

Legislative Council Panel on Transport
Subcommittee on Matters Relating to Railways

Overhead Line Incident
on MTR East Rail Line on 18 May 2017

On May 18 2017, a fault occurred on the overhead line of the MTR East Rail Line (“ERL”), resulting in train service suspension between Hung Hom and Sha Tin stations. Train service was maintained between Sha Tin and Lo Wu and Lok Ma Chau stations at reduced frequencies. Upon urgent recovery, the area affected by service suspension was gradually reduced before the afternoon peak hours. Train service on the whole line gradually resumed after about 4 hours and 26 minutes. The Intercity Through Train service was also affected, with some trips delayed or cancelled.

2. This paper briefs the Subcommittee on the sequence of events, contingency arrangement, preliminary investigation findings and follow-up actions regarding the incident.

Sequence of events

3. At around 3 p.m. on 18 May 2017, the overhead line between Hung Hom and Tai Wai stations on ERL tripped, affecting power supply to that section. The protection system was automatically triggered¹. As a result, train service between Hung Hom and Sha Tin stations was immediately suspended. The MTR Operations Control Centre (“OCC”) immediately deployed trains to maintain service between Sha Tin and Lo Wu stations at 8-minute intervals and between Sha Tin and Lok Ma Chau stations at 15-minute intervals.

¹ When an irregularity is detected in the railway system, the protection system will automatically stop the train service, which can only be re-activated after conducting inspection and repair by maintenance staff. The purpose is to avoid the occurrence of more serious incidents and ensure passenger safety, but service disruption or suspension is inevitable in the circumstances. In terms of the power supply system, the protection system will cut off the power supply when it is in unstable condition, such as circuit overload or short circuit. Accordingly, train service will be suspended.

4. Around 30 minutes later (i.e. around 3:30 p.m.), OCC successfully resumed the power supply for and subsequently the service of the section between Tai Wai and Kowloon Tong stations. Train service between Kowloon Tong and Lo Wu stations and between Kowloon Tong and Lok Ma Chau stations was maintained at 10-minute intervals and 20-minute intervals respectively. The area of service suspension was confined to the section between Hung Hom and Kowloon Tong stations.

5. After the occurrence of the incident, a train departing from Hung Hom Station for Mong Kong East Station stopped at around 400 meters from the latter. Backup power supply was immediately activated for emergency lighting and ventilation on train. As the overhead line power supply at the section between Hung Hom and Mong Kok East stations was not yet re-energised, platform detrainment could not be arranged. After confirming this section was de-energised and no train was on track to ensure track access safety, OCC arranged around 110 passengers on the train to proceed to the track and walk to Mong Kok East Station platform at around 3:55 p.m..

6. At around 5:23 p.m., with further recovery carried out by OCC and maintenance staff, the area with service suspension was further confined to the section between Hung Hom and Mong Kok East stations. Service between Mong Kok East and Lo Wu stations and between Mong Kong East and Lok Ma Chau stations was strengthened to 4-minute intervals and 12-minute intervals respectively.

7. During inspection and urgent recovery, maintenance staff discovered damage at a section of the overhead line between Hung Hom and Mong Kok East stations. A pantograph² of the train stalled at 400 meters away from Mong Kong East Station referred to in paragraph 5 was also found damaged, which was believed to have caused the tripping according to initial observation. Maintenance staff immediately carried out recovery by temporarily fixing the damaged overhead line and pantograph, while arranging the concerned train to return to the depot for detailed examination. Temporary recovery work was completed at around 7 p.m.. After further examining the concerned overhead line, as well as confirming that the power supply resumed to normal for the operation of the whole railway line and that safety check procedures were completed, train service on ERL gradually resumed to normal starting

² Pantographs are installed on the roof of trains and electricity is supplied to trains from overhead line via pantographs.

from 7:26 p.m.. Maintenance staff conducted detailed examination on the concerned overhead line and replaced damaged components to ensure safety after close of traffic on that day.

8. Due to the incident, five trips of north-bound and seven trips of south-bound Intercity Through Trains were delayed, of which one south-bound and one north-bound trip were cancelled.

