

**Information sought by Hon Kenneth Leung**

1. Which are the departments responsible for monitoring the ecological and hydrogeological conditions in the Mai Po Marshes area, and their responsibilities?

The Mai Po Inner Deep Bay was designated in 1995 as a wetland of international importance under the Ramsar Convention (Ramsar Site). To minimise possible impact to the area due to human activities and to restrict entry into the ecologically sensitive area, the Government further designated the gei wais and intertidal mangals of the Mai Po Marshes and the intertidal mudflat of the Inner Deep Bay as "Restricted Area" under Wild Animals Protection Ordinance (Cap. 170). The Agriculture, Fisheries and Conservation Department (AFCD) is responsible for the overall conservation management work of the area. A plan showing the Ramsar Site and the Restricted Area is at **Annex 1**.

AFCD regularly conducts patrolling and law enforcement to control unauthorised entry, and other illegal activities such as fishing. Since 2001, AFCD conducts the Baseline Ecological Monitoring Programme to monitor and update the ecological conditions of the wetland habitats at the Ramsar Site.

The slurry leakage incident at Tam Kon Chau Road on 6 August 2015 was more than 800 metres outside the Mai Po Marshes Restricted Area and just outside the boundary of the Ramsar Site. Whilst AFCD does not conduct monitoring on the hydrogeological conditions in the Mai Po Marshes area, the regular patrolling work by AFCD in the recent months does not indicate any abnormalities in the environment of the mudflat and gei wais. There has not been any observable ecological impact on the habitats and species of conservation interest, in particular waterbirds.

2. The date(s) of meeting(s), if any, which the government held with MTR Corporation before and during the express rail link construction at Mai Po site; and the content of those meetings, in particular, construction methods, potential ecological impact and mitigation measures.

The design, construction, testing and commissioning of the *Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL)* was entrusted to MTRCL by the Government. Highways Department, being the Government department responsible for the XRL project, holds monthly meetings at both management and working levels with MTRCL since project commencement in March 2010 to monitor various activities for the delivery of the XRL project including, but not limited to, key issues on the design, construction, and environmental matters.

For the XRL project, MTRCL also holds an Environmental Permit (EP) issued by the Environmental Protection Department under the Environmental Impact Assessment Ordinance. The XRL project contractor has set up a dedicated environmental team to conduct regular site audits, including regular inspections of the construction activities and works areas to ensure that the mitigation measures are properly implemented. Inspection results and recommendations for improvements to the environmental protection and pollution control measures are vetted by an independent environmental consultant and fed back to the contractor for taking immediate follow up action. The environmental team also carries out ad hoc site inspections on receipt of an environmental complaint, or in response to an incident.

XRL submits monthly reports to EPD based on the requirements of the Environmental Monitoring and Audit (EM&A). Furthermore, MTRCL has been conducting regular groundwater monitoring and observations of the fishponds in the Mai Po area, and the results are reported in the environmental weekly reports submitted to EPD among others. On issues concerning ecological matters, EPD seeks advice from AFCD.

Following the incident on 6 August 2015, EPD has been liaising closely with MTRCL to understand the cause, to follow up the remedial actions being taken and to monitor the effectiveness of these actions. EPD held a special meeting with MTRCL's environmental team on 11 August 2015 and a joint site inspection with MTRCL and the pond cultivator on 21 August 2015 to assess the progress of mud clearance at the fish pond.

3. Concerning the potential impact on groundwater levels, the precautionary measures being taken during underground tunneling works at Mai Po site.

In recognition of the potential impact on groundwater levels in the Mai Po site, MTRCL and its contractor adopt the continuous tunneling construction method and carry out daily monitoring of groundwater levels.

The cross-boundary tunnels run through a number of fishponds and protected wetlands with complex geology including a section of bedrock in the marble formation (cavity zone). Due to the requirement of probing ahead of the Tunnelling Boring Machine (TBM) to test for the presence of cavities, and to ensure safe operations, the tunnel boring works are conducted in a prudent and slow manner. Should cavities be encountered, the TBM operation has to stop and the cavities filled by cement-based grout before the TBM can resume its drive forward. With different work procedures taking place at the same time including excavation and installation of permanent pre-cast tunnel walls, loss or movement of the underground water table and risk of settlement will be greatly reduced.

