

Environmental Protection Planning of Macao (2010-2020)





2010.4

Preliminary works of the Environmental Protection Planning of Macao



Opinions collection document of the "Macao's Environmental Protection Conceptual Planning (2010-2020)"

2011.9

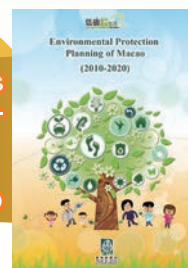
Adopt opinions from different sectors and conduct studies on the master planning and specific planning of environmental protection of Macao



Consultation document of the "Environmental Protection Planning of Macao (2010-2020)"

Collate the public's opinion and formulate the Environmental Protection Planning of Macao

2012.9



"Environmental Protection Planning of Macao (2010-2020)"



Compilation of the opinions collected of the "Macao's Environmental Protection Conceptual Planning (2010-2020)"



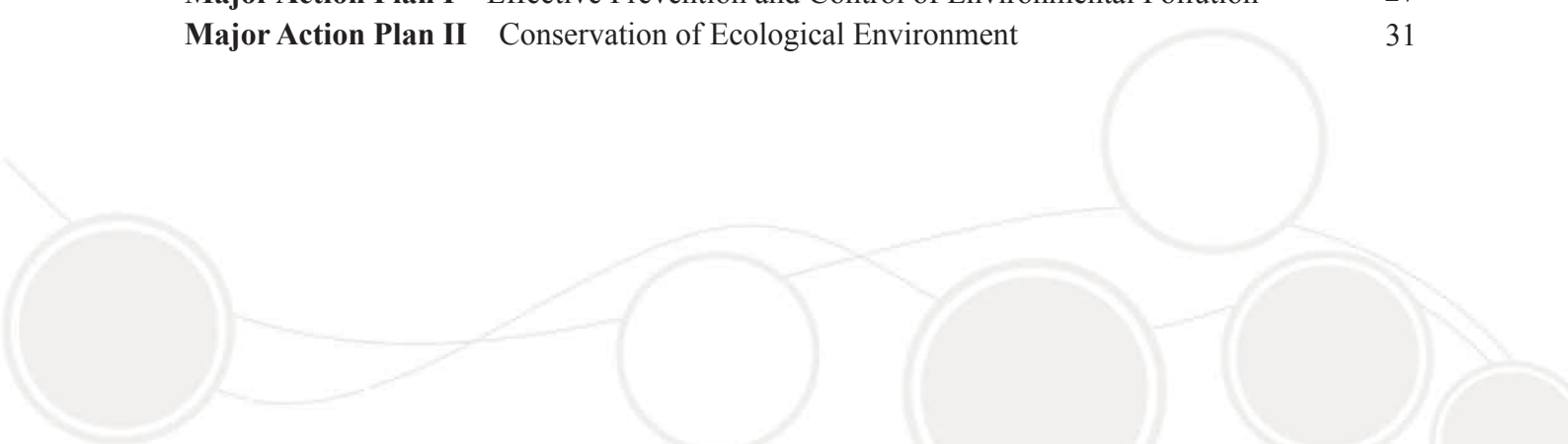
Compilation of the opinions collected of the "Environmental Protection Planning of Macao (2010-2020)"



Consultation report of the "Environmental Protection Planning of Macao (2010-2020)"




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Preface

In an effort to protect the valuable ecological environment and natural resources in Macao, and also enhance the quality of living environment, the Macao Environmental Protection Bureau (DSPA), upon its inception, has initiated the first environmental planning of Macao, in the hope of undertaking the environmental protection work systematically, by way of forward-looking planning, with the principle of “Living for today and planning for future”, formulating more targeted environmental policies for the future and resolving the existing and potential environmental pollution problems in Macao. In the meantime, in an attempt to follow the positioning of Macao as a “Global center of tourism and recreation” in the “*Outline of the Plan for the Reform and Development of the Pearl River Delta (2008-2020)*”, Macao will develop into a green, low carbon city suitable for living, business and tourism.

The present environmental planning of Macao was divided into three phases. Starting with the publication of “*Macao’s Environmental Protection Conceptual Planning (2010-2020)*” as the first phase, which put forward a strategic and directive framework for environmental protection, the DSPA held the first phase public consultation for a period of about one and a half month, from 22nd of April to 31st of May in 2010, collecting the public comments and opinions by means of different presentation sessions, radio programs, exhibition tours, press editorials, as well as telephone calls, emails, faxes and letters, etc. After integrating the public opinions about the environmental protection planning, the DSPA commenced the second phase work, about the studies on the master planning and specific planning of environmental protection of Macao, making evaluation and analysis in respect of the atmosphere, water, ecology, noise, light, waste, radiation and environmental management, etc, as well as the overall environment and development trends of Macao, formulating various action plans and determining various major projects for the future. Based on the first and second phases, the task of the third phase was “*Elaboration of the Text of Environmental Protection Planning of Macao*” and the DSPA published the consultation document of the “*Environmental Protection Planning of Macao (2010-2020)*” (hereinafter refer to as “*Environmental Planning*”), which summarized and integrated the three principal themes as “Optimizing the Environment Suitable for Living and Tourism”, “Promoting a Conservation and Recycling-oriented Society” and “Integrating into the Green and Quality Region”, based on the enrichment of the vision of “Building a Low Carbon Macao, Creating Green Living Together”. Under the three principal themes, various green indicators of the *Environmental Planning* were proposed, together with the short-term (till year 2012), medium-term (till year 2015) and long-term (till year 2020) environmental protection works for 15 areas of concern in the order of their priority and urgency. From 7th of September to 6th of November of 2011, the DSPA conducted diverse consultation activities for public opinions, and also sessions for government agencies, experts and industries, etc. After the collation and analysis of the opinions and recommendations collected, it was concluded that the public generally agreed with the contents of the consultation document, with the focus on the theme of “Optimizing the Environment Suitable for Living and Tourism” as well as the environmental protection works in respect of air pollution, solid waste treatment, water contamination, and noise, etc. Besides deepening the solution to the above-mentioned environmental problems concerned by the public in the present *Environmental Planning*, the DSPA is also in close cooperation with other government agencies to ensure the coordination of the



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Environmental Planning and other local planning projects.

Through a variety of investigations and analyses, in the form of supplementary monitoring, site investigation, questionnaire survey and professional interview, etc., and after several times of public consultation and repeated amendment, integrating the wisdom of different sectors, the DSPA had completed the final text of the “*Environmental Protection Planning of Macao (2010-2020)*”. While working on the *Environmental Planning*, the DSPA has continued to push forward other work, and in particular, carried out relevant action plans in the *Environmental Planning* in response to some extremely urgent environmental problems. The DSPA will continue to cooperate with other government agencies and social sectors to put into place the planning, action plans and various major projects gradually, in view of the planning vision and goals.

As a saying goes: “30% of planning and 70% of management”, we are well aware that, in order to achieve the vision of “Building a Low Carbon Macao, Creating Green Living Together”, the *Environmental Planning* of Macao has to be performed effectively as a due role in this process. Due to the rapid social and economic development, the *Environmental Planning* must also have comprehensive implementation and improvement mechanisms in addition to formulating the environmental planning and measures in a scientific and reasonable manner and enhancing their enforceability. In light of the requirement above, this *Environmental Planning* puts forward pragmatic executive and supervisory mechanisms, in the hope of mustering strength of the government, enterprises and general public to carry out the measures and goals under this planning and strive together for improving the environment of Macao. It is everyone’s responsibility to protect our environment, let’s join in hand to deliver our respective part of the responsibility so as to create a quality ecological environment and share a beautiful life!



1. Political Background

- Since its return to China, the Macao Special Administrative Region (MSAR) has experienced rapid social and economic development. In the meantime, new pressures and challenges in environmental protection issues have been arising. Environmental quality will be one of the core competitive edges for the sustainable development of Macao and the citizens have also shown greater demands for environmental quality, which urged the MSAR Government for a higher environmental management capability.
- Along with the implementation of the “*Outline of the Plan for the Reform and Development of the Pearl River Delta (2008-2020)*”, and signing of the “*Guangdong-Macao Cooperation Framework Agreement*”, Macao will greet a new wave of social and economic development, with the regional positioning as a “Global center of tourism and recreation”. In addition, a couple of international conventions on environmental protection have been applicable to Macao; therefore, improving the environmental quality and advancing the effective implementation of international conventions has become one of the important goals in the environmental protection works of Macao.
- In order to promote sustainable development in social and economic spheres and meet the need for the ongoing, fast economic and social development and the regional integration policy, it is necessary for Macao to formulate a people-oriented environmental protection plan, aimed to improve living environment, on the basis of all-round, systematic and scientific evaluation and analysis and of wide-ranging public opinions.



Chapter I

2. Existing Environmental Problems and Challenges

2.1 Transportation, energy consumption and regional air pollution have been increasing

- With the increase of vehicles in Macao, the environmental problems have become worse. Data showed that the greenhouse gas emissions caused by land transport increased by 70% from 2001 to 2009. Meanwhile, the concentrations of pollutants such as nitrogen dioxide (NO₂), respirable particulates (PM₁₀) and carbon monoxide (CO) have also been rising continuously along with the increase in land transport capacity. All these indicate that measures targeting land transport play a vital role in improving the air quality of Macao.
- In respect of energy consumption, the consumption of heavy oil, which bears relatively more heavily on air pollution, exhibited a downtrend year by year. On the other hand, the greenhouse gas emissions of Macao were also decreasing since 2005, indicating considerable achievements in promoting the use of clean energy. However, in order to reduce the overall carbon emissions in Macao, it is necessary to make efforts to save the types of energy with a relatively higher consumption, including electricity, kerosene and light diesel oil, etc.
- Along with rapid industrial development in the Pearl River Delta Region in recent years, the emissions of air pollutants increased accordingly. Since Macao is geographically connected to the Delta, the air quality of Macao is by no means exempted from the impact of the cross-regional transfer of air pollutants within the city cluster in the Pearl River Delta.



2.2 Ensure the security of potable water and operation of wastewater treatment system; quality of water environment is to be remediated comprehensively

- In respect of potable water, the quality of effluent from local water treatment plant has been affected by the saline tide in recent years. Meanwhile, because the raw water for the potable water of Macao is supplied from mainland, regional cooperation and coordination becomes an important part to ensure the raw water quality and water resources protection in Macao.
- At present, Macao Peninsula Wastewater Treatment Plant (WWTP) is under a relatively higher pressure from wastewater treatment, while other WWTPs receive relatively less wastewater. This situation has caused some impact on the stable operation of the entire wastewater treatment system in Macao.
- Monitoring data in recent years indicated that the quality of coastal waters in Macao has shown a trend of deterioration year by year. Moreover, cases of dead fish even occurred in some waters in the past few years. Among the coastal waters, the Canal dos Patos, North Patane Bay and Inner Harbor are more seriously polluted. In addition, there are still problems such as mistaken connection of pipelines and illegal discharge of sewage due to the drainage network not yet being renovated and optimized. Meanwhile, the rainwater run-off pollution has also caused some burden on the coastal waters. It can be seen that the pollution of coastal waters is in urgent need of systematic and holistic study and improvement to drive the execution of related treatment measures.





