

## **Investigation report on the typhoon forecasting procedures and internal management of the Meteorological and Geophysical Bureau**

### **Foreword**

1. On 1<sup>st</sup> August 2016, tropical cyclone (typhoon) “Nida” hit the southern coast of China. The Meteorological and Geophysical Bureau (hereinafter “SMG”) issued Signals No. 1 and No. 3 at 00:30am and 7:00pm respectively. At 7:00am on 2<sup>nd</sup> August, it reported that “Nida” was gradually moving away from Macao and the Signal No. 3 was expected to remain hoisted for a certain period of time.
2. Some citizens raised doubts on the forecasts of “Nida” made by the SMG. They thought that the weather conditions at that time were bad enough to meet the criteria for issuing the Signal No. 8 and the wind speed recorded by some of the meteorological monitoring centres had already reached the lower limit of the statutory range. Moreover, the neighbouring region had already issued the Signal No. 8 at that time. They complained that the SMG’s decision not to issue the Signal No. 8 was allegedly illegal and requested the Commission Against Corruption (hereinafter “CCAC”) to carry out an investigation.
3. In response to the complaints that the CCAC had received, the Commissioner Against Corruption issued an order to initiate an investigation into the criteria and procedures of issuing typhoon warning signal adopted by the SMG. Following the investigation, the CCAC did not find that the forecasting of “Nida” had violated the law, but it found some problems such as unclear standards and irregular procedures of issuance of typhoon warning signal. Therefore, the CCAC requested the SMG to make improvements.
4. On 23<sup>rd</sup> August 2017, typhoon “Hato” swept Macao. The SMG issued the Signal No. 3 at 3:00am and the Signal No. 8 at 9:00am respectively. Later, since the centre of “Hato” kept approaching Macao, the wind became stronger and stronger. At 10:45am and 11:30am, the Signals No. 9 and No. 10 were hoisted respectively.
5. The severe typhoon “Hato” and the storm surge it brought caused a large number of casualties and serious property loss. Facing the calamity, the citizens raised doubts on the typhoon forecasting again. They thought that the SMG released the forecasting updates too late and even made incorrect forecasts. Some even thought that the SMG might have deliberately delayed the issuance of the Signal No. 8 in the interests of gaming companies. They requested the CCAC to probe into the matters.
6. On 28<sup>th</sup> August 2017, the Commissioner Against Corruption, by an order issued

under Law no. 10/2000 (*Organic Law of the Commission Against Corruption of the Macao Special Administrative Region*), assigned the Ombudsman Bureau to carry out an investigation into the typhoon forecasting procedures and internal management of the SMG, particularly the responsibilities for perfecting the typhoon forecasting procedures and internal management which should be borne by the former Director, Fong Soi Kun.

## Part 1: Investigations by the CCAC

1. The complaints received by the CCAC after the passage of typhoons “Nida” and “Hato” in Macao mainly concerned the SMG’s typhoon forecasting procedures and its decisions on issuing warning signals for tropical cyclones. Holding that the weather conditions were bad enough to necessitate the issuance of the Signal No. 8 or an earlier issuance of the signal as an alert for the forthcoming strong winds, the complainants queried whether there was late issuance or the forecasts were made incorrectly.
2. According to the *Organic Law of the Commission Against Corruption*, the investigation powers of the CCAC as an ombudsman are mainly to find out if an administrative act has contravened the law or legal procedures. In other words, it looks into the “legality” of administrative acts or procedures. The CCAC’s investigations therefore aimed to find out if the SMG’s two typhoon forecasting incidents had contravened the law or legal procedures.
3. The accuracy of the SMG’s forecasts for typhoons “Nida” and “Hato” was not within the scope of the CCAC’s investigations. This is because it is within the SMG’s area of expertise to predict the track and wind force of a typhoon, its impacts on Macao, and make decisions on what tropical cyclone warning signal to be raised and when to raise it. The CCAC does not have the powers or technical capabilities to make the relevant judgments.
4. The two investigations carried out separately by the CCAC both focused on the SMG’s typhoon forecasting procedures and internal management. They aimed to find out whether the criteria and workflow followed by the SMG for making typhoon forecasts conformed to the fundamental principles that public departments should adhere to in their operations, as well as the responsibilities of the SMG’s leaders when it comes to improving the forecasting procedures and internal management.
5. The CCAC’s personnel conducted investigations in accordance with the *Organic Law of the Commission Against Corruption*. The measures included requesting documents, interviewing the people involved, site visits and evidence collecting. After the investigations the CCAC found no evidence that the SMG’s forecasting for typhoons “Nida” and “Hato” had violated the related legislation or legal procedures. There was no evidence that the SMG’s decisions on issuing tropical cyclone warning signals was subject to external factors either.
6. However, the CCAC found in the investigations that the internal procedures and instructions of the SMG for typhoon forecasting needed urgent improvement, so did its human resource and equipment management. The CCAC also found after