9. The sequence of events is at Annex 1.

Contingency arrangement during the incident

10. MTRCL has established contingency plans for various kinds of incidents for execution by the staff in different divisions and stations when incident occurs. The contingency arrangement in the event of railway service disruptions is at Annex 2. Upon the occurrence of the incident on 18 May, MTRCL took the following actions according to this plan to minimise the impact of the incident on passengers –

(a) Notification and information dissemination

11. At 3:04 p.m. on 18 May (i.e. within 4 minutes after the incident took place), MTRCL notified the Transport Department (“TD”) once the incident was expected to last for 8 minutes or more. When MTRCL ascertained that the railway section could not be re-energised within a short period of time and that train service would be disrupted for 20 minutes or more, a “Red Alert” message on major service disruptions was issued at 3:09 p.m. to inform TD and the media of the incident, so that TD could coordinate other public transport operators to strengthen their services and divert passengers. MTRCL also notified passengers of the service disruption on ERL via the MTR Mobile App “Traffic News” at 3:10 p.m., and provided information on alternate public transport services as well as free MTR shuttle bus services via broadcasting in stations and on trains; signage inside stations and on the roads, as well as the Service Information Panel near station entry gates.

12. MTRCL further updated the public on the latest train service information via “Traffic News” and the media. MTRCL also made announcement via these channels when the ERL service gradually resumed at 7:26 p.m..

(b) Manpower Deployment

13. During the incident, MTRCL deployed around 400 staff members (including operating and station staff, members of the Customer Service Support Unit and Customer Service Rapid Respond Unit) to assist passengers at various affected stations of ERL. They assisted in the detrainment of passengers along tracks to reach the platform, crowd management, guiding passengers to take shuttle buses, etc. MTRCL also deployed around 50 maintenance staff members to carry out inspection and recovery at the scene.

(c) Free shuttle bus service

14. MTRCL arranged a total of 126 free shuttle buses during the incident, providing service along the section where railway service was suspended. Service was provided between Shatin and Kowloon Tong from 3:33 p.m. to 4:12 p.m., and between Kowloon Tong and Hung Hom from 3:55 p.m. to 8 p.m.. A total of 295 bus trips were operated, carrying more than 10 000 passengers affected by the incident. Details of the free shuttle bus service are at Annex 3. Large panels providing information on shuttle bus service were displayed at affected stations to guide passengers to use the free shuttle bus service.

15. Free shuttle bus service is a supplementary measure to bring passengers to the nearest MTR station outside the affected section of a railway line to continue with their journeys, with a view to mitigating inconvenience to passengers. The carrying capacity of shuttle buses is limited and it cannot replace normal railway service. Hence, during the incident, there were quite a large number of passengers waiting at the free shuttle bus stops and it took time to relieve the queue.

(d) Other transport services

16. Upon receiving the notification of the incident from MTRCL, in view of the seriousness of the incident, the Emergency Transport Coordination Centre (“ETCC”) of TD escalated its operation to Tier 2 mode³ and deployed more staff to work in the Centre, to better coordinate other public transport services and formulate traffic and transport contingency plans. According to TD, under its coordination, service of

³ Under normal circumstances, ETCC operates round the clock under Tier 1 mode in handling daily minor traffic accidents. If there are small-scale and planned activities, serious road and tunnel accidents or serious or widespread public transport service disruptions, ETCC will escalate its operation to Tier 2 mode and deploy more staff to work in the Centre.

11 franchised bus routes was strengthened during the incident to assist in serving the affected passengers. Details are at **Annex 4**. At the same time, TD deployed personnel to major affected MTR stations, including Hung Hom, Mong Kok East and Kowloon Tong stations, to observe the situation on site and the deployment of shuttle buses by MTRCL during the incident.

17. Besides, ETCC also made announcement at the Cross-Harbour Tunnel and Aberdeen Tunnel to provide drivers with information on road traffic as soon as possible.

Preliminary investigation findings and follow-up actions

18. MTRCL is conducting a detailed investigation and has engaged an independent expert to assist with the investigation. Preliminary findings indicate that the overhead line fault was caused by a damaged pantograph of the train referred to in paragraph 5 above which got entangled with the overhead line and subsequently pulled it down as the train moved. This resulted in the short-circuiting and power-tripping, triggering the protection system to cut off the power supply.