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2.3 Strengthening the reduction and resourcing of solid wastes

- The recovery rate of domestic solid waste through the existing waste recycling system in Macao was estimated to stand at 18.6% in 2009, which was relatively low compared to the surrounding regions. However, the quantity of solid waste generated was on constant increase.
- In the background of fast socioeconomic growth in recent years, the solid waste generated by enterprises increased correspondingly, but the standards and norms governing enterprises' waste generation were relatively insufficient; in combination with the lack of relevant economic control measures, a majority of the small and medium enterprises had a limited input into environmental protection, causing their poor performance in pollution treatment and resources recycling and reuse.
- According to the results of the Macao public environmental awareness surveys in 2010 and 2011, although residents have realized that each one has a part to play in environmental protection, a relatively low percentage of them actually take actions in their daily life. There is still a relatively larger room for improvement especially in respect of the separation of domestic solid waste, purchase of products with eco-labels and rejection of over-packaging. These reflect the insufficient policies in reducing and resourcing solid wastes in Macao.

2.4 Increased pressure in ecological environment, urging for the improvement in preservation of ecological environment

- The results on the status quo analysis of land use in Macao showed that the land used for construction has increased significantly in recent years, but the coastline suitable for ecosystem development has been reducing gradually. Meanwhile, the land use structure has also undergone great changes, resulting that the land used for ecological purpose is squeezed continuously by urban development.
- Statistical data of recent years indicated only a limited growth in green area of Macao. Moreover, the fragmentation of landscape and blockade of the passage caused a very high pressure on animals' inhabitation and foraging.
- There is not much indigenous vegetation in Macao, however, quite many cases of alien species invasion and the plague of plant diseases and pests have been observed in recent years, affecting the normal growth of indigenous ecosystem.

2.5 With the ambient noise pollution worsening, it is necessary to reduce the level of traffic noise pollution and strengthen management of the community noise

- Existing monitoring data indicated that traffic noise was one of the major sources of noise pollution in Macao. Because the transportation system is relatively dense in Macao, particularly in the Macao Peninsula, and the buildings are in close proximity to the roads, it is relatively hard to eliminate the effect of traffic noise on overall ambient noise. As the volume of transportation increases further in the future, it is foreseen that the traffic noise pollution will be more salient.

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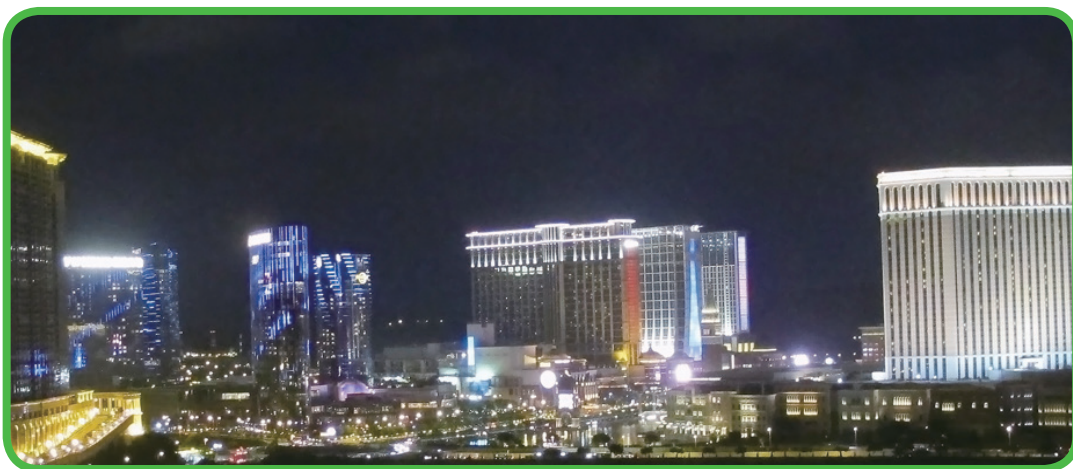
- With the booming economy, the prosperity of tourist gambling industries and the increase of population density, various districts in Macao are subject to certain degrees of impact by noises from community, industrial and commercial activities as well as construction works. In fact, the total number of complaints about noise disturbance in Macao was on the increase in recent years, indicating the deterioration of the overall ambient noise environment in Macao.

2.6 Strengthening the management and supervision of the environmental radiation is needed

- As a highly developed city, the number of electromagnetic radiation sources, such as radio and television towers, telecommunication, radar, navigation equipment, high-voltage power transmission and transformation equipment, transportation system, and industrial, research and facilities will inevitably increase. It is expected to have more and more electromagnetic radiation sources located in close vicinity to residential and office buildings, which might cause a potential threat to the life and health of local residents.

2.7 More attention should be paid on the light pollution problem

- As a city taking tourism and gambling as the key industry, the lighting of advertising signs on the streets, decorative lighting on exterior walls of buildings, large-screen displays and landscape lighting, which are everywhere on the street in Macao, indicates the prosperity of the city on one hand, however, on the other hand, these over-bright lighting in the the close vicinity of residents may have not only an adverse effect on human health and ecosystem, but also waste of energy.

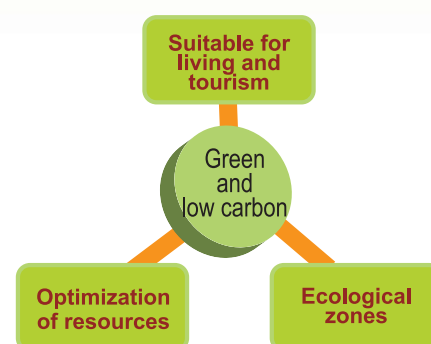


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3. Visions of the Planning

“Building a Low Carbon Macao, Creating Green Living Together” is the vision of the *Environmental Planning*. In light of this vision, Macao will continuously strive for a low carbon economic development mode featuring low pollution, low emissions and environmental friendliness, in order to avoid the consumption of enormous environmental resources during economic and social development. The vision above has different connotations on the three levels as follows:

- Under the guiding “people-oriented” principle, it means to create a beautiful, leisurely city suitable for living and tourism by building low carbon communities based on the core concept of low energy consumption, low pollution and by optimizing spatial environment;
- On the level of the city in general, it means to assimilate resources conservation and environmentally friendly lifestyle, consumption and work modes into all walks of life to build a society, which practices resource-conserving, recycling and environmental friendliness;
- On the level of regional coordination, it means to create a quality living area with good environment in the Pearl River Delta region through joint prevention and control and the coordination in environmental and ecological development, connecting all the joints on the green network (green roads and spaces) and the blue network (coastal spaces) in the whole region.



4. Four Principal Concepts of the Planning

The *Environmental Planning* is based on four core principal concepts, namely, sustainable development, low carbon development, public participation and regional cooperation, with improving the living environment and ensuring residents’ health as the important goal of the *Environmental Planning*.

4.1 Concept of sustainable development

This planning adheres primarily to the sustainable development concept that the economic and social development should not sacrifice the environment. Taking the improvement and protection of local and regional environmental quality as the starting point, by strengthening environmental protection and ecological construction, it aims to ensure the health and security of local and regional living environment, promote interaction, harmony and synchronized development among environmental protection, society and economics, achieving the coordination among the improvement of environmental quality, optimization of economic growth pattern, promotion of social and economic development, as well as regional resources and environmental carrying capacity.

4.2 Concept of low carbon development

This planning follows the concept of low carbon development to formulate environmental protection strategies and action plans featuring the establishment of low carbon communities. In the area of production and consumption, strategies and action plans regarding the establishment of a low carbon production and consumption system are proposed, in accordance with the regional positioning of Macao as a “Global center of tourism and recreation”, in order to promote the development of low carbon city, low carbon region, and achieve a “win-win-win” situation among economic, social development and ecological conservation.

4.3 Concept of public participation

This planning lays emphasis on the concept of public participation during the formulation and implementation of the *Environmental Planning*, enabling public participation in the entire process of the planning including formulation, implementation and performance assessment. For this purpose, the Government needs to formulate practicable environmental protection policies, collect and adopt different opinions, experience and capabilities in the process of planning, execution and decision making; the enterprises need to take up the responsibility of reducing pollution and resources consumption; and the general public needs to take part in saving resources, waste reuse and recycling and nature conservation. Through the cooperation of government agencies, enterprises and general public, by taking the responsibility of each party, this makes environmental protection as the social consensus and vogue, to achieve the planning vision of building low carbon Macao.

4.4 Concept of regional cooperation

This planning proposed the cooperation with other regions in the Pearl River Delta on multiple dimensions and levels, including joint prevention and control of air pollution, cooperation in the prevention and treatment of water pollution, establishment of a cooperation mechanism for waste recycling and reuse as well as hazardous waste treatment, implementation of environmental information sharing and joint construction of ecosystem. At the meantime, planning on transportation and urban development has also been proposed in Macao. The present *Environmental Planning* is to be in coordination with those local planning projects, apart from strengthening the coordination with regional planning, promoting the environmental protection works and enhancing jointly the environmental and residential quality of Macao.

5. Connotation of the Planning

The present *Environmental Planning* incorporates three principal themes, namely “Optimizing the Environment Suitable for Living and Tourism”, “Promoting a Conservation and Recycling-oriented Society” and “Integrating into the Green and Quality Region”, with the implementation of district-based and category-based management according to the three environmental functional districts, puts forward action plans for the 15 areas of concern and establishes 11 green indicators for the *Environmental Planning*. The main contents of this planning include the following respects:



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- **Attaching equal importance to the conservation of ecological environment and pollution prevention and control**

After making scientific survey and studies and sorting out the entire environmental problems in Macao, on the basis of taking public opinions and recommendations into consideration, this planning formulates, in a forward-looking way, the short-term (till 2012), medium-term (till 2015) and long-term (till 2020) action plans which attach equal importance to the conservation of ecological environment and pollution prevention and control.

- **Putting forward the concept of environmental functional district management**

This planning puts forward the concept of environmental functional district management for the first time. It divides Macao into three environmental functional districts, namely, “District for strict environmental protection”, “District for environment oriented development” and “District for environmental optimization and control”, and prompt the control of the intensity of development in different areas via various measures, in order to reduce the impact of social and economic development on the environment.

