A is in charge of the management of this waste, which includes internal distribution of different kinds of waste, waste storage, and waste reuse and deposits into authorized disposal plants. Waste collectors will be labeled according to the type of waste. Red will be used for hazardous waste, blue for paper and cardboard, and black for non-hazardous waste produced from the treatment process. After collection, waste will be stored in a designated space in accordance with Articles 38, 39 and 40 of the Peruvian Waste Law regulation. The law specifies that "residues must be stored according to their physical, chemical and biological characteristics, considering its hazardous characteristics, its incompatibility with other wastes, as well as the reactions that may occur with the container material." Organic waste will be picked up by municipal trash collectors. Additionally, contractors and employees are encouraged to enact recycling practices such as reuse of bond paper, use of large containers instead of small ones, and to be generally aware of waste reduction measures. Also, waste originated by pruning will be used for organic fertilizers. During the dismantling phase of the project, reuse and recycling of the plant's equipment and materials is planned to the greatest extent possible. All metallic equipment should be sold as scrap and prefabricated structures donated to local authorities.</p> <p>Source: Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p.106. Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-167.</p>	<p>Measuring the percentage of waste reduction will improve the plan and the plant waste production. Since there is no information about the projected percentage of reduced waste, the credit was considered as improved.</p>
<p>RA1.6 Reduce Excavated Materials Taken Off Site</p>	<p>2</p>	<p>Improved</p> <p>Extracted earth from the construction processes will be used as organic soil for future vegetation of the project site when feasible. In case the amount of soil exceeds the needs of the project, it will be offered for use by other nearby projects. Alternatively, it will be stored for future use or will be transported and disposed of by the regular waste collectors. No documentation is provided to confirm the percentage of excavated material that will be taken off-site or the proportions of excavated soil versus discarded soil.</p> <p>Source: Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p. 105</p>	<p>Demonstrate how the project was designed to balance cut and fill. provide estimations of the excavated material to be taken off site and excavated material beneficially reused on site.</p>

<p>RA1.7 Provide for Deconstruction & Recycling</p>	<p>1</p>	<p>Improved</p> <p>Although the plant has a lifespan of 100 years, and deconstruction and recycling of the major building materials is considered, recyclable materials cannot be easily separated for reuse. As concrete, metal and plastic are utilized the most and are typically made in a traditional manner, additional effort needs to be taken to separate recyclable material from non-recyclable material. Concrete specifically requires that a crusher be obtained and that the minerals are free of other materials. In the case of metals, a fusion process is required to remove added materials. Plastic requires complex chemical processes. Therefore, intention to recycle the building materials is a possibility but will require additional effort during deconstruction of the plant.</p> <p>Source: Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p. 105.</p>	<p>Facilitate the future disassembly and recycling of used materials. Measure the percentages of possible recycled components. Consider the minimization of adhering recyclable material to non-recyclable materials or materials that will contaminate the waste stream and limit recyclability.</p>
<p>RA2.1 Reduce Energy Consumption</p>	<p>3</p>	<p>Improved</p> <p>Energy consumption is addressed in terms of conscious practices for reduction, regular maintenance and periodic monitoring. Renewable energy equipment, such as solar panels or similar devices, does not exist in the Plant. Only small measures such as automatic lighting will be implemented. However, the La Chira WTP will collect energy consumption data by zone to determine appropriate levels of reductions.</p> <p>The efforts that La Chira WTP will implement to reduce energy consumption are focused on best energy consumption and maintenance practices and include employee information campaigns, monitoring of working hours during the night to maximize the amount of daylight hours used, and periodic maintenance of machinery and vehicles to ensure efficient use of fuel. The use of biodiesel fuel will be prioritized over diesel and gasoline to reduce CO2 emissions. Vehicle and machinery routes will be planned and optimized to reduce vehicle miles traveled. Drivers will be trained to maintain constant speeds to avoid overuse of fuel. Air Conditioning systems will be calibrated periodically to confirm correct energy consumption.</p> <p>Source: Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p. 98.</p>	<p>Analyze costs to determine which reduction methods are resulting in energy consumption reduction. Additionally measure energy consumption in terms of percentage of improvement.</p>