19. MTR has put in place a stringent and established maintenance regime. Train components are regularly checked, repaired and renewed to ensure trains are in good condition. MTR trains are subject to a routine inspection on average every month, covering the train roof, equipment underneath the train and various information system on-train. Train captains conduct a preparation test before each train enters into service, to ensure all systems and equipment are in good condition and proper working order, including the brake-system, door operation, elevating and lowering of pantographs, etc. MTR maintenance staff conduct inspection at the pantographs in every 21 days and replace the worn-out components where necessary. MTR maintenance staff conducted routine inspection at the concerned pantograph on 29 April this year (i.e. 19 days before the incident) and confirmed that the pantograph was in normal condition. The concerned pantograph comprises various components and the concerned component (being a carbon strip which collects electricity through contact with the overhead line) was made in the United Kingdom. The concerned component was put into service on some ERL trains since 2014 and there are 26 pieces of pantographs fixed with such components in total. MTRCL is working with the supplier of the concerned component and the independent expert to find out the cause of the damage. This would take around two

months. MTR maintenance staff completed the fleet check of the remaining 25 pantographs fixed with carbon strips of the same model on 20 May and confirmed that they were in normal condition. Nonetheless, as a precaution, MTR maintenance staff would replace all the 25 pantographs with those of the original pre-2014 model. The replacement is expected to be completed by early June.

20. MTR maintenance staff inspected the overhead line components of the concerned section with a track and overhead-line inspection vehicle on 22 April this year and with an aerial working platform vehicle in October last year. Both inspections confirmed that the overhead line of the incident section was normal. Preliminary investigation findings indicated the incident was caused by the damaged pantograph which pulled down the overhead line, but not the fault of the overhead line equipment *per se*.

21. Upon completion of the investigation, MTRCL will submit a report to the Electrical and Mechanical Services Department (“EMSD”), providing an account of the cause of the incident and subsequent follow-up actions. EMSD will review MTRCL’s report and request MTRCL to take improvement actions accordingly to prevent recurrence of similar incidents. EMSD has also separately engaged an independent expert to advise on the incident investigation. MTRCL will also submit a report to TD on the incident’s impact on railway service and the effectiveness of the contingency measures taken. TD will review the report and examine together with MTRCL the service arrangement during the incident, with a view to improving the arrangements in handling similar incidents in future.

22. Railway is powered by electricity and power supply is a major part of the railway system. The power supply system comprises various segments and components, including the power supply network of the two local electricity supply companies, substations, overhead line above tracks, train pantographs and power cables on trains. Electricity is transmitted to MTR trains from the utility grid of electricity supply companies via these components. The asset lives and conditions of the overhead line above tracks and train pantographs are subject to the impact of various factors (such as their operating environment, usage, etc). In daily operation, pantographs collect power through contact with the overhead line. There will be wear-and-tear on pantograph components due to the friction made in these contacts. Regular maintenance and replacement of these consumable components is therefore necessary to ensure that power supply system operates in good

condition. The overhead line power supply system of the MTR network is commonly adopted by other metro systems around the world. As a railway power supply system consists of a wide range of components, train service delay caused by faulty components of the power supply system is an issue commonly encountered by all metro systems around the world.

23. MTRCL has put in place a stringent maintenance regime for its power supply system (including overhead line and train pantographs) to minimise risks of train service delay caused by faulty components as far as possible. In case of component fault, MTRCL will look into the cause in detail, with a view to avoiding recurrence of similar incidents. The number of incidents caused by pantograph fault, and lasting for 8 minutes or more, in the past five years (i.e. from 2012 to 2016), is 0, 1, 1, 0 and 1 respectively⁴. MTRCL conducted reviews after each incident and sought to enhance the quality monitoring of some components by strengthening the procurement, quality control and maintenance cycles of these components. The last incident caused by a damaged pantograph which resulted in delay in train service occurred in January 2016, causing a 48-minute delay in train service.

24. MTRCL will set aside \$7.5 million for this approximately 4-hour-26-minute service delay under the Service Performance Arrangement (“SPA”). The proceeds will be used for fare concessions in 2018 in accordance with SPA.

25. MTRCL has put in place a maintenance regime internationally recognised as being high standard. MTRCL’s asset management system (including regular maintenance of trains, signalling system, power supply system and tracks) has been accredited with the ISO55001 certification. This standard is internationally recognised as one of the most stringent standards. Independent expert audit is conducted for the asset management system at least once every year, with repair and maintenance work covered. The latest audit was completed in November 2016, confirming that the overall performance of MTRCL’s asset management system satisfies international standards.