the investigations that the SMG's leaders should bear major and unshirkable responsibilities in improving its typhoon forecasting procedures and internal management.

## **Part 2: Problems related to SMG's typhoon forecasting procedures**

### **I. Problems in SMG's decisions on issuing typhoon warning signals**

1. What concerned the CCAC most during the investigations into the SMG's typhoon forecasting procedures were its workflows and powers of making typhoon forecasts and raising tropical cyclone warning signals, that is, how the SMG would issue a typhoon forecast in response to the passage of a typhoon in Macao – namely, who and how to decide whether or not to raise a warning signal, when to raise it and what signal to be raised.
2. On 30<sup>th</sup> September 2016, in his replies to some written inquiries from the legislative members, Fong Soi Kun, the former Director of the SMG pointed out that “whenever a tropical cyclone warning signal is to be raised or the related information is to be released, the leaders of our bureau will, in advance or in a timely manner, have meetings with the relevant chiefs and meteorological technicians to discuss the latest trend of the tropical cyclone and its possible impacts on Macao. All decisions are made after detailed discussions”.
3. However, according to the CCAC's investigation, that was not the case. When it comes to predicting the impacts of typhoons on Macao and making decisions on the issuance of typhoon warning signals, the SMG did not have an internal mechanism for collective discussions and analyses. Instead, the former Director was usually the only one that made judgments and decisions. Both of the typhoon forecasts for “Nida” in 2016 and “Hato” in 2017 were made in such a way.
4. The forecasters of the Meteorological Monitoring Centre under the Meteorology Division are those who are directly in charge of typhoon forecasting in the SMG. When the genesis of a typhoon takes place, the forecasters of the centre will monitor and analyse the satellite and radar data, as well as the wind speed, intensity and tracks of the typhoon. The possible impacts of the typhoon on Macao will also be evaluated.
5. The SMG hosted a “weather briefing” at 4:00 pm on a daily basis. Participants included the Deputy Director, the chief of the Meteorology Division and the forecasters from the Meteorological Monitoring Centre, the Climate & Atmospheric Environment Centre and the Aeronautic Meteorological Centre at the Macao International Airport. However, the Director did not attend the briefings. With a focus on discussing weather conditions for the following seven days, these “weather briefings” were hosted regularly to make weather predictions.
6. Despite that a typhoon's impacts on Macao's weather conditions will also be discussed, the “weather briefings” are not summoned just for making typhoon

predictions. For instance, on the briefing held at 4:00 pm on 22<sup>nd</sup> August 2017, the Deputy Director Leong Ka Cheng mentioned that the superior had already finalised the forecast for typhoon “Hato”. She then asked the participants to discuss the weather forecasts for the following week. The briefing lasted only five minutes or so.