<p>RA2.2 Use Renewable Energy</p>	<p>0</p>	<p>No Score</p> <p>The project has recommended increasing the use of biofuels for trucks and machinery engines; however, there is no evidence of a reduced percentage over time. Moreover, no documentation has been provided regarding the annual energy needs of the project or the use of alternative energy sources.</p> <p>Source: Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p. 85</p>	<p>Utilization of at least 10% renewable energy resources should be used in the completed work. Provide documentation of the annual percentage of renewable energy used to meet energy needs.</p>
<p>RA 2.3 Commission & Monitor Energy Systems</p>	<p>0</p>	<p>No Score</p> <p>No external monitoring will be done to manage the efficiency of energy systems. The La Chira Environmental Management team will review energy consumption every three months and analyze causes of excessive consumption. However, no further actions such as commissioning or monitoring, which could extend the useful life of the energy systems, are described in the documentation provided.</p>	<p>Engage an independent commissioning of the project energy systems. Assemble the necessary information needed to train operations and maintenance personnel to enable proper training for operations and</p>

		<p>Source: Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. 90.</p>	<p>maintenance activities. Incorporate advanced monitoring equipment.</p>
<p>RA3.1 Protect Fresh Water Availability</p>	<p>4</p>	<p>Enhanced</p> <p>Although there is no estimation of the average peak water demand, the project will protect fresh water availability through reuse and purification of water during the construction period.</p> <p>Most of the planned actions tend to protect cement, clay and other particles from making contact with fresh water and the drainage system. For that purpose the floors of the buildings and machinery areas will be waterproof. Additionally, a perimeter drainage system will be built around the construction site and will be comprised of a drain of 0.6 meters in depth which will prevent construction runoff from spreading. Machinery areas will have additional slopes in the floors for channelizing oil, grease and slime into a tight tank. This tight tank will be further treated inside the plant.</p> <p>In addition, a water collector network will be built inside the plant to collect stormwater, and wastewater from concrete machinery and washing. This collected water will be conducted to a solid precipitation device located inside the plant. After a depuration process, the remaining water will be collected in a tanker truck and used in construction processes such as pavement irrigation or concrete watering.</p> <p>Reuse of domestic wastewater is also considered whenever the local sewage system cannot accommodate it; as such, this project involves the construction of a wastewater treatment plant.</p> <p>Source: Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. p. 143 - 144.</p>	<p>Conduct a water availability assessment. Report on the long-term availability and replenishment or recharge of fresh water supply. Calculate the volume of freshwater discharge after use. Locate discharge and impact of discharge on receiving water quality and quantity, including temperature and salinity.</p>
		<p>No Score</p> <p>As described in Credit RA3.1, roads will be wet with non-potable water during construction and operation of the project. Moreover, during operation, sensor-based water fountains and faucets will be installed in bathrooms and other spaces of the working areas. Mechanical sweepers will be used to clean storage areas, and pressure washing cleaning systems will be used to clean vehicles and machinery. However no documentation about percentage of reduction of water consumption was provided. For this reason the credit is considered to be No Score .</p> <p>Source: None</p>	
<p>RA3.2 Reduce Potable Water Consumption</p>	<p>0</p>	<p>Conduct planning or design reviews to identify potable water reduction strategies during operation and maintenance of the project. Conduct planning or design reviews to identify potable water reduction strategies during operation and maintenance of the project.</p>	