MTRCL and the XRL contractor closely monitor the groundwater levels in the Mai Po area. Weekly reports are submitted providing daily monitoring results on groundwater level. The monitoring results recorded in the reports before and after the incident, covering the period from 3 August to 30 August, are presented in **Annex 2**.

According to the contingency plan prepared by the XRL contractor, remedial actions/measures would be initiated in case the groundwater level reaches Alert Level or higher. Alert Level is defined as 500mm groundwater drawdown from the lowest historical groundwater level which is +1.48mPD. The groundwater level as recorded in the week following the current incident on 6 August 2015 was +1.91mPD to +1.94 mPD, much higher than the lowest historical groundwater level, the monitoring results confirmed that there was no drawdown and that the Alert Level had not been triggered. There were no noticeable settlements or groundwater drawdown due to tunnel construction during that period, and there has been no harmful impact on the environment detected.

MTRCL explained that for this incident the source of leakage was predominantly slurry which came directly from the TBM but not the groundwater. The slurry leakage is due to high pressure of the TBM, and the high pressure would prevent groundwater from getting into the slurry. The groundwater levels were therefore not affected by the slurry leakage.

4. Record of incident(s), if any, being reported during the construction phase of express rail link at Mai Po site, including date(s) and content; and whether they have violated the environmental permit obtained by MTR Corporation.

Incidents since the commencement of XRL construction works at Mai Po area are tabulated below, including the recent slurry leakage incident on 6 August 2015.

<b>Date of occurrence</b>	<b>Incident</b>	<b>Cause and actions</b>
24.4.2014 and 17.6.2014	Air leakage	Air leakage is the normal condition for the adjustment of the pressure during the operation of TBM. Since there was a complaint and the leakage had been reported in the press, MTRCL regards it as an incident.  Following up actions include monitoring the air bubbles conditions and weekly groundwater level monitoring. There was no violation of EP requirement.
6.8.2015	Slurry leakage at Tam Kon Chau Road	The pressurised slurry suspension in TBM operation leaked through some connection paths between a plugged borehole and the excavation chamber. The TBM was stopped from advancing. Remedial measures taken included containment of the slurry runoff, plugging of the borehole, additional grouting through tunnel segments to seal up subsurface connection paths and cleaning up of the slurry.

Regarding the slurry leakage incident at Tam Kon Chau Road on 6 August 2015, MTRCL submitted a report to EPD on 26 August 2015, in accordance with the requirements stipulated in the EM&A Manual and the EP. Based on the information provided in the report, the XRL contractor had immediately stopped the TBM advance. Remedial actions taken included plugging the leaking borehole, cleaning up mud slurry on road and in the open channel, clearance of mud runoff from the nearby low lying areas, backfilling the collapsed section with fill materials, and secondary grouting to the ground from within the tunnel etc. EPD conducted multiple follow-up inspections between 10 August and 27

August to monitor progress and was satisfied that the remedial actions reported by MTRCL were completed.

MTRCL further reported on 4 September 2015 that the contractor had completed additional re-plugging works above-ground around the borehole which might be affected by the TBM operation in order to minimise the risk in re-occurrence of similar incident.

EPD is conducting further investigations of the incident to determine whether there were violations of the EIAO or other pollution control ordinances.