- **Formulating green indicators for the *Environmental Planning***

11 green indicators for the *Environmental Planning* are formulated to push forward the short, medium and long-term environmental protection work, strive for the implementation of the planning goals stage by stage, and enhance the environmental quality gradually.

- **Emphasizing mutual participation of the general public**

This planning emphasizes that the environmental protection work relies on participation of the government, enterprises and general public to meet the preset goals of the environmental protection policies and measures.

- **Rolling approach to the implementation of the planning**

This planning adopts the rolling approach to the implementation of the planning, namely, the “Planning – Implementation – Evaluation – Amendment - Updating”, to ensure continuous improvement of the planning in the process of social development.

- **Guaranteeing the implementation of the planning**

The implementation of the action plans of the *Environmental Planning* is guaranteed via different execution and supervision mechanisms to achieve the vision of “Building a Low Carbon Macao, Creating Green Living Together”.

- **Coordination with other plans**

This planning will cope with other planning such as the urban and transportation plans of Macao, as well as regional plans such as “*Outline of the Plan for the Reform and Development of the Pearl River Delta (2008-2020)*” and the “*Regional Cooperation Plan on Building a Quality Living Area*”, to integrate the low carbon and environmental concepts into all aspects of social development in Macao.

6. Goals of the Planning

6.1 Promotion of the objectives in three phases

The present *Environmental Planning* will be executed in three phases, namely, the short term (2010-2012), medium term (2013-2015) and long term (2016-2020).

Short-term goals (2010-2012):

By formulating different measures for prevention and control of air pollution; conducting overall evaluation on the quality of coastal waters; establishing water supply warning, forecast and emergency response mechanisms; upgrading environmental infrastructures; encouraging and promoting conservation of energy and water resources; promoting separation and recycling of domestic solid waste; reducing energy consumption per unit of GDP; enhancing greening development; and promoting energy saving lighting equipment and design, the environmental quality will gradually be improved and the environmental management ability will be enhanced.

In response to some extremely urgent environmental problems, the DSPA has already begun to implement relevant short-term action plans while conducting the environmental planning.

Medium-term goals (2013-2015):

Through controlling exhausts from motor vehicles and major industrial air pollution sources; continually promoting energy and water conservation and undertaking comprehensive remediation of coastal waters; establishing the solid waste separation and recycling system; intensifying the construction of solid waste treatment facilities; supervising community noise; improving the environmental monitoring network; preventing deterioration of ecosystems; and strengthening regional cooperation in environmental protection, etc., the environmental pollution will basically be under control and a good security pattern for ecological environment will preliminarily be formed. Moreover, rules, regulations and technical standards for environmental management will gradually be formulated, enhancing the environmental management ability to a more advanced level.

Long-term goals (2016-2020):

Through continual promotion of green commuting; establishing water recycling systems; improving the management system for the whole solid waste handling process; carrying out comprehensive measures aimed for reducing, resourcing and detoxification of waste; safely disposing hazardous waste; stepping up prevention and control of noises from transportation, industries, commercial activities and construction; strengthening supervision over prevention and control of light pollution; enhancing greening development; establishing the management system for environmental functional districts; and improving the regional environmental cooperation mechanism, etc., the regional environmental quality will further be improved, a harmonious, healthy and balanced ecosystem will basically be formed, and a relatively complete system of laws, regulations and technical norms for environmental protection will gradually be established.

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6.2 Green indicators of the planning

In order to better evaluate the degree to which the goals set in the *Environmental Planning* are met and keep track of the execution for the *Environmental Planning*, the present document sets forth 11 quantified green indicators, in respects of the utilization of resources and energy, environmental quality, pollution control and recycling, and ecological conservation. Specifically, they include the following: energy consumption per unit of GDP; utilization rate of clean energy; utilization rate of recycled water; annual compliance rate of ambient air quality; total evaluation index of coastal waters; centralized treatment rate of urban domestic wastewater; average reduction of regional ambient noise; recovery rate of recyclable waste; recycling rate of special and hazardous waste; centralized recovery rate of electronic and electrical equipment waste; and rate of urban green area.



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Indicator system for the Environmental Protection Planning of Macao Special Administrative Region

 Utilization of resources and energy					
Indicator	Unit	2009	2012	2015	2020
 Energy consumption per unit of GDP	TJ / 100 million MOP	17.0	12.0	10.0	8.5
 Utilization rate of clean energy	%	12.6	18	25	35
 Utilization rate of recycled water	%	-	-	<2	4
 Environmental quality					
Indicator	Unit	2009	2012	2015	2020
 Annual compliance rate of ambient air quality ¹	%	98	98	≥98	99
 Total evaluation index of coastal waters	/	0.77	0.77	0.75	0.70
 Pollution control and recycling					
Indicator	Unit	2009	2012	2015	2020
 Centralized treatment rate of urban domestic wastewater	%	95	95	97	99
 Average reduction of regional ambient noise	dB(A)	0	0.2	1.0	2.3
 Recovery rate of recyclable waste	%	18.6 ²	20	30	45
 Recycling rate of special and hazardous waste	%	4	5	10	15
 Centralized recovery rate of electronic and electrical equipment waste	%	-	-	20	60
 Ecological conservation					
Indicator	Unit	2009	2012	2015	2020
 Rate of urban green area	%	39.1 ³	41.5	43.5	45.0

1 Since the 2nd of July of 2012, the standard for air quality index of Macao enhanced to the interim target-1 (IT-1) recommended by the World Health Organization (WHO). Owing to the lack of sufficient historical data the standard in year 2009 will be taken as the base year in the relevant planning goals, and will be subject to change according to the amendment in the future upon overall evaluation in view of actual conditions.

2 Since the waste collected in Macao has been basically exported for recovery, the waste recovery rate of 2009 is calculated with reference to the DSEC import and export data, including statistics of the quantity of paper, plastics, metals, and etc.

3 According to the categories of green spaces specified in the “*Planning and Study on Park Construction and Green Space System in Macao*”, there was a significant change of the calculation of green area in Macao in 2010. Thus, taking 2010 as the base year, the planning value is calculated on the basis of the Environmental Statistics 2010 and the foresaid data.



Chapter I

Significance of the indicators:

(1) Indicators for utilization of resources and energy

The indicators for utilization of resources and energy mainly address the consumption and utilization of energy and water resources in the process of urban development, comprising three indicators as follows:

- **Energy consumption per unit of GDP**
It is defined as the final energy consumption per unit of gross domestic product in a region, and represented by the ratio of final energy consumption to local GDP.
- **Utilization rate of clean energy**
It is defined as the ratio of clean energy consumption to the final energy consumption in Macao.
- **Utilization rate of recycled water**
It is defined as the ratio of recycled water to the total wastewater discharged, and is used to measure the level of wastewater reutilization.

(2) Indicators for environmental quality

The indicators for environmental quality mainly represent the quality of various environmental elements (e.g. air and water environment, etc.), comprising two indicators as follows:

- **Annual compliance rate of ambient air quality**
It is defined as the ratio of the number of days recorded, having an air quality index being “Good” or “Moderate” to the total number of days in a particular year, by the automatic air quality monitoring stations in Macao.
- **Total evaluation index of coastal waters**
It is defined as a comprehensive evaluation of the 11 coastal monitoring points (except the reference points) in Macao, in reference to the standards for the Category II water quality under the *Sea Water Quality Standards* (GB3097-97) of China.

(3) Indicators for pollution control and recycling

The indicators for pollution control and recycling mainly represent the control and recycling situation of pollutants such as wastewater and solid waste, etc., comprising the following five indicators:

- **Centralized treatment rate of urban domestic wastewater**
It is defined as the ratio of domestic wastewater treated with centralized facilities to the total domestic wastewater discharged, and representing the level of collection and treatment of domestic wastewater.

- **Average reduction of regional ambient noise**

It is defined as the noise level reduced relative to the level of regional ambient noise predicted by modelling under the “Zero scenarios where no improvement measures are taken”⁴, in a particular year under the short, medium or long-term planning.

- **Recovery rate of recyclable waste**

It is defined as the ratio of recovered recyclable waste to the total urban solid waste, and is used to measure the level of waste recycling.

- **Recycling rate of special and hazardous waste**

It is defined as the ratio of the special and hazardous waste recycled and treated in an environmentally sound manner to the total special and hazardous waste disposed.

- **Centralized recovery rate of electronic and electrical equipment waste**

It is defined as the ratio of the total quantity recovered of the electronic and electrical equipment waste recyclable to the total quantity of the electronic and electrical equipment waste generated, and is used to measure of the level of recycling of the electronic and electrical equipment waste.

(4) Indicator for ecological conservation

The indicator for ecological conservation mainly represents the level of ecological protection and establishment in the region. It comprises one indicator as follows:

- **Rate of urban green area**

It is defined as the ratio of the total area of different types of green spaces in a city (including green space for leisure and recreation, green space for traffic infrastructure, nursery for urban greening and green space for ecological landscape, etc, excluding waters) to the total area of the city.

⁴ The “Zero scenario where no improvement measures are taken” refers to the quality of environmental elements in a particular year of the planning phases forecasted by mathematical models, based on existing states of each elements and on the assumption that no control or improvement measures are taken.

Chapter II

Promoting Environmental Functional District Management

In spite of the small land area of Macao, there are still various kinds of land parcels or districts with different functions or uses. Since the environmental impacts posed by different districts vary, and also their contribution to the entire ecosystem of the city, it is inappropriate to impose same environmental management systems and environmental quality standards on all these different areas. In view of this fact, the present *Environmental Planning* conducts for the first time the environmental functional district, which divides the entire territory of Macao into three types, namely, “District for strict environmental protection”, “District for environment oriented development” and “District for environmental optimization and control”, according to their environmental features, in order to implement better environmental strategies step-by-step with well classification in the future. On this basis, this planning puts forward suitable development orientations for different functional districts, and will gradually establish corresponding quality standards for air, noise, water and other environmental elements in the respective districts. It is expected to achieve a final balance between urban construction and ecological conservation by introducing environmental protection measures during urban development.

1. Management of Three Environmental Functional Districts

In view of the environmental features of single environmental element such as air, water, ecology and noise, etc., the origin of environmental problems and the status quo of the environment in Macao as well as the requirements for future development planning, the present *Environmental Planning* undertakes environmental functional district based on each environmental element, for the purpose of protecting and improving regional environment. Based on the functional district by environmental elements, it then takes into consideration on natural conditions, social and economic standing, and environmental management needs of Macao, as well as the difference of various areas in service functions, ecological sensitivity and the impact of human activities, so as to formulate the classifying standards for the environmental functional districts.