<p>RA3.3 Monitor Water Systems</p>	<p>11</p>	<p>Conserving</p> <p>Surface water contamination will be prevented by periodical monitoring processes during the construction, dredging and dismantling phases of the project. Evaluations will be performed by the Environment, Security and Health Division of the Concession La Chira S.A. Parameters for measurement, such as organoleptic, chemical, organic, inorganic and microbiological, will be determined by the Peruvian National Standards of Environmental Quality for Water, in accordance with the following document: Estandares Nacionales de Calidad Ambiental del Agua. Categoría 2: Actividades Marino Costeras. Subcategoría: C3. Otras Actividades.</p> <p>During the marine outfall construction phase, sea water quality will be monitored every three months at eleven points along the marine outfall. During dredging, water quality evaluations will be done before, during and after activities. Monitoring will occur on a monthly basis since the dredging process occurs on 30 to 45-day timeframe. Approval of the analysis will be done by accredited laboratories under the Peruvian Institute of Consumer Defense and Intellectual Property INDECOPI (Instituto Nacional de Defensa del Consumidor y de la Propiedad Intelectual).</p> <p>Since the marine outfall will be constructed underwater, groundwater contamination is a major concern. During the construction phase, groundwater contamination will be prevented through periodic verification that equipment and machinery is functioning correctly. Additionally, a traditional water well located in the area surrounding the WTP will be used as a source to collect samples of groundwater in accordance with the Standard Methods of Water and Wastewater.</p> <p>Since the major purpose of the operation of the WTP is to reduce sea water pollution, daily samples of incoming wastewater and outgoing treated water will be gathered. Moreover, fountain fixtures and pipes will be inspected for leaks and water meters will be distributed by production zone.</p> <p>Consorcio La Chira.Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. p. 141 - 144.</p> <p>Walsh Consulting Services. Estrategia de Manejo Ambiental. Pág. 7-7 to 7-11 , 7-25 to 7-27. 7-39, 7-43.</p>	<p>Expand the scope and extent of monitoring activities. Plan to incorporate monitoring data to improve the operational efficiency of the project.</p> <p>Expand the scope and extent of monitoring activities. Plan to incorporate monitoring data to improve the operational efficiency of the project.</p>
<p>RA0.0 Innovate Or Exceed Credit Requirements</p>	<p>0</p>	<p>N/A</p>	
<p>43</p>			

NATURAL WORLD				
	WASTEWATER TREATMENT PLANT AND MARINE OUTFALL OF LA CHIRA, PERU	RECOMMENDATIONS		
NW1.1 Preserve Prime Habitat	0	<p>No Score</p> <p>The La Chira WTP is located between 25 and 40 meters from the shore. According to the documentation provided, fragile ecosystems such as coastal wetlands and coastal desert vegetation exist along the shoreline. Although the majority of the project's area of influence is comprised of barren hills and little vegetation, wetlands consist of prime habitat that may be affected by the Plant's operations. As wetlands have been identified within the project area, this credit has been considered non-achieving.</p> <p>However, it is worth noting that the LA Chira WTP has monitored existing vegetative families and species as well as birds, mammals and insects. The Plant has planned actions to minimize noise and light spillover and reduce impacts on the existing flora and fauna.</p> <p>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-167. Walsh Consulting Services. Evaluación de Impactos. p. 5-27. 5-36.</p>	<p>Depict the location of the wetlands in relation to Plant structures. Establish a 100 meter buffer zone around wetland areas. Increase coastal wetland habitat connectivity as much as possible.</p>	
		<p>Superior</p> <p>The La Chira WTP team analyzed the Plant's impacts within the direct and indirect areas of influence. Although the majority of the La Chira WTP will be located in an area free of vegetated cover, coastal wetlands have been identified within the direct and indirect areas of influence. Construction of the Plant will occur 25 to 40 meters from the shoreline.</p> <p>Source: Walsh Consulting Services. Evaluación de Impactos. p. 5-27. 5-34.</p>		<p>The project team can establish a larger vegetation and soil protection zone to provide a natural buffer equal to specified distances within this Credit. Procedures to restore previously degraded buffer zones to a more natural state or to stabilize the shoreline with additional native plants should be considered.</p>
		<p>Conserving</p> <p>The WTP is located in the urban area of Chorrillos in Lima. The specific area of the Plant was designated for industrial use by Lima's government administration. The current project site has a high proportion of barren soil without vegetation. Additionally did not contain any previous development. As it is adjacent to the neighborhoods of Pácifico de Villa and Victor Raul Haya, the project site is not suitable for agriculture and is not utilizing prime farmland.</p> <p>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-167.</p>		
