

5.3.2 The proposed monitoring boreholes at KTAC are evenly allocated in the KTAC. These boreholes are distributed in two rows with 5 monitoring boreholes in each row. In the event that the measured methane emission rate is higher than the maximum safe rate of gas emission, additional monitoring boreholes in between the adjacent boreholes may be required.

5.3.3 The biogas assessment of the EIA concluded that the methane potential in KTTS and Hoi Sham areas was lower than that in KTAC. It is proposed to install approximately 20 monitoring boreholes for the Hoi Sham reclamation and 10 monitoring boreholes for the KTTS reclamation. The boreholes should be evenly distributed across the areas.

5.4 Monitoring for Biogas after Reclamation

5.4.1 Monitoring of the methane, carbon dioxide and oxygen levels at the monitoring boreholes as shown in **Drawing No. 22936/EN/145** should be carried out on a monthly basis. The purposes of the monitoring are:

- to detect the actual methane emission rate after reclamation and to confirm the biogas assessment results;
- to confirm if there is any constraint to the future development due to methane hazards; and
- to identify the suitable protection measures or any additional protection measures to be incorporated into the design stage so as to safeguard the future development.

5.4.2 The monitoring should be implemented prior to commencement of the construction works and may be extended throughout the construction period. The duration for borehole monitoring would depend on the actual methane emission rate. The monitoring data should cover the flow rate of methane measured during the low atmospheric conditions to confirm whether there is any exceedance of the maximum safe rate of gas emission (10 l/m²/d) under unusual conditions. The trend of the monitoring results should be analysed. Continuous monitoring would be required if an increasing trend of the flow rate in a particular area were found. Monitoring should continue until the measured methane emission rate is consistently lower than the maximum safe rate of gas emission. The exact monitoring duration should be agreed and confirmed with EPD.

5.5 Monitoring for Biogas during Construction

5.5.1 With reference to the *Landfill Gas Hazard Assessment Guidance Note*, methane gas should be monitored periodically in all excavations, manholes, chambers and confined areas during construction. In order to safeguard the personnel on-site during the construction phase of the development, excavations of 1m depth or more and all poorly ventilated areas should be monitored for methane, carbon dioxide and oxygen. Other toxic gases such as hydrogen sulphide and carbon monoxide should also be monitored.

5.6 Monitoring for Biogas in Buildings

5.6.1 Routine monitoring should be carried out in void space of those buildings with protection measures implemented. Rooms with poor ventilations, unventilated areas, basements, basement car parks, etc. should be monitored in order to check the effectiveness of the implemented protection measures. The parameters to be monitored should include methane, carbon dioxide and oxygen.

5.6.2 Methane gas may penetrate into buildings through conduits, pipes, sewer drains and storm drains of the underground services. Utility voids of the underground services should be monitored periodically. Monitoring frequency should be reviewed quarterly and be agreed with EPD.

5.6.3 The requirement for biogas monitoring during the operational phase of the development should be established based on the detailed design of the development and the borehole monitoring results. Consultation with EPD to set up the requirement would be necessary.

5.7 Limit Levels and Action Plan for Biogas Monitoring

5.7.1 Table 5.1 summarises the limit levels and action plan for biogas monitoring during construction.

Table 5.1 Limit Levels and Action Plan for Biogas Monitoring during Construction Phase

Parameter	Limit Level	Action
Methane	> 0.5% v/v (or > 10% LEL)	<ol style="list-style-type: none"> 1. Prohibit smoking, all fires and naked flames. 2. Post warning signs. 3. Increase ventilation to lower the methane level to less than 0.5% v/v.
	> 1% v/v (or > 20% LEL)	<ol style="list-style-type: none"> 1. Stop all the construction activities in the affected area. 2. Evacuate personnel who are working in the affected area. 3. Prohibit entry to the affected area. 4. Increase ventilation to lower the methane level to less than 0.5% v/v.
Carbon Dioxide	> 0.5% v/v	<ol style="list-style-type: none"> 1. Increase ventilation to lower the carbon dioxide level to less than 0.5% v/v.
	> 1.5 % v/v	<ol style="list-style-type: none"> 1. Extinguish all fires and naked flames. 2. Stop all the construction works in the affected area. 3. Evacuate personnel in the affected area. 4. Prohibit entry to the affected area. 5. Increase ventilation to lower the carbon dioxide level to less than 0.5% v/v.
Oxygen	≤ 18% v/v	<ol style="list-style-type: none"> 1. Stop all the construction activities in the affected area. 2. Evacuate personnel in the affected area. 3. Prohibit entry to the affected area. 4. Increase ventilation to increase the oxygen level to above 18% v/v.

5.8 Biogas Mitigation Measures

5.8.1 Mitigation measures for control of biogas would be required for no dredged reclamation and minimum dredged reclamation. The recommended environmental mitigation measures for the sediment treatment are presented in **Appendix A** of the EM&A Manual and the provision therein would be properly enforced. Relevant mitigation measures are also detailed as follows:

No Dredged Reclamation

No Sediment Treatment

5.8.2 Precaution measures for construction site:

- Provision of safety measures for works to be carried out in confined space;
- Monitoring of the methane, carbon dioxide and oxygen levels in excavated areas and areas below ground;
- Provision of adequate ventilation in temporary structures;
- No smoking and open fire in region where drilling activities are carried out; and
- Provision of vent pipes to collect and vent off the accumulated methane gas to atmosphere should high methane concentrations be detected.