7. The “discussion meetings” mentioned by the former Director were in fact summoned by him when a typhoon affected Macao during normal working hours and might necessitate the issuance of the Signal No. 3 or 8. At the meetings held at his own office, the former Director would, together with the Deputy Director and the Chief of the Meteorology Division, discuss the typhoon forecast and decide whether to issue a warning signal. There was no frontline forecasters involved in this process.
8. When the Signal No. 3 or 8 might be issued for a typhoon taking place during non-working hours or on a public holiday, the Deputy Director would report it only to the former Director by phone, and the latter would, after analysing the relevant data and information on the internet at home, decide whether and when to raise a typhoon warning signal. He would then notify the forecasters on duty at the bureau by phone to publicise the relevant information.
9. The CCAC believes that there were serious problems in the SMG’s typhoon forecasting procedures and decision making mechanism. First, it lacked a sound mechanism for internal meetings and discussions. The decision making solely relied on the meetings involving very few people or even the personal judgments of the former Director. Second, there was no comprehensive disaster warning mechanism. Considering that the decisions were made only through phone calls and the internet at home, the leaders of the SMG could not stay vigilant against unexpected situations.
10. When answering the query why he could not have discussion meetings with the personnel, the former Director said that the frontline meteorological technicians were only responsible for the monitoring work and making forecasts. The typhoon tracks and information they provided could be viewed on the computer. Therefore, they should talk to the Chief of the Meteorology Division should they have any opinions regarding the issuance of typhoon warning signals. There was no need for the Director to communicate with the frontline personnel about typhoon issues.
11. According to the former Director, he went straight into his own office when arriving at the SMG in the early morning of 23<sup>rd</sup> August, and then tried to catch up on the information about the typhoon via his computer. He did not go to the Meteorological Monitoring Centre to understand what was going on or exchange ideas with the frontline forecasters, as he regarded that the forecasters were

undoubtedly less experienced than the leaders and the chiefs. Besides, their analyses might not be on point.

12. In the CCAC's opinion, the weather conditions during a typhoon are ever-changing. Therefore, with only the reports by the chiefs and the use of a computer to monitor and make judgments, it is hardly possible for the Director to catch up on the updates about the typhoon in a holistic and timely manner. Moreover, even though there was room for improvement in the professionalism of frontline forecasters, the SMG leaders should have understood that it is wise to listen to ideas from different perspectives. They should not have simply disregarded the opinions of the frontline forecasters.
13. The staff members and chiefs of the SMG told the CCAC that the atmosphere, system and culture of the bureau hindered the forecasters from expressing their own views. Even when they brought up suggestions about forecasting such as issuance of typhoon warning signal, their suggestions would not be valued or adopted by the leadership. Moreover, the leadership even stated that the frontline forecasting staff had no power to raise any suggestions of issuing typhoon warning signal.
14. However, the CCAC found in the investigations that when a typhoon was approaching Macao during non-working hours, the former SMG Director did not stay in or go back to the office but stayed at home instead and accessed the intranet of the SMG via internet to view the data and information about the typhoon. Then he communicated with the Deputy Director on phone. If he decided to issue typhoon warning signal, he would also give the order to the forecasters via phone.
15. In other words, when a typhoon was approaching Macao and it was necessary to consider whether or not to issue signal no. 3 or even no. 8, the leaders of the SMG did not stand by in the office but made decision via phone and internet at home instead. Such practices were hugely different from that of the counterparts of the surrounding regions and citizens' expected scenarios of making typhoon forecasts.
16. In fact, such method of dealing with natural disasters was disturbing: When power shortage, internet failure or telephone line disconnection occurred due to typhoon or any other reasons, the leaders of the SMG would not have access to the meteorological data, communicate with the forecasting staff and even give any orders to issue warning signal at home. In this case, the typhoon forecasting system of Macao would stop running.
17. Since the Director was the only one who had the power to make decision to issue typhoon warning signal. When he was out of contact or could not be reached timely due to any reason, the Deputy Director, the Chief of the Meteorology

Division or even the forecasters on duty could not make the decision to issue a warning signal. This would definitely result in delayed or incorrect forecasts.

18. When “Hato” hit Macao, the leaders of the SMG went back to office in the early morning of 23<sup>rd</sup> August. Nevertheless, “making decision at home” and “remote instruction” were absolutely not the working methods that public departments should adopt to deal with severe natural disasters. If there were any accidents, the safety of citizens’ lives and properties would be seriously threatened.