1.1 District for strict environmental protection

It is referred to areas which are relatively more ecologically sensitive, with the ecological environment extremely susceptible to damage and hard to be recovered once damaged, and which, therefore, must be strictly protected and restricted in respect of construction. The precious natural resources in such areas shall be protected by forestalling any development activities which are by no means related to environmental protection and construction of the ecosystem.

1.2 District for environment oriented development

It is referred to areas with ecological sensitivity in the intermediate range and the ecological environment is relatively vulnerable. For this reason, such areas are suitable to be moderately exploited under the guidance of relevant environmental management guidelines or standards. Considering the fact that the older districts in Macao have almost been fully developed and there is a significant difference between the development of the old and new districts, strategically, the older districts shall be gradually renovated and developed with restrictions, while the newer districts shall be moderately developed under the guidance of urban development planning, in an effort to plan the urban development reasonably. While developing these areas, greening efforts shall also be exerted to protect the urban landscape and various natural landscape elements and cultural elements.

1.3 District for environmental optimization and control

It is referred to areas where development can be moderately optimized and controlled on condition that such development will not result in the deterioration of environmental quality or damage to the ecological functions. Considering the relatively serious pollution caused by facilities in such areas, strict control on pollution should be conducted through optimizing the local industrial layout, adjusting the structure and treating industrial pollution sources. In the meantime, measures should be taken vigorously to improve and elevate the regional ecological functions.

2. Gradual Optimization and Implementation of the Environmental Functional Districts

2.1 Short-term (2010-2012):

Relevant studies for deepened and phase-by-phase implementation of the environmental functional districts are to be conducted. According to the needs and requirements of the environmental functional districts for the protection of ecological environment, and also taking into consideration the socioeconomic development in each environmental functional district, corresponding management guidelines for each district would be formulated and effective environmental protection measures would be promoted in the respective district.

2.2 Medium-term (2013-2015):

Through gradually putting in place the environmental functional district management and optimizing the relevant environmental quality standards and pollutant emission standards, gradually impose the corresponding quality standards and management requirements in each environmental functional district to prevent and control pollution, and to explore the requirements for the implementation of environmental functional district management in the process of socioeconomic development and project construction.

2.3 Long-term (2016-2020):

To incorporate the environmental functional district management into the routine environmental management system for systemic management, implement the environmental functional districts in an all-round way, and apply classified control and guidance over the environmental quality of different districts and different environmental elements according to the environmental quality standards for the environmental functional districts based on single element⁵; to make the environmental quality in each environmental functional district achieve the environmental quality standards by implementing major action plans and projects; and to exercise supervision and provide guidance for social economic activities and projects with the view of improving environmental quality and environmental functional districts management, and provide guidance for and amendment to the long-term major action plans and projects in respect of environmental protection.

⁵ The environmental functional districts based on single elements mainly include the atmospheric environment, water environment and acoustic environment.

Chapter III

Optimizing the Environment Suitable for Living and Tourism

The main purpose of “Optimizing the Environment Suitable for Living and Tourism” is to provide a beautiful and comfortable environment for citizens and tourists in Macao. It is a crucial factor for driving Macao to be the “Global center of tourism and recreation” and toward sustainable development, in order to turn Macao into a low carbon, environmentally friendly city suitable for living and tourism. For this purpose, efforts are to be carried on in the following seven areas of concern, including improvement of air quality, enhancement of water environment quality, treatment and disposal of solid waste, control of noise pollution, conservation of ecological environment, prevention and control of light pollution, and protection of environmental radiation. Effective actions would be taken in respect of the prevention and control of environmental pollution, conservation of the ecological environment, and strengthening of the environmental management, etc., so as to improve the overall environmental quality of the region, foster an atmosphere for green living, and achieve the goal of optimizing the environment suitable for living and tourism.



1. Improvement of Air Quality

Strategic Directions

1.1 To alleviate air pollution in the transportation sector

To advocate public transport priority and green commuting, curb the increasing trend of motor vehicles, and promote environmentally friendly vehicles gradually by means of changing the structure of vehicle fuels, promoting tax preferences for environmentally friendly vehicles, imposing stricter exhaust emission standards for motor vehicles, gradually eliminating vehicles with serious pollution, and promoting development of emission control technologies, etc.

1.2 To strengthen supervision over the management of atmospheric environment

To formulate emission standards for major air pollutants, strengthen networking and automation of various online monitoring data on air pollution sources, undertake surveys on stationary air pollution sources and figure out the inventory of pollution sources, and gradually carry out district-based management of atmospheric environmental functional districts.

1.3 To control major air pollution sources

To control emissions from scattered pollution sources such as cooking fume from restaurants and gasoline vapor from gas stations by formulating technical guidelines and emission standards and strengthening supervision, and to control emissions from major air pollution sources by engineering, technical and managerial measures.



2. Enhancement of Water Environment Quality

Strategic Directions

2.1 To ensure security of potable water supply

To improve the liaison and coordination mechanism between Guangdong Province and Macao, protect the environment of potable water sources and ensure security of the water supply.

2.2 To construct and renovate wastewater treatment facilities

To accomplish the capacity expansion and upgrading of the wastewater treatment plants (WWTPs), renovate the wastewater piping in the old districts of the city, and strengthen the wastewater treatment planning for the new town reclamation zone.

2.3 To strengthen the protection for coastal water environment

To gradually undertake prevention and control projects for point source and non-point source pollution of the coastal waters on the basis of relevant study results, conducting remediation projects on major polluted waters.

2.4 To gradually improve the water environment monitoring network

To construct the water environment monitoring and supervision system, including monitoring network for potable water sources protection and coastal waters, and actively promote cross-regional automated online monitoring of water quality.



Chapter III



3. Treatment and Disposal of Solid Waste

Strategic Directions

3.1 To optimize the end-of-pipe treatment facilities

To promote environmentally sound treatment and resource recovery for the sludge generated from WWTPs, plan and construct new fly ash landfill with due criteria, and upgrade the treatment processes of the old refuse incineration plant.

3.2 To strengthen the whole-process supervision and management of solid waste

To manage solid waste separation according to the quantity, type and nature of the solid waste generated, strengthen supervision on hazardous wastes, formulate pollution prevention and control guidelines for the solid waste, and gradually introduce the “Polluter pays principle” and the “Producer responsibility scheme”, and establish a complete solid waste information management system.

3.3 To establish a special and hazardous waste recycling and innocuous treatment management system

To establish a relatively complete management system for the special and hazardous waste by establishing an electronic and electrical equipment waste recycling system and a mechanism promoting reutilization of special wastes such as scrapped tires, and strengthening the innocuous treatment of poisonous or harmful domestic waste, etc.



4. Control of Noise Pollution

Strategic Directions

4.1 To optimize the monitoring system for acoustic environmental quality

To establish a monitoring system for acoustic environment which will help the management department understand better the state of noise pollution, provide bases for decision making concerning the acoustic environment protection and feed data for different factor analyses related to noise, etc.

4.2 To control noise sources

To put noise under control from the following perspectives, namely, the control of noise sources, the control of noise transmission channels, and the protection of noise-sensitive receivers; formulate the Regulation on the “*Prevention and Control of Ambient Noise*”, strengthen the control of noise from piling works and community activities, increase publicity and education targeting all social sectors to reduce noise disturbances, and take various measures to control noise from industry, commerce, traffic and construction.

4.3 To reduce noise at the stage of urban planning

To reduce noise at source during the stage of urban planning, and manage the acoustic environment by preventive means such as environmental impact assessment and green design.



5. Conservation of Ecological Environment

Strategic Directions

5.1 To plan and deploy the green areas reasonably

To establish an urban ecosystem network consisting of green points (greening nodes), lines (linear greening and corridors), areas (parks and leisure zones), spaces (vertical greening) and rings (coastal greening corridor around the islands).

5.2 To strengthen the maintenance of ecological and environmental resources and cultural heritage districts

To make holistic investigation into local ecosystems, to implement district-based protection by dividing them into different environmental functional districts according to their nature and the protected targets, and to apply protective measures for the sensitive ecosystem, together with continual monitoring.

5.3 To strengthen protection of animals and plants

To preserve the sites of inhabitation, foraging and propagation for animals, maintain and enhance the diversity of plants, and to retain or open up passages for animals to migrate during urban planning and construction according to the characteristics of different species.



6. Prevention and Control of Light Pollution

Strategic Directions

6.1 To formulate light pollution control measures and relevant regulations

To provide regulations for the brightness of large-area decorative lighting and the protective distance between them and the residential areas, hospitals and parks, and to formulate control measures and other regulations for large-scale lighting, decorative lighting, advertising signs and outdoor electronic displays, etc.

6.2 To promote application of green lighting products and devices

To encourage the use of green lighting products and modes via incentive systems and economic tools, and to promote the application of green lighting products and devices.

6.3 To prevent and control light pollution through architectural design

To prevent and control the light pollution from glass curtain walls; and specifically, to control and manage the quantity of such walls in view of the environment, climate, function and planning requirements, and also to strengthen the environmental design, and utilize green building materials.

Chapter III



7. Protection of Environmental Radiation

Strategic Directions

- 7.1 **To establish a comprehensive radiation management system**
To enhance the ability to supervise the radiation protection and establish a radiation emergency response system.
- 7.2 **To strengthen radiation security management and establish a radiation monitoring network**
To establish a comprehensive environmental management system on radiation, and to strengthen the monitoring of potential pollution sources and radiation in the environment.
- 7.3 **To popularize knowledge about radiation and strengthen education on environmental protection**
To enable people from different social sectors to have a correct view on electromagnetic radiation and radioactive pollution through publicity and training.



Major Action Plans for Optimizing the Environment Suitable for Living and Tourism

Major Action Plan 1 Effective Prevention and Control of Environmental Pollution

(1) Strengthen the control and management of air pollution

Short-term : to introduce and promote the use of environmentally friendly vehicles; provide tax subsidies for new vehicles in compliance with environmentally friendly emission standards; promote the application of more environmentally friendly buses for public transportation; promote the application of exhaust particulate filter devices for heavy duty vehicles and carry out studies on policies aimed to eliminate vehicles with heavy pollution; to study the formulation of gas exhaust emission standards for newly-imported and in-use vehicles, improve laws and regulations governing gas exhaust emissions of vehicles; to study and formulate standards for lead-free gasoline and light diesel used for vehicles, and review and optimize relevant regulations constantly; to control the cooking fume from restaurants and conduct studies on cooking fume emission standards and supervision strategies; to conduct studies on the formulation of indoor air quality management guideline for general public places; and to conduct the preliminary works for the survey of stationary air pollution sources.