NW1.4 Avoid Adverse Geology	1	<p>Improved</p> <p>Seismic hazards, tsunamis and flooding risks were evaluated throughout the area of influence of the project. The conclusion of the seismic analysis for 42 districts of Lima and Callao was compiled into a map. According to the documentation provided, the WTP plant has been categorized as having high and medium risk for natural hazards. Therefore, the project team has convened a contingency team to explore ways to preserve and minimize the alteration or damage of areas that affect adjacent populations. However, the team has not created contingency plans for earthquake faults, low lying coastal areas or karst formations</p> <p>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-169 to 7-15.</p>	<p>Identify and delineate earthquake faults, low lying coastal areas, karst formations and aquifers. Develop plans and designs to reduce the risk of damage, establish operating procedures, and establish a monitoring program for adverse geologic settings. Establish a cleanup plan.</p>	
		<p>Improved</p> <p>The La Chira WTP has delimited indirect and direct zones of influence. The direct area corresponds to the surface on which the WTP buildings and conduction channel will be built (the conduction channel connects the Plant to the previous water chamber collector). The indirect zone is a larger area that includes the adjacent human settlements of Pacífico de Villa and Victor Raul Haya de la Torre.</p> <p>The project's area of influence infringes upon the Surco river, but the floodplain area of the river does not affect the project's ground-based built area. However, an elevated aqueduct, that conducts collected wastewater from wastewater collector chambers, will cross the Surco river and will require the construction of concrete pillars. "The channel will pass over the Surco River through an aqueduct, requiring concrete pillars to be built reaching an elevation of 7.81 masl. Pillars will be distributed every 17m".</p> <p>Source: Walsh Consulting Services. Descripción del proyecto. p. 3-8.</p>		<p>Asses the project design relative to a 100-year storm. Consider the maintenance of floodplain infiltration based on the amount of impervious surface, established vegetation and soil protection zones, and other strategies that allow for natural floodwater infiltration and filtration of pollutants.</p>
NW1.5 Preserve Floodplain Functions	2			

NW1.6 Avoid Unsuitable Development on Steep Slopes	6	Conserving	Maintain the minimized intervention on steep slopes and hillsides.
		The La Chira WTP buildings are located on flat coastal terrain. As mentioned before, the majority of the area is characterized by low hills, barren plains, wetlands and beaches. The tunnel connecting the previous water collector with the new WTP is not being considered because it has no buildings or surface construction that can favor landslides or excessive erosion.	
		Source: Walsh Consulting Services. Resumen Ejecutivo. p. R-7 Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-167. Consorcio La Chira.Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 3. Operaciones y Procesos de Tratamiento Propuesto. p. 61	
NW1.7 Preserve Greenfields	0	No Score	
		A greenfield site is described as an “Undeveloped land in a city or rural area being considered for urban development. This land may contain natural landscapes, natural amenities, or agricultural land” (Envision manual). The La Chira WTP is located on urban land near the ocean that is largely non-cultivable and has not been built on previously. According to the description, the project is developing a greenfield.	
		Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. Pág. 7-167. Walsh Consulting Services. Evaluación de Impactos. Pág. 5-27. 5-36. Envision manual. Glossary. p. 158	
NW2.1 Manage Stormwater	4	Enhanced	Measure the water storage capacity of the plant and increase the percentage as much as possible from 30% to 100%. Provide management programs and handling structures to capture and repurpose 100% of the stormwater on-site to mitigate impacts to adjacent sites.
		A system for stormwater treatment will be provided during the construction period. As described in Credit RA 3.1, a network of water collectors will be built inside the plant to collect stormwater, as well as wastewater from concrete machinery and washing. Collected water will be channeled to a solid retention device located inside the Plant. After a depuration process, the remaining water will be collected in a tanker truck and used in construction processes such as pavement irrigation or concrete watering. However, no evidence has been provided that stormwater management will occur during operation or that water storage capacity will be improved.	
		Source: Consorcio La Chira.Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. p. 143 - 144.	
NW2.2 Reduce Pesticides and Fertilizer Impacts	0	No Score	Implement policies and programs to control and reduce application of pesticides and fertilizers. Install runoff controls to minimize contamination of ground and surface water. Use fertilizers and pesticides that have less toxicity, persistence and bioavailability. Design landscapes to incorporate plant species that require no pesticides, herbicides and fertilizers.