## **II. Problems in the criteria for issuing typhoon warning signals**

1. Another major concern of the CCAC’s probes was the criteria adopted by the SMG for raising typhoon warning signals. During the investigations, the personnel in charge of making typhoon forecasts told the CCAC that it was always the former Director that made decisions on issuing warning signals and there was no discussion in advance and explanation after the typhoons, so they had no idea what criteria the former Director had followed when making decisions on issuing typhoon warning signals.
2. The former Director told the media in August 2016 that the SMG would take into account different elements when issuing a warning signal for a typhoon, such as its prevalence, representativeness and continuity. Although the minimum wind speed that necessitates the issuance of the Signal No. 8 was recorded by some meteorological stations, the overall wind speed of “Nida” was relatively low, that is, it did not meet the levels of prevalence and continuity that justify the issuance of the Signal No.8.
3. The former Director also told the CCAC during the investigation that typhoon forecasting cannot solely depend on the criteria prescribed in the *Instructions on Tropical Cyclone Situations* approved by the Administrative Order no. 16/2000, adding that the “three elements” of a typhoon, namely its prevalence, representativeness and continuity, must also be considered. We can therefore infer that the “three elements” are important bases and criteria for evaluating the impacts of a typhoon on Macao and making decisions on the issuance of tropical cyclone warning signals.
4. However, prior to the intervention of the CCAC, the SMG did not release any document to define or explain what prevalence, representativeness and continuity mean, neither did it publish any internal guidelines on how to make typhoon forecasts according to these “three elements”. Regarding this issue, the former Director only said that all of their personnel had clear understanding of what the “three elements” are, adding that they had “a pretty clear idea” and “there should



not be any ambiguity”.

5. However, this is not true. The leaders and chiefs’ understanding of the “three elements” differed from each other. For example, for the former Director, “prevalence” meant that the strong wind had covered a major part of Macao Peninsula. The Deputy Director thought that if any of the meteorological monitoring centres on the cross-sea bridges had recorded the wind speed which had reached the lower limit of statutory range necessitating the issuance of typhoon signal, then the criterion about “prevalence” would be met, while the Chief of the Meteorology Division thought that it meant the relevant weather conditions did not only occur in certain places but affected a larger area.
6. For “representativeness”, the former Director considered that some of the meteorological monitoring centres were located in open spaces and therefore the data they recorded were more representative. For the Deputy Director, it referred to the fact that the typhoon had larger effect on the citizens. For example, the data recorded by the meteorological monitoring centres on the bridges between Macao and the offshore islands were representative. The Chief of the Meteorology Division thought that the data recorded by the meteorological monitoring centres at the Taipa Grande Hill, the three bridges between Macao and Taipa and the Mount Fortress were more representative.
7. “Continuity” meant that although the average wind speed had reached the lower limit of the statutory range, the relevant typhoon warning signal would only be hoisted when the intensity of the wind had remained at least for a certain period of time. However, the leaders and chiefs of the SMG did not have the same understanding of the length of the period. The former Director considered it as one to three hours. The Deputy Director thought that it should be over half an hour, while the Chief of the Meteorology Division thought that it should not be a short period of time.
8. The Director and the Deputy Director had different understandings of the definitions and criteria of the “three elements”. In this sense, when the Deputy Director substituted for the former Director because he was on annual leave or was not in Macao and there was a typhoon approaching which necessitated her decision whether or not to issue typhoon warning signal, the standards adopted by the Deputy Director might be different and the decisions would be inconsistent and vary from person to person.
9. The leaders and chiefs of the SMG had their own interpretations of the “three elements”, while other staff members knew little or even never heard about prevalence, representativeness and continuity. The definition and standards of them had never been mentioned in the training events held by the SMG. The

forecasting staff had also never heard that the “three elements” should be considered when it came to whether or not to issue typhoon warning signal.

10. Moreover, the forecasters of the SMG told the CCAC that they never took any written records of the observations, analyses and forecasts of typhoons since the superior never requested for them and there was manpower shortage. In fact, they only orally reported the data and findings of the analyses to their supervisor. Moreover, the SMG never made any written records of the basis and reasons for the issuance of typhoon warning signal.
11. The decisions to issue typhoon warning signal were all made by the former Director, who never discussed with the meteorological staff beforehand and never made any analysis and review of the accuracy of the forecasts afterwards. No one knew which meteorological data and factors that his decisions were based on. Before receiving the former Director’s instruction, the forecasters did not know whether or not or when to issue the typhoon warning signal.
12. The factors and standards for issuance of typhoon warning signal did not only matter for the leaders of the SMG. They were even not “confidential” or “concealed” information. If the forecasters of the SMG were also not clear about them, it is even impossible for the public to have any idea of them. Therefore, it is inevitable that the public would raise doubts on the accuracy of the forecasts and whether they were delayed or incorrect.