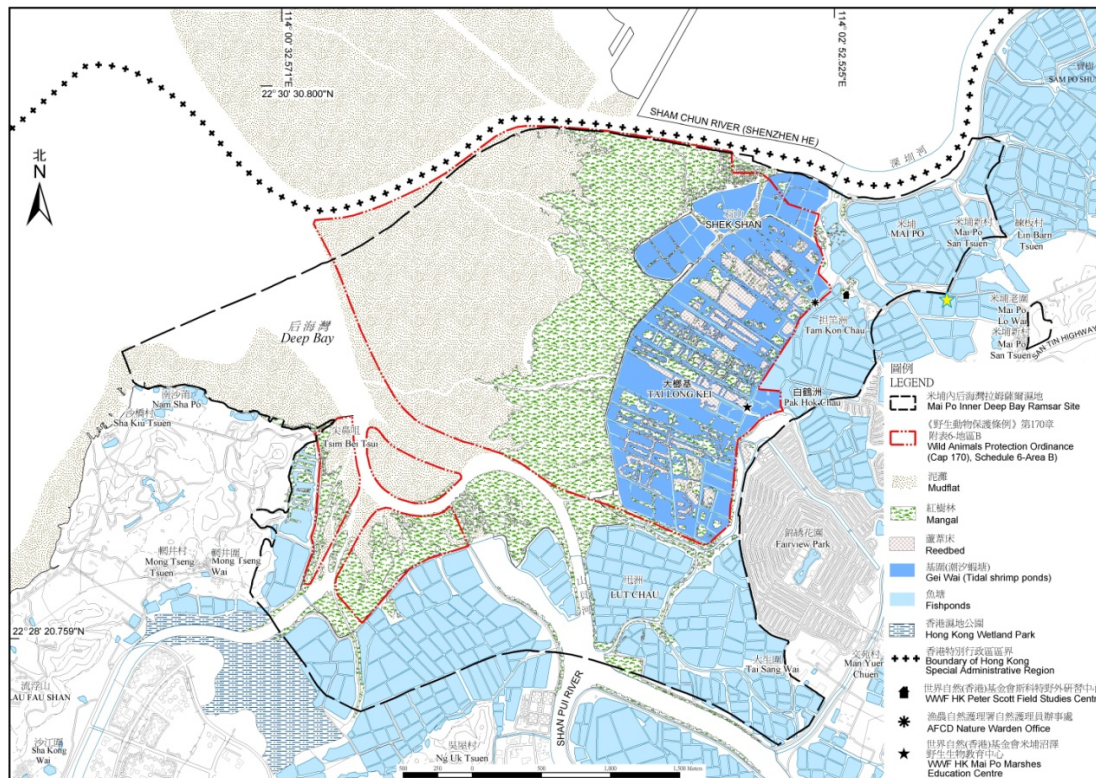
5. Regarding the sludge leakage incident mentioned above, we are aware that grouting was proposed as a mitigation measure for groundwater drawdown in the Environmental Impact Assessment Report issued in 2009. Is grouting currently being undertaken as a mitigation measure? If yes, what would be its effectiveness and would there be any potential impact on the hydrogeology of Mai Po Marshes?

Grouting is currently being undertaken through tunnel segments to seal up subsurface connection paths in order to minimise the groundwater drawdown as one mitigation measure. This measure is effective as the aforementioned monitoring results reveal that there were no noticeable settlements or groundwater drawdown.

6. Whether other tunneling methods or other more environmentally sound options have been considered for the Mai Po site construction.

In the approved XRL EIA report (Chapter 2), alternative construction methods including cut-and-cover, drill-and-blast tunneling and bored tunneling were described and considered. Bored tunneling has the benefit of minimising the disturbance to land, wildlife and public activities at ground level throughout the period of construction. Bored tunneling construction method was selected for the Mai Po section based on geological and engineering factors as well as environmental considerations in particular the need to avoid works areas in ecological sensitive areas, including Mai Po wetlands, Mai Po Inner Deep Bay Ramsar Site, etc. Ecological impact monitoring and groundwater monitoring conducted during tunneling works in Mai Po so far indicates that the local conditions are normal.

A plan showing the Ramsar Site and the Restricted Area





## Groundwater Level Monitoring Results

The groundwater level monitoring results are normal (details in the tables below), no noticeable change before and after the incident. In accordance with the Ground water Monitoring and Contingency Plan, no Alert, Action and Alarm levels were triggered, therefore no action is required.