⁴ The overhead line incident on Kwun Tong Line on 10 April 2017 was caused by a loosened support component of an overhead line (please refer to the paper submitted by MTRCL to the Subcommittee in April 2017, with document number CB(4)890/16-17(03)), which is different from the cause of the current incident on ERL. In the past 5 years, the number of incidents caused by faulty overhead line component is 1, 2, 5, 2, 2 respectively.

26. MTRCL has been providing safe and reliable railway service which is internationally recognised, with the Passengers Journey On-time maintained at 99.9%. Nonetheless, MTRCL will continue to use its best endeavours to improve service quality. MTRCL apologises to the passengers who were affected by this service disruption. MTRCL will conduct an in-depth investigation into the incident to prevent recurrence of similar incident.

MTR Corporation Limited
May 2017

**Overhead line incident on MTR East Rail Line
Sequence of events**

Time	Events
3 p.m.	The overhead line between Hung Hom and Tai Wai stations tripped, the protection system was automatically triggered and train service between Hung Hom and Sha Tin stations was immediately suspended. Train services between Sha Tin and Hung Hom stations and between Sha Tin and Lok Ma Chau stations were maintained at 8-minute intervals and 15-minute intervals respectively.
3:10 p.m.	MTRCL notified passengers of the service disruption on ERL via the MTR Mobile App “Traffic News”.
3:30 p.m.	OCC successfully resumed the power supply for the section between Tai Wai and Kowloon Tong stations and the area affected by service suspension was confined to the section between Kowloon Tong and Hung Hom stations. Services between Kowloon Tong and Lo Wu and between Kowloon Tong and Lok Ma Chau stations were maintained at 10-minute intervals and 20-minute intervals respectively.
5:23 p.m.	The area with service suspension was further confined to the section between Hung Hom and Mong Kok East stations. Services between Mong Kok East and Lo Wu stations and between Mong Kok East and Lok Ma Chau stations were at 4-minute intervals and 12-minute intervals respectively.
7 p.m.	Urgent recovery work was completed with the damaged overhead line and pantograph temporarily fixed.
7:20 p.m.	The concerned train was arranged to return to the depot for examination.
7:24 p.m.	All safety check procedures were completed.
7:26 p.m.	Train service on ERL gradually resumed to normal.

MTRCL's contingency plans for railway service disruptions

Purpose

The MTRCL has drawn up contingency plans for various service disruption situations specific to the needs of individual stations. They are made available to the staff assigned to contingency duties. For information that is of use to passengers, it is made available to them in stations and in the Internet. This note gives an account of the MTRCL's contingency plans for railway service disruptions.

Handling of railway service disruptions

2. When a serious incident happens and is expected to lead to a prolonged suspension of railway services for 20 minutes or more, the MTRCL will issue a "Red Alert" message to inform Government departments including the TD, other public transport operators and media organisations of the incident. Upon notification by the MTRCL, other public transport operators will provide appropriate supportive services as best as they can under the co-ordination of the TD. On its part, the MTRCL will suitably adjust its railway service to minimise impact and arrange free MTR shuttle buses to carry passengers from the affected stations to convenient locations, such as the nearest MTR station with railway service still in operation.

Alert System

3. "Red Alert" is defined as a signal which denotes that serious railway service disruption will continue or is expected to continue for 20 minutes or more, and emergency transport support services from other public transport operators are required. Upon being alerted, public transport operators will urgently mobilise their resources to provide appropriate supporting services as quickly as possible.

4. Prior to the issuance of a Red Alert message, the MTRCL may issue an "Amber Alert" message. "Amber Alert" is defined as an early warning in respect of an incident which may lead to a serious disruption

of service. After receiving this Alert, other public transport operators will alert their emergency unit, get prepared for possible emergency actions which may be demanded for at short notice and keep close contact with the MTRCL.

5. The MTRCL is also required to notify TD within 8 minutes on any service disruption incident which has lasted for 8 minutes or is expected to last for 8 minutes or more. Train service disruption incidents refer to those incidents that lead to a suspension or delay of service at a railway station or a Light Rail stop, or on a section of a railway line.