Medium-term : to establish the air quality environmental functional district system and formulate relevant environmental quality standards; to optimize the public transportation system and to effectively integrate the light rail transit, bus, taxi and pedestrian systems; to install rapid exhaust testing devices for vehicles at traffic hotspots to monitor continually the gas exhaust emission of vehicles in motion; to formulate indoor air quality standards and encourage schools, hotels, government agencies and enterprises to carry out indoor air quality monitoring and improvement plans; to conduct all-round investigation into and study on the air pollutant emissions from industrial and commercial venues; to establish archives of major air pollution sources, databases of pollution sources and platforms for environmental statistics; to carry out studies on air pollutant emission standards for industrial and commercial venues with relatively serious pollution and corresponding pollution control strategies; to conduct studies on carbon emission reduction and low carbon development for Macao to help realize the low carbon development vision; to constantly promote and improve the exhaust emission control measures for heavy oil power generation units to reduce the air pollution caused by power generation; and to gradually optimize the online monitoring data gridding and automation for various air pollution sources on the basis of the existing online monitoring system.

Long-term : to control the number of motor vehicles properly and continue to eliminate the high-pollutant emitting vehicles; to optimize the transportation network and structure to reduce the air pollutant emissions from the transportation sector; to introduce and promote environmentally friendly vehicles more vigorously; to formulate air pollutant emission standards for industrial and commercial venues with relatively serious air pollution and the corresponding control measures; and to gradually push forward and improve the atmospheric environmental functional district system.



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(2) To protect water resources and improve water environment

Short-term : to establish water supply (saline tide and emergency) forecast alerting, and emergency response mechanisms; to carry out study on pollution control of the Canal Dos Patos, undertake survey on the status quo of its water environment, and formulate a comprehensive remediation plan for the canal; to expand the capacity and upgrade the technologies of the Macao Peninsula WWTP, and complete the effluent quality improvement and relevant projects for the Taipa WWTP; and to conduct holistic water quality evaluation and improvement strategies for coastal waters, make investigation and overall evaluation on the coastal aquatic environment; and to plan for the coastal water environment monitoring network.

Medium-term : to improve the potable water sources management system, ensure the security of potable water supply in Macao, and undertake pollution prevention and control projects for local water sources protection zones (ponds and reservoirs); to formulate and implement gradually the pollution remediation plan for the Canal Dos Patos and carry out the pollution remediation project orderly; to carry out study on coastal water pollution simulation and push forward projects for the prevention and control of coastal waters pollution and the protection of coastal ecosystems; to conduct study on the sewage interception projects; to control the surface runoff pollution in Macao, and adopt optimized management measures which are suitable for Macao, according to the district-based control of surface runoff pollution; to undertake the sewage piping reconstruction project and the rainwater/sewage separation mechanism for the old districts of the city; to amend the “*Regulation of Water and Wastewater Drainage of Macao (RADARM)*” and improve the water environment standards of Macao SAR gradually; to establish technical norms for surface water and wastewater monitoring and formulate evaluation and screening methods for priority pollutants; to conduct survey on water pollution sources and establish water pollution sources databases; to carry out study on water pollutant discharge reporting system as well as the online monitoring of pollution sources and the risk response plans, strengthen the supervision over the industrial and commercial point source pollution.

Long-term : to strengthen continually the protection of potable water sources, including undertaking prevention and control projects for pollutions in the protected zones, ecological recovery and establishment projects, and environmental emergency, alerting and management capacity building projects; and to reinforce the pollution emergency response plans.

(3) To establish the management system and safe treatment and disposal of solid waste

Short-term : to optimize the refuse incineration plant constantly, undertake technological upgrading for the old plant and raise the emission standards; to formulate long-term monitoring mechanisms and relevant measures for the fly ash landfill to improve the environmental quality within and surrounding the landfill; to conduct studies and demonstration projects on devices for recycling of typical electronic waste and explore the efficiency of those devices as the pre-treatment for electronic waste recycling; to carry out preliminary studies on the solid waste billing system, promoting the reduction and recycling of solid wastes; and to conduct study and investigation on restricting the production and use of plastic bags in Macao.

Medium-term : to plan and construct new fly ash landfill in compliance with due criteria on the basis of technical evaluation and reasonable siting; to establish a safe treatment system for the hazardous waste; to strengthen the environmentally sound treatment process and disposal of toxic and harmful domestic wastes and construct the environmentally sound treatment facilities for scrapped light tubes and storage batteries, etc; to strengthen the management of electronic and electrical equipment waste and design plans for the electronic and electrical equipment waste recycling and treatment which are suitable for Macao; to explore the establishment of a management mechanism for the reutilization of scrapped tires; to optimize and update continually various types of solid waste treatment technologies and introduce more effective and advanced waste treatment technologies and facilities, which can help promoting the development of environmental protection industries.

Long-term : to conduct study on gradually introducing the “Polluter pays principle” and “Producer responsibility scheme” policies through management standards, billing systems and guidelines for solid waste recycling and treatment; to formulate technical norms for the hazardous waste treatment and establish a safe collection, treatment and disposal system for hazardous wastes; to establish a management system for the closed hazardous waste treatment facilities (e.g. the fly ash landfill); to establish an electronic and electrical equipment waste recycling network, and based on the existing waste recycling system, establish gradually a recycling and treatment system for the electronic and electrical equipment waste and to establish a whole process solid waste information management system.

(4) To control the noise pollution

Short-term : to formulate the Regulation on the “*Prevention and Control of Ambient Noise*” for strengthening the regulation of noise from piling works and community activities; to enhance the environmental awareness of the society by strengthening publicity and popularization of laws on noise prevention in order to reduce the noise disturbances at source; to make investigation on the main low-frequency noise sources or frequency variant facilities, such as air conditioning and ventilation devices, and conduct studies on the control strategies, monitoring methods and standards.

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Medium-term : to intensify noise prevention publicity targeting the decorative works and construction industries, establish partnerships with the industries for joint noise control; integrating with the eco-building guideline, to promote and implement on a trial basis the noise prevention measures for constructions, including putting up temporary noise barriers at the construction site and setting independent temporary noise barriers at the site of noisy construction equipments; to establish and improve the noise control guidelines for the industrial and commercial venues to strengthen the supervision over industrial and commercial noise; to carry out studies on strengthening supervision over the industrial and commercial noise sources, requiring them to utilize low-noise fans and cooling units, together with low-noise or speed-control cooling towers, etc.

Long-term : to properly set noise barriers on flyovers and the above-ground section of the future light rail transit system; to carry out studies on the utilization of noise reducing surfaces for appropriate road sections, and particularly, for the roads in the new districts of the city and those renovated in the old districts; to continue noise supervision after the enactment of the Regulation on the “*Prevention and Control of Ambient Noise*” ; to take districts into consideration in the planning and development of the new districts, preventing projects with a relatively high level of noise from being constructed in the noise sensitive areas, and plan the road system in the new districts reasonably; and conduct studies on the criteria for establishing traffic-calmed areas, and evaluate and select communities in the old and new districts and the world heritage core site which are suitable for establishing traffic-calmed areas.

(5) To prevent and control light pollution

Short-term : to formulate and implement on a trial basis the light pollution control guidelines for advertising signs, decorative lighting of buildings and outdoor electronic displays; and to promote energy-saving green lighting equipment and design, and encourage the application of energy-saving and environmentally friendly lighting equipment, in order to reduce the light pollution while saving energy.

Medium-term : to conduct studies in formulating technical standards for the prevention of light pollution; and to gradually establish the light pollution database and formulate relevant control policies.

Long-term : to formulate technical criteria and standards for light pollution prevention and control in the lighting and construction industries; and to carry out studies in the establishment of light pollution prevention and control supervision system and management procedures.

(6) To protect from the environmental radiation

Short-term : to provide training on nuclear radiation for technicians; and to start the preliminary preparations for the nuclear radiation survey for conducting baseline survey on radiation sources.

Medium-term : to establish the nuclear emergency response plans in collaboration with the public emergency alerting and alarming system; to enhance the understanding of people from different sectors on electromagnetic radiation and radioactive pollution through publicity; and to strengthen the radiation supervision capacity, conduct supervision and management of radiation, increase investment into the environmental radiation management, and improve the relevant management mechanism.

Long-term : to incorporate the users of radiation sources into the scope of radiation supervision and establish a responsibility system and a responsibility-transfer system for the radiation sources management; and to construct safe storage facilities for low radioactivity waste and realize the goal of putting under surveillance and storing the low radioactivity waste safely in the entire territory of Macao.

Major Action Plan 2 Conservation of Ecological Environment

(1) To optimize ecological security

Short-term : to strengthen road greening, develop vertical greening and roof greening to raise the ratio of green area in Macao, in particular on the Macao Peninsula.

Medium-term : to take full advantage of the important construction projects such as construction of the Cotai new districts, renovation of the old districts on Macao Peninsula, construction of the light rail transit system, and development of the new town reclamation zone to optimize the spatial layout of green areas and create green area networks.

Long-term : to organically connect spots of isolated green areas, such as parks, green areas on the street, courtyard gardens and nurseries, etc. through ramp greening, pavement trees, roadside greenbelts and isolation strip greening, etc.; to promote development of the green areas system and green corridors on Macao Peninsula in collaboration with the urban planning, in order to create the “green lung” of Macao; to construct the peninsular and island green belts comprising the coastal, inland lake and water pond greening in the new town reclamation zone; to cooperate with neighboring regions in ecological conservation in order to preserve the regional ecological and environmental resources jointly; as well as to conduct feasibility studies of introducing the ecological compensation system.

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(2) To protect biodiversity

Short-term : to construct bird-watching houses in the Ecological Zones I and II, facilitating the visit and learning of citizens and students; to construct footpaths, with some rare protected plants on both sides of the paths, for studying the nature, exhibiting their roles in ecological conservation and education.

Medium-term : to undertake ecosystem recovery projects; to construct near-shore ecological screens by planting *Mangrove*, in order to maintain ecological balance in the coastal areas and recover the marine ecological environment; to investigate and straighten out rare animal and plant resources in Macao and neighboring regions; to strengthen the management and protection measures for ecological zones; to keep the water exchange between the Ecological Zone I and the outside areas, maintaining the passages for planktons to enter the external waters; and to improve distribution of *Mangrove* in the Ecological Zone II favorable for the inhabitation and propagation of fish, benthos and for the foraging of birds.

Long-term : to properly arrange building layout on the migration route of birds to avoid obstructing the birds from migrating to the wetland; for the lighting planning, to place restrictions on excessively bright lighting in order to avoid dizziness of birds and impacts on their inhabitation; to moderately monitor the impact of land reclamation on the aquatic animals; and to develop the existing green areas into green ecological corridors with rich habitats to ensure the passage of birds within the city.