### **24-30 August 2015:**

Station		Historical Lowest Level	Unit
826_117270_SPP_D261_S1		+1.48	mPD
Station <sup>(1)(2)</sup>	Date	GWL	Unit
826_117270_SPP_D261_S1	24/08/2015	1.93	mPD
826_117270_SPP_D261_S1	25/08/2015	1.99	mPD
826_117270_SPP_D261_S1	26/08/2015	1.98	mPD
826_117270_SPP_D261_S1	27/08/2015	1.86	mPD
826_117270_SPP_D261_S1	28/08/2015	1.94	mPD
826_117270_SPP_D261_S1	29/08/2015	1.90	mPD
826_117270_SPP_D261_S1	30/08/2015	1.94	mPD

Note:

- (1) Active standpipe 826-117270-D261-S1 is currently within the active influence zone of S624 machine but outside the influence zone of S623 machine. Contractor would keep monitoring the condition and consider to plug the standpipe when necessary.
- (2) Other standpipes close to TBM were plugged due to safety reason.

**17-23 August 2015:**

<b>Station</b>	<b>Historical</b>		
	<b>Lowest Level</b>	<b>Unit</b>	
826_117270_SPP_D261_S1	+1.48	mPD	
<b>Station</b> <sup>(1)(2)</sup>	<b>Date</b>	<b>GWL</b>	<b>Unit</b>
826_117270_SPP_D261_S1	17/08/2015	1.91	mPD
826_117270_SPP_D261_S1	18/08/2015	1.93	mPD
826_117270_SPP_D261_S1	19/08/2015	1.91	mPD
826_117270_SPP_D261_S1	20/08/2015	-- <sup>(3)</sup>	mPD
826_117270_SPP_D261_S1	21/08/2015	1.93	mPD
826_117270_SPP_D261_S1	22/08/2015	1.96	mPD
826_117270_SPP_D261_S1	23/08/2015	1.90	mPD

Note:

- (1) Active standpipe 826-117270-D261-S1 is currently within the active influence zone of S624 machine but outside the influence zone of S623 machine. Contractor would keep monitoring the condition and consider to plug the standpipe when necessary.
- (2) Other standpipes close to TBM were plugged due to safety reason.
- (3) No data due to adverse weather.

**10-16 August 2015:**

Station	Historical		
	Lowest Level	Unit	
826_117270_SPP_D261_S1	+1.48	mPD	
Station <sup>(1)(2)</sup>	Date	GWL	Unit
826_117270_SPP_D261_S1	10/08/2015	1.93	mPD
826_117270_SPP_D261_S1	11/08/2015	1.93	mPD
826_117270_SPP_D261_S1	12/08/2015	1.93	mPD
826_117270_SPP_D261_S1	13/08/2015	1.91	mPD
826_117270_SPP_D261_S1	14/08/2015	-- <sup>(3)</sup>	mPD
826_117270_SPP_D261_S1	15/08/2015	-- <sup>(3)</sup>	mPD
826_117270_SPP_D261_S1	16/08/2015	1.94	mPD

Note:

- (1) Active standpipe 826-117270-D261-S1 is currently within the active influence zone of S624 machine but outside the influence zone of S623 machine. Contractor would keep monitoring the condition and consider to plug the standpipe when necessary.
- (2) Other standpipes close to TBM were plugged due to safety reason.
- (3) No data due to adverse weather.

**3-9 August 2015:**

Station		Historical Lowest Level	Unit
826_117270_SPP_D261_S1		+1.48	mPD
Station <sup>(1)(2)</sup>	Date	GWL	Unit
826_117270_SPP_D261_S1	03/08/2015	1.89	mPD
826_117270_SPP_D261_S1	04/08/2015	1.88	mPD
826_117270_SPP_D261_S1	05/08/2015	1.87	mPD
826_117270_SPP_D261_S1	06/08/2015	1.90	mPD
826_117270_SPP_D261_S1	07/08/2015	1.93	mPD
826_117270_SPP_D261_S1	08/08/2015	1.91	mPD
826_117270_SPP_D261_S1	09/08/2015	1.89	mPD

Note:

- (1) Active standpipe 826-117270-D261-S1 is currently within the active influence zone of S624 machine but outside the influence zone of S623 machine. Contractor would keep monitoring the condition and consider to plug the standpipe when necessary.
- (2) Other standpipes close to TBM were plugged due to safety reason.