### **III. The follow-up measures in response to CCAC’s suggestions**

1. The CCAC carried out an investigation into the SMG after the incident of typhoon “Nida” and suggested standardising the criteria of issuance of typhoon warning signal. However, the former Director told the CCAC that it is impossible to clearly define the ‘three elements’ and the criteria, “but the insiders understand them easily”. The Deputy Director stated that “due to the complicated landform of Macao, it is difficult to formulate a set of standardised guidelines in written form and it is necessary to make a comprehensive consideration according to the reality”.
2. However, the leaders of the SMG eventually admitted that the frontline staff did not have any idea of the “three elements” and accepted the CCAC’s suggestion of standardising the criteria. The *Guidelines of Internal Evaluation of Issuance of the Signal No. 3 or No. 8 (Trial Version)* (hereinafter “guidelines”) were formulated. However, the guidelines only indicated the criteria of “prevalence” and “continuity”, but the definition and criteria of “representativeness” were missing.
3. The guidelines were passed by the Chief of the Meteorology Division to the

forecasters on duty in the afternoon of 22<sup>nd</sup> August and uploaded on the intranet of the SMG that night. However, the former SMG Director stated that he did not know whether the staff knew that the guidelines had already been upload to the intranet, nor did he knew whether the chiefs had already explained the contents of the guidelines to the staff.

4. The CCAC considered that the regulations about typhoon forecasting and issuance of typhoon warning signal should be revised. The chiefs of the SMG also told the media that the bureau had already commenced a review of all the standards of issuance of typhoon warning signal provided for in Administrative Order no. 16/2000 in order to make them clearer and expected to consult civil aid entities and associations in the latter half of 2016. They added that the SMG would take an open attitude to whether the administrative order needed to be revised in the future.
5. In response to media's interview, the former Director also pointed out that the current definitions of the typhoon warning signals had been in force for many years and only minor revisions had been made, so it was necessary to make a comprehensive review promptly and revise the definitions in response to citizens' demands. However, when the CCAC asked him about the progress of the revision during the investigations, he denied the statement about the intention to revise the relevant administrative order and asserted that he did not see anything that required revision in the administrative order.

### **Part 3: Problems related to SMG's internal management**

#### **I. Problems in SMG's personnel management**

1. In addition to the defects in the typhoon forecasting procedures, the CCAC also found during the investigations that there were problems that should not be ignored in the internal management of the SMG, particularly on its personnel and equipment.
2. First of all, according to the personnel of the SMG, there has been frequent staff movement within the bureau in recent years, especially among the forecasters of the Meteorological Monitoring Centre, who were repeatedly redeployed to other affiliated units within a short period of time. Some forecaster was even redeployed for six times within a year. This situation affected the stability of the operations.
3. During the investigations, the CCAC found there were usually only two forecasters on duty at the Meteorological Monitoring Centre, so it could be short of hands when there was a typhoon coming. The forecasters at the centre worked on shifts and there were originally three forecasters per shift. The former Director however decided that, with the automation and computerisation in some operations, they did not need that much manpower. Therefore, the number of forecasters on duty per shift has been reduced to two since this year.
4. When there was a typhoon coming, the two forecasters on duty at the Meteorological Monitoring Centre not only needed to locate it and generate the tracks, but also needed to issue weather forecasts regularly and give online updates of the typhoon. Moreover, they had to notify the government departments of the information about the typhoon, exchange typhoon forecast information with the meteorological departments in Zhuhai and Hong Kong, and reply the inquiries from residents and the media.
5. According to the personnel of the SMG, they are swamped by a deluge of phone calls from residents and media especially when the Signal No. 3 is in force in Macao while Hong Kong has already raised the Signal No. 8, as everybody is concerned with whether and when the Signal No. 8 will also be in force in Macao. This has added on the already heavy workload of the forecasters.
6. Nevertheless, the former Director did not think it was necessary to increase manpower just for answering phone calls. His reason was that when the forecaster is answering a phone call, he cannot answer dozens of other phone calls all coming in at the same time. He even thought that the forecasters should finish the work on weather forecasting first and answer the calls only when they have time. The former Director therefore insisted that only when the typhoon Signal No. 8 is

issued may the number of forecasters on duty be increased.