Promoting a Conservation and Recycling-oriented Society

Saving energy, reducing emissions and low carbon development is one of the priority policies of the Macao SAR Government. It is also an inevitable choice for the sustainable development of Macao. Under the theme of “Promoting a Conservation and Recycling-oriented Society”, actions will be taken in the following five areas of concern: promotion of energy conservation and renewable energy; recycling of solid waste; recycling of water resources; emission reduction of enterprises; and construction of low carbon production and consumption system, with the aim of building Macao into an environmentally friendly, conservation-oriented and low carbon city through actions in respect of saving energy and resources, realization of material recycling and establishment of a low carbon socioeconomic system. For this purpose, based on the major action plans set forth in the consultation document and taking the public opinions solicited into consideration, the present *Environmental Planning* puts forward the short, medium and long-term action plans for promoting a conservation and recycling-oriented society.



1. Promotion of Energy Conservation

Strategic Directions

1.1 To increase the proportion of clean energy

To optimize the energy structure, raise the proportion of renewable energy used, promote application of the solar energy, and establish demonstration projects for solar energy.

1.2 To improve the environmental management system of enterprises

To popularize the environmental management system in enterprises, implement clean production processes, and establish more comprehensive environmental management systems, and tighten supervision over the pollutant discharge of enterprises.

1.3 To promote energy-saving in buildings

To promote energy-saving in buildings, enhance the energy utilization efficiency and increase the application of renewable energy by implementing the guidelines for environmentally friendly constructions.

Chapter IV



2. Recycling of Recoverable Waste

Strategic Directions

2.1 To enhance waste reduction at source

To promote separation and recycling of domestic, industrial and commercial waste and issue corresponding waste separation guidelines and provisions; and to establish an urban waste treatment system based on the principles of “Reduction at the sources, separated collection, classified transportation, recycling and comprehensive treatment”.

2.2 To promote recycling and diversified utilization of waste

To introduce technologies and strategies for reutilizing different forms of waste in a diversified way, for example, establishing the food waste recycling management system and promoting recycling of the construction waste and the bottom ash generated from domestic waste incineration, and to promote cross-border cooperation among Macao, Guangdong and Hong Kong in the recycling of waste resources.



3. Implementation of Water Resources Recycling

Strategic Directions

3.1 To popularize water conservation devices and facilities

To adopt and popularize water conservation devices, to reduce the leakage rate of the water piping, and to undertake actions for water conservation in industrial, domestic, commercial and public facilities.

3.2 To utilize the non-regular water resources

To construct water reclamation plants, formulate guidelines on the utilization of recycled water, gradually expand the scale of water reclamation and the rainwater collection system in the mountain areas and the new districts of the city.



4. Emission Reduction of Enterprises

Strategic Directions

4.1 To popularize environmental management and clean production

To enhance the technology level of industrial and commercial sectors in Macao, popularize environmental management systems, implement clean production processes, reduce the energy consumption per unit output value and pollutant emission of industrial enterprises, and strictly implement the pollutant emission guidelines and regulations for enterprises.

4.2 To improve and promote subsidizing systems for the environmental protection works of commercial enterprises

To improve the “Environmental Protection and Energy Conservation Fund” mechanism in order to enhance its role in driving commercial enterprises to save energy and water and reduce air pollutant emission, etc.



5. Construction of the Low Carbon Production and Consumption System

Strategic Directions

5.1 To advocate green living

To advocate green living styles and enhance the awareness on environmental protection of the citizens; to strengthen water conservation education by formulating and implementing environmental protection education and publicity plans targeting primary and secondary schools and different social sectors; and to drive environmental protection works such as energy conservation and emissions reduction, emphasizing waste separation and treatment, and advocate green products, etc., in order to enhance citizens’ sense of responsibility in environmental protection.

5.2 To develop environmental protection industries

To develop the environmental protection industries by keeping track of the dynamics of international environmental protection industries, and to introduce the newest environmental protection technologies and concepts through holding various international exhibitions and conferences about environmental protection, in order to enhance the environmental management level of local industries.

Chapter IV

Major Action Plans for Promoting a Conservation and Recycling-oriented Society

Major Action Plan 1 Conservation of Resources and Energy

(1) To optimize the energy structure and strengthen the energy management

Short-term : to optimize continually the pollution control technologies in the power generation process, together with the efficiency of natural gas power generation. In addition, increase moderately the proportion of outsourced electricity.

Medium-term : to increase the rate of clean energy utilization by optimizing the energy structure.

Long-term : to promote and encourage the development and application of renewable energies, making them the effective supplementary energy; to undertake demonstration projects for solar energy in public buildings; and to promote the energy audit and assessment system, as well as establish corresponding institutional systems.

(2) To promote energy-saving in constructions

Short-term : to conduct studies on the guidelines for environmentally friendly constructions of Macao and gradually implement those guidelines in public projects on a trial basis.

Medium-term : to apply gradually the environmentally friendly construction technologies in all the public constructions, and promote the application of those technologies to private constructions with potentially more serious environmental impacts; and to disseminate knowledge of energy conservation and resource recycling for green buildings to enterprises and general public through various education and publicity activities, in order to enhance gradually the environmental protection awareness of the construction industry.

Long-term : to apply the relevant guidelines for environmentally friendly constructions to all the private construction projects, and review and update the guidelines in due course, in order to reduce the environmental impact of the buildings themselves and the construction of them through relatively advanced environmental protection measures; and in respect of the planning of the new districts and renovation of the old districts of the city, to enhance the energy utilization efficiency and increase application of the renewable energies through implementing the guidelines for environmentally friendly constructions.

(3) To guide the entire society to save energy

Short-term : to formulate and implement gradually the “*Guideline for Environmental Management in Public Administrations*” in order to push the public administrations to commit to environmental protection behaviors; and to promote eco-purchasing and formulate the “*Guideline for Green Procurement in Public Administrations*” and the “*Suggestions on Environmentally Friendly Product Specifications*”, in order to help the government agencies purchase energy-conserving, water-saving and low-pollution products preferentially and enhance the market of environmentally friendly products.

Medium-term : to constantly optimize and enrich the environmental management guidelines; and to promote the implementation of environmentally friendly behaviors in enterprises.

Long-term : to introduce a market-oriented energy conservation mechanism and promote systematic energy management models, in order to further enhance energy conservation during the operation of the enterprises.

Major Action Plan 2 Realization of Resources Recycling

(1) To recycle the recoverable waste

Short-term : to encourage continually citizens to reduce the quantity of waste produced by incentive means; to separate recyclable waste resources according to the types and publicize the application of recyclable products; to enhance the willingness of the public to recycle waste by incentive means through cooperation with social associations, and to push the public to choose products made of recyclable materials of their own accord; to promote recycling of the food waste and introduce small-scale food waste treatment systems for preliminary experiments on their application; and to conduct studies on the diversified utilization of construction waste and investigate the recycling of construction wastes.

Medium-term : to enhance the recycling rate of construction waste; to explore billing plans for construction or special waste treatment; to evaluate and formulate the food waste treatment plans most suitable for the reality of Macao; to conduct studies on the feasibility of recycling the bottom ash from incineration; to promote research and development, together with the application of technologies on the transformation and recycling of recoverable materials; to establish gradually a relatively comprehensive waste separation and recycling system; and to carry out studies on the technical standards, cross-border cooperation procedures and supervision measures for recycling of recoverable wastes.

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Long-term : to encourage recycling industries and gradually improve the environmentally sound pretreatment technologies for the recovery of recoverable materials, which are suitable for Macao; and on the basis of complying with national laws and relevant standards, to explore new cooperation models for cross-border recycling of recoverable materials, establishing a cyclic industry system in the greater Pearl River Delta region.

(2) To recycle the water resources

Short-term : to implement tiered pricing system for potable water and formulate preferential policies to encourage enterprises to save water, and enhance the recycling rate of water; to utilize water-conserving devices in public facilities in the first place, and apply them gradually to industrial, commercial and domestic facilities; and to reduce the leakage rate in the water piping system.

Medium-term : to formulate standard for utilization of recycled water and incorporate the standard into the “*Regulation of Water and Wastewater Drainage of Macao (RADARM)*”; to enhance the utilization rate of recycled water in domestic, industrial and commercial sector and reduce the consumption of potable water; and to enhance the re-utilization of recycled water in wastewater treatment plants and implement the production and utilization of recycled water.

Long-term : to further increase the scale of the utilization of recycled water in Macao and construct water reclamation facilities in appropriate WWTPs to enhance the water reclamation production of Macao.



Major Action Plans 3 Construction of the Low Carbon Economic and Social Systems

(1) Emission reduction and low carbon production system of enterprises

Short-term : to establish the “Environmental Protection and Energy Conservation Fund” in order to support the low carbon oriented transformation of commercial enterprises, and particularly, in the projects aimed to improve air quality, save energy and water, etc.; to continue the “Macao Green Hotel Award” activity, and constantly improve the evaluation standards for the award.

Medium-term : to popularize the environmental management system in enterprises and promote implementation of clean production processes; and to form a comprehensive environmental management system for enterprises by gradually formulating the pollutant emission standard system and technical guidelines for pollution treatment, in order to strengthen the supervision over the pollutant emission of enterprises.

Long-term : to strengthen cooperation among Guangdong, Hong Kong and Macao in respect of the clean production of enterprises, circular economy, environmental protection industries, research and development of new and renewable energies, clean energy infrastructure construction, as well as research, development, production and application of new energy vehicles, etc.

(2) To construct a low carbon consumption system

Short-term : to publicize the concept of conservation, low carbon and green consumption, making the low carbon consumption modes and living style deeply rooted in the mind of the public and become a conscious action of them.

Medium-term : to formulate the list of recommended energy-saving products and encourage the government agencies to give such products priority in their purchasing, in order to promote energy conservation actions to the public.

Long-term : to promote the development of environmental protection industries in Macao through international conferences such as the “Macao International Environmental Co-operation Forum & Exhibition (MIECF)”, with the participation of industries and associations, gradually introduce the latest international environmental protection technologies, and enhance the environmental protection management capability of local enterprises to help form a distinctive ecological industry cluster with relatively sharp competitive edge.