		No documentation has been provided regarding the use of pesticides and fertilizers in the project. For this reason, the credit is considered to be non-achieving	
		Source: None	

<p>NW2.3 Prevent Surface and Groundwater Contamination</p>	<p>9</p>	<p>Superior</p> <p>Spills of contaminated solids and liquids into the sea water will be prevented through periodic maintenance and monitoring of the system. Furthermore, strategic locations away from the coast will be identified and adapted into temporary supply and storage zones. Dams will be built where hydrocarbon supplies for trucks and machinery are stored. Polluting waste will be temporarily stored and then transferred to authorized landfills. A service company, registered and authorized by the National Direction of Environmental Health, DIGESA (Dirección Nacional de Salud Ambiental), will oversee waste distribution.</p> <p>Several initiatives have been implemented for the prevention of surface and groundwater contamination. When work along the coast occurs, portable toilets will be provided. The water waste of these toilets will be channeled to existing water collectors instead of the ocean. Boats used in the construction process will have micro-treatment plants that will perform an initial oxidation process of organic matter; liquid waste from these boats will then be authorized by DICAPI the National Direction of Captaincy and Guard of Perú. Spills will be controlled by periodic maintenance of machinery and boats used in the Plant's construction. Once the Plant is functioning, toilet water will be directed to the new WTP.</p> <p>Source: Consorcio La Chira.Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. p. 141 - 144. Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-7 to 7-11 , 7-25 to 7-27. 7-39, 7-43, 7-47 to 7-48, 7-69, 7-75 to 7-80.</p>	<p>Elimination of potentially polluting substances from operations. In case this is not possible, recycle the substances, keep them within the operation or send them off-site for use in other applications. Restoration of groundwater infiltration patterns can be implemented.</p>
<p>NW3.1 Preserve Species Biodiversity</p>	<p>13</p>	<p>Conserving</p> <p>Preservation and restoration of habitat areas is a goal for both the marine outfall and plant construction phases. Identification and monitoring of existing vegetation and animal species, as well as collaboration with external agencies, is planned in order to preserve and restore the vegetative and animal habitats in the area.</p> <p>The outfall is designed to generate the smallest possible impact to marine habitats. For the construction, Consorcio La Chira plans to minimize and optimize tunnel dredging so that negative impacts to phytoplankton and benthos habitats are reduced. In order to restore the marine animal habitats - which include species of fish, reptiles and mammals - water quality is strictly controlled. (see Prevent surface and groundwater Contamination [NW2.3]). In addition, fishing is forbidden in this area and boat speeds are controlled.</p> <p>The bird population is the most vulnerable within the area of project influence. It is also the most abundant. Some species are designated for conservation by Peruvian and international agencies. Collaboration with the Peruvian General Direction of Environment, Water, Urbanism and Housing will be scheduled in order to preserve nesting and breeding habitats for the bird population. Monitoring the number of individuals by species and the number of species will be done in three monitoring bases. Each base will count the birds spotted during a 30-minute period within a radius between 30 and 50m. The monitoring bases will be located 100m away from each other. During construction, monitoring will be done weekly, with special attention paid while controlled explosions necessary to the project are performed.</p> <p>Although the most protection will be provided for bird and underwater species, vegetation is also considered. Restoration of native vegetation will be done after the construction period of the project, with the intention of restoring the initial image of the landscape and assuring soil protection. For this purpose, periodic irrigation and the addition of new native specimens may be required.</p>	<p>Gather efforts during the course of the project to not only protect and upgrade existing habitats, but to restore and create new habitats. Reinststate appropriate vegetation, improve and expand wildlife corridors, and link existing habitats.</p>

		<p>Source: Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p. 164 - 165. Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-81.</p>	
<p>NW 3.2 Control Invasive Species</p>	<p>5</p>	<p>Superior</p> <p>Native vegetation in the project area will be restored after the construction period. However, no documentation has been provided to confirm that a team comprised of state or local agencies will be identifying and monitoring the exclusive use of appropriate plants. Moreover, no documentation has been provided to confirm the presence and types of potentially invasive plants on the site.</p>	
		<p>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. Pág. 7-81.</p>	