7. For instance, during the passage of typhoon “Hato” in Macao, some forecasters already made a suggestion in the afternoon of 22<sup>nd</sup> August that manpower should be increased. However, the Deputy Director rejected the idea immediately, holding that the duty of frontline workers was only observing the wind speed other than deciding the issuance of warning signals. Besides, the former Director also thought that, according to the working guidelines, only when the Signal No. 8 is in force may they increase manpower. Therefore, it was not until the morning of 23<sup>rd</sup> August that two more forecasters were deployed.
8. Regarding the rumours on the internet about the religious belief of the Deputy Director, it was difficult for the CCAC to verify whether they were true or hearsay. Nevertheless, according to the personnel the CCAC got in touch with, the rumours were widely circulated in the bureau and everyone heard of them. The rumours, along with some of her behaviour, would really make others feel uneasy, especially those who needed to work on the overnight shift.
9. In the CCAC’s opinion, the freedom of religious belief is a fundamental right of the residents protected by the *Basic Law of Macao*. Public servants also enjoy this right. However, personal religious belief and public entity management should not be mixed up. Public servants should not bring their religious practices or activities to work, otherwise they might pose psychological stress to the colleagues and affect the operations of their departments.
10. The former Director said during the investigations that he himself was an atheist and would not ask his subordinates about their religious beliefs, adding that he had never read the posts and information on the internet and therefore did not try to find out if the rumours were true or not. From the CCAC’s perspective, as the highest authority of the SMG, the Director should not turn a blind eye to rumours that affect the operations of the bureau. After all, avoiding the problem is not a solution, as the rumours will spread even more wildly and greatly undermine the professional image and credibility of the bureau.

## **II. The problems existing in the equipment management of SMG**

1. During the investigation, the CCAC noticed that there were a series of problems existing in the equipment management and maintenance of the SMG. Some staff members stated that the internet connection of the SMG failed frequently. It could only resume after one to two hours in general or sometimes half a day or a whole day. When the internet was disconnected, meteorological data could not be collected and thus the frontline forecasting staff’s work would be affected.

2. In 2009, the SMG purchased and installed an X-band meteorological radar to monitor the nimbostratus and other kinds of weather conditions. However, it was damaged by thunder in September 2010. Although it had been repaired, malfunction always occurred. Therefore, it could only be used on and off. Since some of the damaged parts of the radar were no longer produced, the radar could not function since 2013. Currently the SMG has to monitor weather condition through the S-band meteorological radar shared with Zhuhai.
3. Moreover, early this year, the SMG also purchased a LIDAR (Light Detection and Ranging), which was mainly used to monitor the data of air pollution. However, after installation, it was found that its laser light source did not function. The former Director stated that the SMG did not accept the LIDAR after discovering the problem and the supplier had already taken it back for repair, but the LIDAR had not yet been delivered to the SMG.
4. In the headquarters of the SMG, there is a generator for providing backup electricity for the important equipment of the Meteorological Observance Centre such as the computers and servers for collection of meteorological data and handling and release of meteorological information. However, after the power outage occurred at noon of 23<sup>rd</sup> August 2017, the generator did not function immediately due to failure of battery and the problem was not fixed until two hours later.
5. Recently the SMG had UPS (uninterruptible power supply) installed for those computers and servers. With the backup power supplied by the UPS, the forecasting work of the Meteorological Observance Centre was not seriously affected by the power outage that day. However, the staff members stated that the backup electricity supplied by the UPS should only last for several ten minutes, but it came as a surprise that the backup power actually lasted for around two hours that day.
6. The SMG has set up meteorological monitoring centres in over ten places in Macao in order to collect data such as temperature, humidity, wind force, wind direction and rainfall. According to the staff members, when power outage occurs, the stations cannot function normally due to failure of backup battery, which affects the punctuality and accuracy of meteorological forecasts to a certain extent.
7. Moreover, there are also over ten water level observation stations and two tide stations. Due to lack of anti-flood facilities, when there is heavy rain or strong tide, the observation equipment may fail as it is soaked by rainwater. The backup batteries of the water level observation stations and the tide stations may also fail due to flood. As a result, the stations cannot fully exert their function of

observation.