Integrating into the Green and Quality Region

In order to achieve the objective of building a quality living area, according to requirements in the “*Outline of the Plan for the Reform and Development of the Pearl River Delta (2008-2020)*” and under the “*Guangdong-Macao Cooperation Framework Agreement*”, the cooperation with the greater Pearl River Delta region and Hong Kong should be strengthened in the next decade. Availing the opportunity of cooperating with the greater Pearl River Delta region, focus should be laid on joint prevention and control of regional pollutions and the formulation of corresponding regional development coordination mechanisms, in order to ensure the coordination and complementarity of regional development. Actions would be taken in the areas such as optimizing the environmental functional district management, strengthening the coordination mechanism for regional environmental security, realization of joint prevention and control of regional pollution, exploring joint treatment and disposal channels of solid and hazardous waste, protecting jointly the ecosystem in the Pearl River Delta region, and establishing collaboratively a low carbon region, etc. Through actions like enhancing the regional coordination on environmental protection and building low carbon cities and region collaboratively, promote the integration of Macao into the green and quality-living region and realize the goal of building a quality-living community. For these purposes, based on the major action plans set forth in the consultation document, the present *Environmental Planning* will be amended according to the public opinions solicited, and put forward the short, medium and long-term action plans in respect to integrating Macao into the green and quality region.



1. Optimization of the Environmental Functional Districts

Strategic Directions

1.1 To implement the environmental functional district management

To incorporate the local environmental functional districts into the routine environmental management system; and to supervise and guide the socioeconomic activities and construction projects, in view of improving the environmental quality and the district-based environmental management, in order to enhance the overall environmental quality in the region.

1.2 To establish quality standards of single environmental element for the functional districts

To implement the district-based management and control by gradually adopting corresponding quality standards for the functional districts by single environmental element (mainly the atmospheric environment, aquatic environment and acoustic environment).





2. Environmental Protection Cooperation in the Pearl River Delta Region

Strategic Direction

2.1 To jointly prevent and control regional pollution

Through joint prevention and control of air pollution, to protect the water resource collaboratively and establish a cooperation mechanism for the recycling of recoverable waste and the treatment of hazardous waste, etc., to enhance the cooperation in environmental protection issues and circular economy in the greater Pearl River Delta region.

2.2 To proactively participate in the establishment of eco-systems in the greater Pearl River Delta region

To proactively participate in the establishment of eco-systems in the greater Pearl River Delta region, in order to construct ecosystems in good status and optimize the ecological pattern.



3. Joint Building of a Low Carbon City and Region

Strategic Directions

3.1 To strengthen the publicity and education on environmental protection and low carbon development

To strengthen the publicity and education on environmental protection and low carbon development, and create an atmosphere of green communities by establishing green schools as a starting point.

3.2 To promote the low carbon concept in urban planning

To follow the low carbon concept in urban planning and layout, and to build low carbon demonstration areas in collaboration with urban planning, and to build a low carbon region integrating with the construction of the quality-living community in the Pearl River Delta region.

Chapter V

Major Action Plans for Integrating into the Green and Quality Region

Major Action Plan 1 Strengthening Regional Cooperation in Environmental Protection

(1) To optimize and implement the environmental functional management

Short-term : to conduct studies on the formulation of the emergency response plans for environmental incidents in Macao.

Medium-term : to formulate environmental functional districts according to single environmental element, in order to support the district-based and category-based management, and formulate environmental quality standards and management guidelines for different functional districts, gradually carry out the district-based environmental management; to optimize the layout of pollutant discharge outlets in Macao for enhancing the environmental capacity, in collaboration with the near-shore environmental functional districts and requirements for seawater of Zhuhai; and to strengthen the environmental monitoring and management for important coastal waters.

Long-term : to construct regional ecological corridors and integrate into the “Green network” in the Pearl River Delta region.

(2) To promote environmental protection cooperation in the Pearl River Delta region

Short-term : to conduct joint studies on hydrology and water quality, analysing and investigating basic data for the hydrology, topography, geology and water quality of local waters and coastal waters of Macao, in order to provide support for the protection of water resources and remediation of water pollution.

Medium-term : to join the Guangdong-Hong Kong-Pearl River Delta region air quality monitoring network, achieving the connection and sharing of data preliminarily; to establish a cross-border framework and mechanism for the treatment of recoverable hazardous and electronic waste; to protect the regional ecological tourism resources by constructing cross-border nature reserves and a comprehensive regional eco-system.

Long-term : to provide supports for the material recycling and resourcing in Guangdong-Hong Kong-Macao by promoting the development and construction of regional circular economy industrial parks, enhancing the development and studies on the reutilization of renewable resources.



Major Action Plan 2 Joint Building of a Low Carbon City and Region

Short-term : to keep track on the environmental awareness and behavior of the Macao citizens by conducting the studies on public environmental awareness survey continuously; to conduct diversified publicity and interaction activities for popularizing the low carbon concept, fostering a highly favorable environment for building low carbon communities and integrating the communities' resources in various aspects; to conduct diversified publicity and education activities on low carbon consumption in communities and schools, etc.; to encourage more schools to participate in the "Green School Partnership Program", enhancing the education on low carbon knowledge in schools; to encourage the teachers and students to take an active part in the environmental supervision and low carbon publicity and education activities in the society, and also adopt the more environmentally friendly teaching modes and equipment; and to constantly conduct the "Environmental Education Design Project" to further promote the environmental education.

Medium-term : to promote environmentally friendly education modes and equipment in schools; and to create a good walking environment and construct energy-saving building blocks in respect of the urban spatial arrangement.

Long-term : to promote the all-round development of low carbon cities and communities by creating demonstrative areas for low carbon city.



Chapter VI

Implementation, Supervision and Guarantee

The purpose of establishing the implementation and supervision system is to ensure the effectiveness and quality of the execution of the *Environmental Planning*. Through formulating the implementation mechanism of the planning, policies and systems for environmental protection, and the guarantee and supervision mechanisms of the execution of the *Environmental Planning*, the Government and citizens can share the content of the planning and review its implementation in a more objective view. Meanwhile, extensive public participation, institutionalized arrangement for supervision and highly transparent information releasing mechanism will also help perfecting the planning, realizing the vision of low carbon city and green living environment and providing solid supports for the execution of the planning.

1. Implementation Mechanism

1.1 Establishment of the planning implementation system

In order to ensure the implementation of the *Environmental Planning*, economic and technical policies and measures in favor of environmental protection would be adopted, harmonizing the *Environmental Planning* and the economic and social development, together with other plans. Also, an implementation system which is led by the Government and supported by the society would be established.

1.2 Coordination of government agencies

The implementation of the action plans of the *Environmental Planning* involves works in various aspects. While the DSPA plays a leading role, other government agencies also have a part to play in mutual cooperation, in order to promote and implement the measures jointly. During the implementation of the planning, a cross-departmental group communication mechanism will be established, coordinating various government agencies to carry out the various action plans under this planning in an orderly manner.

1.3 Public participation and responsibility

Everyone shares the responsibility in environmental protection. In order to achieve the planning vision of “Building a Low Carbon Macao, Creating Green Living Together”, all communities in the society, including the government, enterprises and general public, shall interact and communicate with each other well.

- The primary responsibility of the Macao SAR Government is to lead and promote the implementation of the planning, to formulate regulations and operation modes for achieving the objectives, and to set necessary policy measures and facilities. Meanwhile, the Government also plays a supervisory and managerial role in this process, and through exercising the legal competences and duties in environmental protection, each government agency shall cooperate with each other and participate jointly in supervising the implementation of the *Environmental Planning*.
- Enterprises are important stockholders in the environmental protection, especially at the moment when Macao is right in the rapid social and economic development. Therefore, multiple measures would be taken to promote the voluntary environmental management in enterprises, and pushing enterprises to resolve their own pollution problems properly and to fulfill their social responsibility, and promoting the low carbon economic development.

- The public is the principal participant in the environmental management. The level of environmental pollution and resource consumption is directly affected by the public behaviors. Therefore, each citizen would have the obligation to practice an environmentally friendly consumption style, so as to gradually establish a paradigm of ecological ethics and creation of low carbon green lives.

1.4 To improve the establishment of legislation and standards

Given the fact that there is imperfection and a lack of provision in the existing legal system with the weak norms of legal liability, in order to optimize the environmental management of Macao, legislative work should be planned on the basis of the existing environmental laws, to gradually improve the development of environmental legal system and structure.

- To formulate specific laws and regulations for environmental protection, such as the “*Prevention and Control of Ambient Noise*”, “*Standards for Gas Exhaust Emission from Newly Imported Vehicles*”, “*Standards for Lead-free Gasoline and Light Diesel Used for Vehicles*”, “*Environmental Protection and Energy Conservation Fund*”, and the “*Environmentally Friendly, Energy-efficient Product and Equipment Funding Plan*”, etc., and to strengthen the laws and regulations in respect of air, water and acoustic environment protection;
- To formulate environmental protection standards, such as the emission standards for major air pollution sources, the environmental quality standards and the acoustics norm, etc.;
- To review the table of gaseous pollutant emission parameters to be met by the newly imported heavy and light duty motorcycles on a regular basis, and put forward amendment proposals in response to the actual needs and technological development trend;
- To conduct studies on and promote legislation about environmental management, such as the legislation of environmental licensing and environmental impact assessment;
- To conduct studies on legislation related to the implementation of international environmental agreements and conventions in Macao.



Chapter VI

Table of the Standard and Legislation Research Projects Proposed under the *Environmental Planning (2010-2020)*

Environmental field	Standard and legislation research projects proposed under this planning
Basic	Review of the <i>Law of Environmental Framework</i>
Acoustic Environment	Formulation of the Regulation on the “ <i>Prevention and Control of Ambient Noise</i> ”, [Amendment to <i>Noise Law</i> (Decree-law No.54/94/M)] and Amendment to <i>Acoustics Norm</i> (Order No. 241/94/M)
	Standards of Ambient Noise
Atmospheric Environment	Legislation related to the Protection of Atmospheric Environment
	<i>Standards for Gas Exhaust Emission from Newly Imported Vehicles</i>
	Emission Standards for Major Air Pollution Sources
	Standards for Lead-free Gasoline and Light Diesel Used for Vehicles
	Exhaust Emission Standards for In-use Vehicles
	Standards of Environmental Air Quality
Aquatic Environment	<i>Regulation of Water and Wastewater Drainage of Macao</i> (Amendment)
	Standards of Surface Water Environment
Solid Waste	Legislation related to the Prevention and Control of Solid Waste Pollution
	Standards for Management, Disposal and Treatment of Solid Wastes
Light Environment	Technical Criteria and Standards for Light Pollution

Environmental field	Standard and legislation research projects proposed under this planning
Natural Ecosystem	Regulation for Managing the Nature Reserve
Environmental Management	<i>Environmental Protection and Energy Conservation Fund</i>
	Environmental Impact Assessment System
	Guidelines for Managing the Environmental Planning
International Conventions	Import and Export Control on Persistent Organic Pollutants (POPs)
	Import Control of Hazardous Wastes

1.5 To enhance the environmental management ability of the government

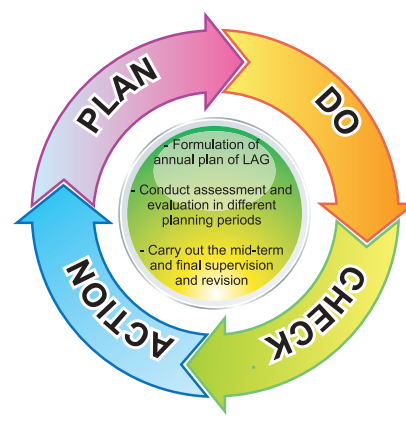
In order to carry out the environmental policies and measures proposed in the present *Environmental Planning*, we will progressively build up any required environmental management system, including environmental publicity and education, release of environmental information, environmental monitoring, environmental impact assessment system and environmental licensing system, etc., in order to have laws and norms to be followed in the implementation of environmental management, gradually improving the design and implementation of the environmental management system and environmental policies of the government. In addition, through strengthening the team of qualified personnel and the construction of infrastructures, the capability in decision making of the Government and the execution of environmental legislations would be strengthened, gradually enhancing the environmental emergency response capability of the Macao SAR Government.