6. Besides, according to the Mass Transit Railway Regulations (Cap. 556A), the MTRCL shall report to the EMSD any incident that occurs at any part of the entire railway premises and which has a direct bearing on the safe operation of the railway.

Dissemination of information during incident

7. Regarding dissemination of information to passengers, the MTRCL has formulated measures to ensure effective communication with passengers during service disruption, with a view to assisting them to make appropriate alternative travel arrangements. These measures include:

- (a) broadcasting details of the service situation at stations and in trains;
- (b) providing information of alternative public transport service such as franchised bus routes, bus stop locations and free MTR shuttle bus boarding/alighting points on large information displays installed at stations;
- (c) displaying signs from concourse ceilings and at street level to mark routes to free MTR shuttle bus boarding/alighting points when free shuttle bus service is ready;
- (d) during service disruption, using LCD screens installed at visible locations near station entry gates of to provide train service information and other important notices;

- (e) posting railway service disruption message and information on free MTR shuttle bus services on the MTR website and MTR Mobile App “Traffic News”;
- (f) displaying alternative public transport information on maps in the concourse of affected stations; and
- (g) distributing “Rail Service Suspension – Passenger Guide” to passengers.

Operation of train and free MTR shuttle bus during serious railway service disruptions

8. In the event of serious service disruption, the MTRCL will endeavour to minimise the area being affected and provide train service to the farthest extent by:

- (a) reversing trains at designated track sections to maintain train service in unaffected sections;
- (b) diverting trains through supplementary track sections to bypass the affected section;
- (c) diverting trains across lines through designated track sections to reduce the impact of service disruption; and
- (d) diverting trains through spare track sections to reduce the impact of service disruption (for example, when the cross-harbour section of Tseung Kwan O Line is suspended, depending on which section is affected, cross-harbour train service can be maintained via the Service Connection Tunnel of Kwun Tong Line to provide linkage between Lam Tin Station and Quarry Bay Station).

9. The MTRCL has formulated free shuttle bus deployment plans for railway incidents and agreements have been entered into with bus operators for the provision of such services during railway incidents to take affected passengers to the nearest MTR station still under normal operation to continue their journeys.

Operation of free MTR shuttle buses

10. Free MTR shuttle bus service is a supplementary measure to assist passengers to travel to convenient locations. Given the limited carrying capacity of shuttle buses, it is not intended to be a substitute for normal train service. It brings passengers to the nearest station outside the affected section of a railway line where service is disrupted, to enable them to continue with their journeys. Shuttle buses would also stop at stations in the affected section to provide services to passengers.

Activation of free MTR shuttle bus services

11. The number of free MTR shuttle buses and the level of shuttle bus service to be deployed during a railway incident will depend on which section of the railway line is involved and the seriousness of the situation. Generally speaking, according to the agreement between the MTRCL and the Public Omnibus Operators Association (POOA)⁵, when free MTR shuttle bus service is needed, the POOA will arrange about 7 buses to provide service within 30 to 45 minutes after receiving the MTRCL's notification; an additional 40 buses, if required, will be deployed within 1 to 1.5 hour; and about 100 buses in total after 2 to 2.5 hours. The actual number of buses to be deployed will depend on the extent of impact to train service and road traffic condition. Depending on the actual situation, the MTRCL may operate additional shuttle buses or modify the operating details of shuttle bus services to suit the need of the affected passengers.

12. Information on the estimated arrival time, locations of and routes to boarding and alighting points of free MTR shuttle buses is included in MTRCL's "Rail Service Suspension – Passenger Guide" which is tailor-made for each station for distribution in the station. The Guide is also uploaded to MTRCL's website (http://www.mtr.com.hk/en/customer/services/needs_index.html).

13. Since the carrying capacity of shuttle buses is far below that of the railway, they can only serve as a support service to assist affected passengers to continue with their journeys. It is not possible for shuttle buses to serve as replacement for the entire railway service. Therefore, lines queuing for such bus service are expected and most passengers may

⁵ POOA is the confederation of non-franchised public bus operators in Hong Kong. At present, more than 200 non-franchised operators are members of the POOA, and together having a fleet of about 4 000 buses which accounts for about 60% of the total non-franchised buses operating in Hong Kong.

have to change to other unaffected MTR lines or take alternative public transport services to travel to their destinations.