8. “To do a good job, one must sharpen his tools first.” Since meteorological forecasts hugely rely on computer programs and observation equipment, it is necessary to ensure the relevant devices are in good condition. Otherwise, the punctuality and accuracy of forecasts will be affected. For the problems concerning the relevant equipment, most of the time the former Director said he did not know about them because the chiefs or staff members did not tell him.
9. Although the leaders and chiefs of public department perform their respective duties as provided for in the organic law, when some problems occur repeatedly but are not solved promptly, or when some problems are big enough to have serious effect on the department’s operation, the top leader of the department shall intervene into the matters and follow up and solve the problems promptly and shall not keep himself aloof from the problems for the reason that the relevant powers have been delegated to his subordinates or that it is the subordinates’ duty to solve the problems.

#### **Part 4: Opinions and suggestions**

1. After investigations the CCAC believed that there were many problems in the SMG in terms of its typhoon forecasting procedures and internal management. The most prominent problem was that the power of decision making on typhoon forecasting was highly centralised. As the procedures were not standardised and the criteria were not transparent, they give rise to a certain degree of arbitrariness. The leaders of the bureau therefore should bear major and unshirkable responsibilities in this regard.
2. According to the organic law of the SMG, the leaders have the powers to make decisions on typhoon forecasting and issuance of tropical cyclone warning signals. Nevertheless, it does not mean that they may ignore the views of the meteorological technicians and act in an autocratic manner. As typhoon forecasting necessitates the compilation and analysis of a great deal of information in a short period of time, it can by no means solely rely on the wisdom and professionalism of one or only a few people.
3. The leaders of the SMG thought there was no need to communicate with the frontline personnel with regard to typhoon forecasting. There was not any discussion in advance or review after the typhoons. Such practices have not only demonstrated autocracy and the disregard for the opinions of the personnel, but has also revealed the egotistical attitude and professional arrogance in its decision making processes. This is not conducive to the improvement of its typhoon forecasting or training of professionals.
4. The processes of decision making of the SMG's leaders for typhoon forecasting lacked openness and transparency. As different people within the bureau had different interpretations of the relevant criteria, it was even more impossible for the public to know what the SMG had based on and considered when it comes to the issuance of typhoon warning signals. In response to public queries on the forecasts after the passage of typhoons, the SMG's leaders always failed to make clear the relevant details and take the responsibilities.
5. As the weather is changing all the time, there are uncertainty and unpredictable factors existing in typhoon forecasting. In fact, the public does not demand 100% accurate forecasts, but what they care is whether or not the SMG has done its best to perform its duty to make the typhoon forecasts. It was the leadership of the SMG who made the decisions of typhoon warning signal, but finally everyone has paid for the cost.



**To conclude, based on the investigation into the typhoon forecasting procedures and internal management of the SMG, the CCAC hereby presents the following recommendations:**

1. The SMG should set up a specific mechanism of discussion meetings which the meteorological staff are allowed to join in order to analyse and discuss the conditions of typhoons and their effect on Macao.
2. The SMG should set up an emergency forecasting mechanism to be applied when a typhoon signal is issued and a rotation system for the leaders, chiefs, forecasting staff and other staff members to stand by in the office.
3. The SMG should standardise the factors to be taken into account and the criteria to be applied for the issuance of typhoon warning signal and it should be followed by all personnel of the SMG and understood by the media and citizens.
4. The SMG should take an initiative in revising the *Instructions on Tropical Cyclone Situations* approved by Administrative Order no. 16/2000 in order to perfect the stipulations about typhoon forecasting and typhoon warning signal issuance and the specific guidelines about the relevant criteria.
5. The SMG should improve the management of personnel and equipment. The leadership should shoulder their responsibilities to promptly follow up and deal with the problems concerning the internal management.

**We hereby present the report to the Chief Executive for his perusal.**

Commission Against Corruption, 15<sup>th</sup> October 2017

The Commissioner Against Corruption

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Cheong Weng Chon