		<p>Conserving</p> <p>According to the documentation provided, La Chira is located mainly on uncultivated plains and beaches and does not disturb important vegetated soil. However, monitoring and testing of soil quality will be done during the construction, operation and dismantling phases. Hydrocarbon concentration was identified as the main potential source of contamination. Therefore, the Protective Conservation Limits (PCLs) used by the Texas Commission on Environmental Quality for residential, commercial and industrial areas will be used as the parameter for evaluating contamination levels. The samples will be evaluated using EPA 8015 and SM 5520F analysis methods. Three monitoring bases will be used for analysing samples taken at fuel storage and supply zones: south area, center area and treatment plant. Periodic maintenance procedures will be performed on fuel-dependent equipment and machinery in order to reduce possible leaks and sources of contamination. Additionally, construction contractors and operators of the Plant will be provided with appropriate contingency materials for accidental hydrocarbons leaks.</p>	
<p>NW3.3 Restore Disturbed Soils</p>	<p>8</p>	<p>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. p. 7-72. 7-78</p>	<p>Reuse restored soils for functions comparable to their original function (i.e., topsoil is used as topsoil, subsoil as subsoil, or subsoil is amended to become functional topsoil).</p>

NW3.4 Maintain wetland and surface water functions.	9	<p>Superior</p> <p>Ecosystem functions related to water will be enhanced by the project in three ways: water quality, habitat and sediment transport. Periodic monitoring practices will be implemented to evaluate the impact that the plant may have on water quality; samples will be taken and sent to external agencies that will evaluate them according to existing quality standards. Once the results of the evaluations are received by the WTP Environmental Impact Team, corrective measures will be taken as needed.</p> <p>Water contamination will be reduced through periodic water quality controls performed in three different parts of the plant. Evaluatory samples taken must achieve the standards set forth by the National Standard for Environmental Quality of Water (Peru). Category 2. Subcategory: C3. Other activities. (Estandares Nacionales de Calidad Ambiental del Agua. Categoría 2: Actividades Marino Costeras. Subcategoría: C3. Otras Actividades) (see Credit NW 2.3). Monitoring will be done during construction, operation and dismantling periods.</p> <p>Existing water flows of the Surco River will not be disturbed. As described in Credit NW 1.2, the canal construction required to connect La Chira WTP with existing wastewater collectors will be an elevated aqueduct. Additionally, working areas will be delineated with mesh so that waste does not accidentally fall into the river.</p> <p>Vegetative and animal habitats will be preserved and enhanced. Water habitats and bird habitats will benefit the most. As described in Credit NW 3.1, habitat disturbance will be monitored during the building and operation processes. To a lesser degree, vegetative habitats will be enhanced by the cultivation of new native species on the site. All the analyses and tests should be performed by accredited laboratories of INDECOPI.</p> <p>Source: Wash Consulting Services. Estrategia de Manejo Ambiental. p. 7-86</p>	Hydrologic connection can be improved in addition to water quality, habitat enhancement and sediment transport. All ecosystem functions can be restored to its original functions by a qualified restoration plan.
	0	N/A	
	70		

CLIMATE AND RISK			
	WASTEWATER TREATMENT PLANT AND MARINE OUTFALL OF LA CHIRA, PERU	RECOMMENDATIONS	
CR1.1 Reduce Greenhouse Gas Emissions	4	<p>Improved</p> <p>As described in credits RA1.1 and RA1.2, carbon lifecycle monitoring and analysis will be performed during operation and construction. The project will cause greenhouse gas emissions during the construction, operation and dismantling periods. The emissions will be more intensive during construction and dismantling, due to the movement of trucks and machinery, and less intensive during operation when the primary vehicles entering the site will be waste removal trucks.</p> <p>An Environmental Management System Team (SGMA in Spanish) will evaluate and register greenhouse gas emissions based on ISO 14001 standards for organization of the overall environmental management program. Specifically, the Team will follow the 2002/88/C E Directive and the D.S. 047-2001-MTC Agreement on Peruvian national targets limiting automobile emissions. There is an overall awareness that proper maintenance of the machinery and engines can reduce additional greenhouse gas emissions.</p> <p>Recommendations on the use of biofuels and best driving practices have been made for the construction, operation and dismantling periods, but are not controlled or measured by any specific methodology or software. Measurements of greenhouse gas emissions should be done by an accepted software so that the planned intentions of reducing emissions can be measured by percentages and evaluated on their quantitative impacts.</p> <p><i>Source:Consortio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. 105. Wash Consulting Services. Estrategia de Manejo Ambiental. p. 7-74.</i></p>	<p>Calculate carbon emissions reduction percentage with available methodologies, data sources and software.</p>