Manpower Deployment

14. In response to a service disruption incident, the MTRCL staff would be on duty at each MTR station to carry out crowd management duties, make public announcements, issue station notices and help passengers on fare matters according to the established procedures in times of incidents. The number of station staff will be increased as needed.

15. The MTRCL has also established a dedicated Customer Service Rapid Response Unit (“CSRRU”) with around 90 members to provide additional support focusing on customer service on top of the manpower stationed at individual stations. The MTRCL will from time to time review the number of team members of the CSRRU as necessary.

16. Upon calling out the free MTR shuttle bus services during serious service disruption, the Operations Control Centre (“OCC”) of the MTRCL will mobilise team members of CSRRU to affected stations to provide extra support on:

- setting up facilities for the implementation of free MTR shuttle bus services;
- maintaining order at affected stations and free MTR shuttle bus boarding/alighting points;
- making timely reports to the OCC during incidents to facilitate more effective co-ordination with relevant Government departments such as the Police for better crowd management;
- handling enquiries and advising passengers on alternative routes and transport choices; and
- providing guidance and assistance to passengers.

17. Upon notification of deployment, CSRRU team members will proceed to the affected stations by the best available means of transport, including taxi. The first team would likely arrive within 20 minutes in most cases according to past experience. CSRRU team members are easily identifiable in their pink vests.

Regular review and updating

18. The MTRCL will continue to regularly review and update its contingency plans for railway service disruption in consultation with relevant Government departments, in the light of operational experience gained.

**Provision of free shuttle bus service during
the overhead line incident on MTR East Rail Line**

Shuttle Bus Service	Bus Service during Service Disruption		
	Operation details	Departure Time	Arrival Time
Route E3A/K80S – Plying between Shatin and Kowloon Tong Service Hour: from 3:33 p.m. to 4:12 p.m.	Frequency: 2 to 3 minutes Number of departures from Shatin: 11 Number of departures from Kowloon Tong: 9 Number of passengers carried from Shatin: 100 Number of passengers carried from Kowloon Tong: 240 Number of buses deployed: 20	First departure from Shatin: 3:45 p.m. First departure from Kowloon Tong: 3:33 p.m. Last departure from Shatin: 4:12 p.m. Last departure from Kowloon Tong: 4:11 p.m.	Last departure arriving Shatin: 4:30 p.m. Last departure arriving Kowloon Tong: 4:30 p.m.
Route E00 – Plying between Hung Hom and Kowloon Tong Service Hour: from 3:55 p.m. to 8 p.m.	Frequency: 1 to 9 minutes Number of departures from Hung Hom: 174 Number of departures from Kowloon Tong: 101 Number of passengers carried from Hung Hom: 6328	First departure from Hung Hom: 4:05 p.m. First departure from Kowloon Tong: 3:55 p.m. Last departure from Hung Hom: 8 p.m. Last departure from Kowloon	Last departure arriving Hung Hom: 8:09 p.m. Last departure arriving Kowloon Tong: 8:16 p.m.

Shuttle Bus Service	Bus Service during Service Disruption		
	Operation details	Departure Time	Arrival Time
	Number of passengers carried from Kowloon Tong: 4169 Number of buses deployed: 118	Tong: 8 p.m.	

Annex 4**Franchised bus routes with strengthened services
during the overhead line incident on MTR East Rail Line**

Route Number		Origin	Destination	Number of vehicles allocated	Number of additional vehicles allocated
1	72X	Mong Kok (Park Avenue)	Tai Po Central	17	1
2	81	Jordan (To Wah Road)	Wo Che	17	3
3	87D	Hung Hom Station	Kam Ying Court	30	2
4	170	Wah Fu (Central)	Sha Tin Station	15	8
5	182	Central (Macau Ferry)	Yu Chui Court	23	2
6	270A	Tsim Sha Tsui East (Mody Road)	Sheung Shui	25	3
7	271	Tsim Sha Tsui (Canton Road)	Fu Heng	25	4
8	281M	Kowloon Tong (Suffolk Road)	Sun Tin Wai	6	3
9	307	Central (Ferry Piers)	Tai Po Central	35	3
10	680	Admiralty Station (East)	Lee On Estate	21	4
11	798	Fo Tan (Shan Mei Street)	Tiu Keng Leng Station	10	2
Total				224	35