2. Supervision Mechanism

2.1 Supervision system

In an effort to supervise and implement the *Environmental Planning*, a cross-departmental environmental planning group should be established to monitor the execution of the action plans and major projects under the present planning according to the principle of Plan-Do-Check-Action cycle (PDCA cycle), in order to resolve the errors and problems in the planning. The supervision system mainly includes the following aspects:

- To formulate annual work plans: to formulate annual work plans according to the short, medium and long-term planning tasks.
- To evaluate and assess the implementation of the planning in various phases: to conduct evaluation and assessment on the effectiveness of the planning, assessing the status of implementation of the objectives and action plans in the present *Environmental Planning* in the end of 2012 and 2015, in order to summarize the execution status of the planning and analyze the experience and problems in the implementation of the planning, serving as references for the implementation of the planning in later phases and for amending the planning. Also, evaluation reports will be publicized to the public in a timely manner, making known to the public the status of implementation of the planning. In the year of 2020, which is the end of the present planning, a comprehensive review about the implementation of the planning would be carried out to evaluate the level of compliance of the planning objectives and indicators, as well as the implementation status and effectiveness of the action plans and major projects of the planning. At the meantime, on the basis of summarizing the experience of the first *Environmental Planning*, the DSPA will prepare the environmental protection planning of the next phase, as the continual, enduring, foreseeing and targeted strategies for the environmental protection work of Macao.

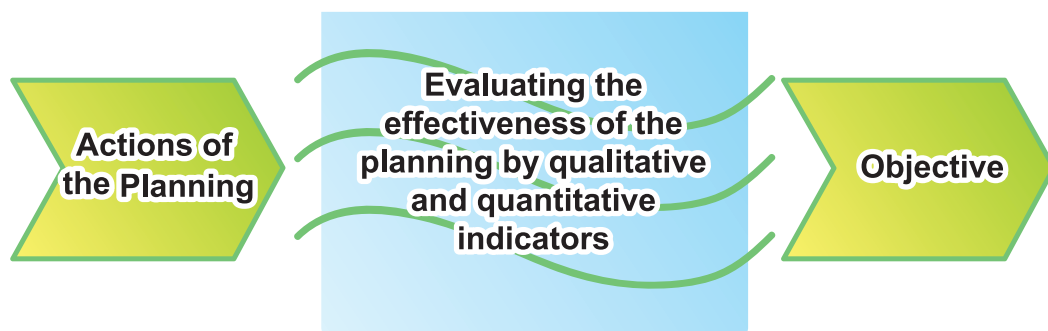


2.2 Publicizing the environmental information of the government

In order to enhance the depth and width of the environmental information released, ensuring the public to have the right to know, participate and supervise, information about the status of the environment will timely be publicized through the media easily reached by the general public such as the government website, reports, newspapers, magazines, radio and television. On the other hand, through promoting the publication of the environmental information of enterprises by establishing the publication system of enterprise environmental information, encouraging the enterprises to publicize the environmental information of their own in a voluntary and initiative manner, enhancing the effectiveness of public supervision on the environmental protection behavior of the enterprises.

2.3 Evaluation of the implementation of the *Environmental Planning*

The implementation of the *Environmental Planning* is a long-term and dynamic process, and it is required that the intent of the planning be imparted to different government agencies and relevant organizations. Meanwhile, the implementation of the planning may be affected by various factors. It is, therefore, necessary to establish a mechanism to evaluate the effectiveness of the implementation of the planning, in order to ensure the achievement of the anticipated planning goals. In reference to the national and international evaluation indicator systems for similar planning, and in consideration of the operability, possibility for evaluation and representativeness of the indicators, an evaluation indicator system for the implementation of the action plans and major projects under this planning would be established. Through assessing the overall objectives, goals of different phases and the indicator system formulated in this planning, the extent of accomplishment of the objectives and the main problems can be analyzed. Also, the difficulties in achieving the goals of later phase planning can be predicted. The purpose of the assessment is to gradually make the implementation of the *Environmental Planning* to be the starting point for leading the quantitative environmental management, systematic management and regular management. By evaluating the implementation of the planning, the execution of the planning can be promoted and the planning can be improved. The evaluation will primarily be based on quantitative methods, supported by qualitative methods, and will also cover the input-output transformation status.





Chapter VI

3. Guarantee Mechanism

The “*Environmental Protection Planning of Macao (2010-2020)*” is the first forward-looking and programmatic planning document of Macao in the field of environmental protection. In order to ensure that the entire action plans contemplated in the planning is executed in an orderly manner, there is the need to establish a comprehensive system to guarantee the input of resources and the coordination among various government agencies concerned.

3.1 To focus on resource input

In an effort to achieve the goals set in the present planning, the Macao SAR Government will invest corresponding human and material resources required to carry out the action plans under the planning, and particularly, reserve sufficient fiscal budget as support. Meanwhile, in order to ensure effective implementation of and continual amendment to the planning, corresponding scientific and technical support would be issued in due course, for example, training local scientific and technological personnel in respect of environmental protection and introducing advanced technologies and equipment, for the purpose of enabling science and technology to play a role in environmental protection in the future.

3.2 To establish cross-departmental coordination and cooperation mechanisms

Environmental protection involves multifaceted efforts. The DSPA will inevitably take up the main and major duties of the environmental protection work; even so, the implementation of the environmental planning still requires the cooperation and coordination of other government agencies. In fact, the present planning has got strong support from other government agencies from the beginning. In the future, upholding the concept of coordination, a cross-departmental communication mechanism would be established to put in place and evaluate the action plans under the planning, achieving the vision of “Building a Low Carbon Macao, Creating Green Living Together” through joint efforts.

3.3 To have the general public participate

To have the action plans in the planning to be implemented effectively, the Macao Government will play a leading role as a leader and promoter, but the realization of various planning goals also relies on the participation and cooperation of all the social communities. The government, enterprises and general public shall do their own part respectively, cooperating and interacting with each other to ensure implementation of all the work under the planning.

3.4 To implement the planning in a roll-on way

Environmental protection is complicated, ever-changing and wide-reaching; therefore, the formulation and implementation of the *Environmental Planning* is a long and dynamic process. There is the need to review, optimize

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and improve the planning based on the development reality and in a roll-on approach featuring a chain of “Planning – Implementation – Evaluation – Amendment – Updating” actions, in order to ensure advancement of the action plans and achievement of the goals set forth in the planning.





Conclusion

For resolving the increasing stress on the environment and resources, and also responding to the ever-increasing demands of the citizens for environmental quality protection and improvement in ecological environment, the Environmental Protection Bureau (DSPA) conducted the environmental master planning of Macao SAR, in order to realize the vision of “Building a Low Carbon Macao, Creating Green Living Together”.

On the basis of coordinating with other related planning and analyzing the current challenges in the environment, the present *Environmental Planning* has proposed the planning vision and objectives, together with a preliminary scheme for environmental functional districts and environmental functional district management. Under the three principal themes of “Optimizing the Environment Suitable for Living and Tourism”, “Promoting a Conservation and Recycling-oriented Society” and “Integrating into the Green and Quality Region”, this planning has also established 11 green indicators for the *Environmental Planning*, proposed 15 areas of concern and their strategic direction, formulated various major actions, and established the implementation and supervision mechanisms, in order to enhance the environmental management capability of the Macao SAR Government and guarantee the execution of the planning. In the meantime, this planning, based on the requirements in the vision of “Building a Low Carbon Macao, Creating Green Living Together” has also proposed a demand for coordinating the regional environment, taking into consideration of the integrated development in the environment, building jointly a quality-living area.

The “*Environmental Protection Planning of Macao (2010-2020)*”, as the first environmental planning of Macao, has systematically depicted the roadmap of future environmental management works in Macao. The *Environmental Planning*, on the one hand, has proposed objectives in improving environmental quality and guidance in actions to be taken for Macao up to year 2020. On the other hand, it has also acted as the foundation of the environmental management works in Macao, in the view of harmonizing the environment, society and economy, leading for the sustainable social and economic development.

This planning aims to establish the planning objectives and indicators in a forward-looking way, and execute and implement the actions for improving the environment according to their priority. We have to point out that formulation and implementation of this planning is a dynamic process, which relies on the participation of general public, and should be reviewed, amended and improved in accordance with the actual status of the social and economic development, supported by the input of corresponding resources, in order to facilitate and ensure the implementation of this planning.

In fact, the *Environmental Planning* is a starting point for the environmental protection works. It is hoped that in the coming decade, by formulating the implementation mechanism for the execution of the present planning document in view of different environmental elements and by the coordination of different government agencies and sectors of the society, action plans in the atmospheric, acoustic, ecological and aquatic environments would be carried out. By implementing effective control measures for pollution, we hope to reduce the pollutants produced at source and maintain achievements in nature conservation and greening in the city. More importantly, by educating the citizens for good awareness in environmental protection, consumption motives and commuting habit, it is hoped that while the Macao citizens are enjoying the abundant material lives, they can also have breaths of fresh air, tastes of clean drinking water and experiences of a comfortable natural environment.

However, since the environment is a complex, variable and extensive system, protecting the environment is a hard and enduring task. It is impossible that all the existing pollution problems in the environmental can completely be resolved in the next decade. A wonderful and quality environment must be achieved by continuous planning, governmental policies, efforts of the enterprises and public participation.

It is the responsibility of everyone to protect our environment. Let us fulfill our responsibilities in environmental protection, creating a quality ecological environment and sharing wonderful green living together.



🌿 Acknowledgement 🌿

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Transport Bureau (DSAT)

Transportation Infrastructure Office (GIT)

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