	2	<p>Improved</p> <p>Although the project will not follow the California Ambient Air Quality Standards, the Peruvian National Standards of Environmental Quality have similar minimum standards for the same pollutant compounds.</p> <p>As described in Credit CR1.1., the project will produce air pollutant emissions primarily during the construction period. During operation, the pollutant emissions are reduced to combustion emission of trucks that transport waste out of the plant. During dismantling, the major air pollutant emissions will be particulates resulting from the demolition process and the transportation of construction debris. For all three periods, the SGMA team will use the Peruvian National Standards of Environmental Quality Approved by the Supreme Decree No 074-2001-PCM and Supreme Decree No 003-2008-MINAM.</p> <p>Air quality monitoring will be performed every three months during construction, every six months during operation, and every three months during closing and dismantling. Five monitoring sites will be in place during the three periods. No calculations of expected emissions were found in the project documentation.</p>	<p>Calculate expected emissions of the plant. Follow Sections XI and XIV of South Coast Air Quality Management (SCAQM) Rules. Improve existing air quality to a higher than pre-development level.</p>

		<p>Source: Wash Consulting Services. Estrategia de Manejo Ambiental. p 7-74. Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012. p 105.</p>	
CR2.1 Assess Climate Threat	0	<p>No Score</p>	Provide assessments of sea level rise in coastal cities, Increased desertification and changes in extreme weather events and natural hazards.
		<p>The La Chira WTP environmental management planning and policies respond only to the changes in long-term weather patterns; no comprehensive climate assessment has been provided. For this reason, the credit is considered to be No Score .</p>	
		<p>Source: none</p>	
CR2.2 Avoid Traps And Vulnerabilities	16	<p>Conserving</p>	Shift from a cursory look to a more systematic evaluation of risks and vulnerabilities. Seek to establish design criteria for climate-proof infrastructure that contributes to a more robust and resilient community.
		<p>Considering the current public health threat derived from pouring untreated wastewater into the shore near the urbanized areas of Lima, the La Chira WTP will significantly reduce the long-term threat of epidemics and pandemics.</p> <p>Prior to development of the La chira WTP, the collected wastewater from all districts of Lima was diverted into the sea adjacent to the residential neighborhoods of Víctor Raúl and Pacífico in the area of Chorrillos. Contamination of seawater has spread to the southern seashore of Lima where the neighborhoods of Chorrillos, Barranco and Miraflores are located. The main objective of the project is to reduce contamination of the southern seashore of Lima and improve sanitary conditions for the population along Lima’s seashore. The La Chira WTP will treat the 8m3/s of wastewater collected by the largest collector of Lima.</p> <p>Additionally, a community relations plan will be adopted within which a continuous dialogue with the community will be fundamental. The main purpose for communicating with the community is to promote environmental policies and establish fluid interaction and cooperation with the local population in order to generate development opportunities beyond the WTP. Considering the current public health threat derived from pouring untreated wastewater into the shore near the urbanized areas of Lima, the La Chira WTP will significantly reduce the long-term threat of epidemics and pandemics.</p>	
		<p>Source: Wash Consulting Services. Estrategia de Manejo Ambiental. p.7-74. Consorcio La Chira. Relación de documentos de la Propuesta Técnica. Concurso de proyectos integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de Aguas Residuales y Emisario submarino La Chira. Documento 7. Identificación de los impactos positivos y negativos de la solución técnica propuesta y planteamiento de medidas de mitigación. 2012.</p>	
CR2.3 Prepare For Long-Term Adaptability	0	<p>No Score</p>	Increase preparation for climate change. Move from assessment to action. Implement strategies that prepare for or mitigate the negative consequences of climate change or other significant alterations in environmental and operating conditions.
		<p>The WTP does not consider adaptation to possible long-term climate change. Considering that the plant is located next to the coastline, a possible sea level rise could drastically affect the plant operations. No documentation is provided about strategies for managing long-term challenges. Therefore, the credit is considered to be No Score .</p>	
		<p>Source:</p>	

CR2.4 Prepare For Short-Term Hazards	17	Conserving	Create a design a plan to prepare both for earthquakes as for tsunamis.
		<p>The WTP has considered earthquakes and tsunamis to be the main natural hazards that could affect the area of influence of the project. A specialized Contingency Committee consisting of a coordinator, an emergency brigade, and external support institutions (police, firefighters, ambulances) will be present during the construction and operation periods and will have periodic meetings and information sessions. Contingency measures for pre- and post-hazard situations are planned for 100 years. The Contingency Committee will be tasked with adjusting measures to better accommodate possible changes that develop during the 100-year period. To this end, the Contingency Committee will meet once a year to evaluate the plan.</p> <p>The project’s influence area is within a highly seismic region of Peru. However, the specific granulometry, humidity and structure of the soil was found to have low seismic wave amplification and low liquefaction capacity. Therefore, the seismic risk was categorized as low for Zone I and relatively low for Zone II. This information also shows the national registers for density and the locations of identified seismic sources. There are superficial and deep seismic sources, 60 km and 300 km respectively. Superficial sources are located in the sector between the pit and the coast, while the deep sources are distributed throughout the area of influence. Seismic acceleration in the deep sources was found to be high with values of 0.44g - 0.52g for 50 and 100 years of useful life respectively.</p> <p>The risk of tsunami was evaluated according to historical information. The project area of influence was impacted by 7m tall waves in 1746. However, in the last 100 years, the tallest wave recorded was 4m in height. The affected area of a possible tsunami event is displayed on the Risk of Rough Seas Map and was calculated based on a 5m tall wave. The risk was categorized as medium mainly because the site is at an elevation of 6 meters.</p> <p>The contingency plan for the project is a structured response plan; however, no documentation about design strategies have been provided in the event of an actual hazard.</p> <p><i>Source: Walsh Consulting Services. Estrategia de Manejo Ambiental. Pág. 7-164, 7-169, 7-187 to 7-191.</i></p>	
		No Score	
		<p>There is no information available regarding management of any heat island effects created by the project. There is no documentation about reduction in paved surfaces or solar reflectance indices. For this reason, the credit is considered to be No Score .</p> <p><i>Source: none</i></p>	
CR2.5 Manage Heat Island Effects	0		Use materials with high SRI or through increased vegetation, which cools through evapotranspiration, and increased shade. Draw, calculate and register heat island reduction efforts.
CR0.0 Innovate Or Exceed Credit Requirements	0	N/A	
	39		
OVERALL:	298	WASTEWATER TREATMENT PLANT AND MARINE OUTFALL OF LA CHIRA, PERU	

APPENDIX D: CREDIT DETAILS

DOCUMENTATION PROVIDED
GENERAL INFORMATION
Concesionaria La Chira. Exposición Planta de Tratamiento de Aguas Residuales y emisario Submarino La Chira. Marzo 2013
Consortio La Chira. Concurso de Proyectos Integrales para la entrega en concesión del diseño, financiamiento, construcción, operación y mantenimiento del proyecto planta de tratamiento de aguas residuales y emisario submarino La Chira. Relación de documentos de la Propuesta Técnica. 2012
Walsh Perú. Estudio de Impacto Ambiental "Planta de Tratamiento de Aguas Residuales y Emisario Submarino -PTAR LA CHIRA-. Resumen Ejecutivo. Marzo 2012.
Walsh Perú. Estudio de Impacto Ambiental "Planta de Tratamiento de Aguas Residuales y Emisario Submarino -PTAR LA CHIRA-.2.0 Marco Legal. Marzo 2012.
Walsh Perú. Estudio de Impacto Ambiental "Planta de Tratamiento de Aguas Residuales y Emisario Submarino -PTAR LA CHIRA-.3.0 Descripción del Proyecto. Marzo 2012.
Walsh Perú. Estudio de Impacto Ambiental "Planta de Tratamiento de Aguas Residuales y Emisario Submarino -PTAR LA CHIRA-.5.0 Identificación, Valoración y Descripción de los Impactos Ambientales Significativos. Marzo 2012.
Walsh Perú. Estudio de Impacto Ambiental "Planta de Tratamiento de Aguas Residuales y Emisario Submarino -PTAR LA CHIRA-.7.0 Estrategia de Manejo Ambiental. Marzo 2012.
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