

INFORMATION BULLETIN

BU-055

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Methane Gas Mitigation

This Bulletin is developed to clarify City regulations related to construction on private property (not within the public right-of-way) requiring implementation of methane gas mitigation measures. Construction in the vicinity of oil and gas wells and in areas near landfills can trigger methane gas mitigation requirements in accordance with Chapter 18.79 of the Long Beach Municipal Code (LBMC).

Permit Applicants (Applicants) are advised to review the City's methane gas zone GIS map (Attachment 1) and the standards set forth in this Bulletin prior to submitting a project to the City. Based on the result of site soil investigations and, levels of methane gas concentration and pressure detected in the soil (Attachment 2), three (3) different levels of methane gas mitigation will be required.

Due to the complex nature of required mitigation measures, additional City staff review, and inspection work should be anticipated. Applicant shall hire Qualified Professional/s who will be responsible for the required mitigation, soil testing, membrane leak testing, and other mitigation as deemed necessary for projects involving methane gas.

The City has developed a prescriptive set of standard details for methane gas mitigation (Attachment 3), for Applicants to use, however, if an Applicant wishes to deviate from the City prescriptive standards, then Applicant shall submit their proposed system for the City's review through a code modification in accordance with LBMC Chapter 18.79.

Process to obtain grading/building approval on projects within the methane gas zone:

Project Entitlement/Pre-plan check Submittal Phase:

Applicants should check the City's methane gas zone GIS map ([Link](#)), review this Bulletin, and Chapter 18.79 of the LBMC to determine if a project requires methane mitigation, whether the requirements are waived pursuant to Section 18.79.030 of the LBMC, or if the project is exempt per Section 18.79.40 due to the nature and size of the project. If a project is not exempt or the requirements are not waived, then the project Applicant is required to retain the services of a Qualified Professional to conduct a soil gas investigation. The Qualified Professional is required to conduct the investigation in accordance with general engineering practices and is required to complete a Certificate of Compliance for Methane Test Data (Attachment 4). This certificate shall identify site methane gas testing and the detected concentration and pressure of methane gas on the site. The Qualified Professional shall also prepare the project methane mitigation plan/report. A Certificate of Compliance for Methane Test Data shall be printed on the methane mitigation plan.

The City Building and Safety Plan review staff will review the soil gas investigation and will provide comments or approve the project methane gas mitigation plan/report in conjunction with the grading or building plans.

If methane gas levels are below the levels indicated in Attachment 2, no mitigation will be necessary and said information shall be noted on the project plans by the Applicant. If methane mitigation is necessary:

- Applicant can submit a methane mitigation plan in accordance with the City prescriptive standards and in conjunction with the project grading or building plans to plan check. The submittal shall include any and all components of the proposed active or passive methane mitigation system (membrane barrier, piping, probes, vents, gas detection system, and signage). A membrane installation contractor manufacturer's approval letter shall also be submitted with the methane mitigation plans.
- Should the Applicant wish to deviate from the City's prescriptive standards, a code modification must be submitted to the Building Official. Fire Marshal review of proposed code modifications will also be required for the active methane systems, integrating sensors, and alarm systems. A Hansen application (BFFS) will be submitted for the code modification.

Project plan review phase:

- Applicant submits the project plans and the site methane gas test results for projects that require methane gas mitigation to plan check and will receive a project number (BGRD, BRMD, BNEW).
- Plan check staff reviews the project for compliance with the City prescriptive methane gas standards during project grading or building plan submittal.
- If a code modification is requested and the City prescriptive standards are deviated from, the code modification shall be approved prior to final approval of plans or permit issuance. A peer review service may be required based on the complexity of the proposed mitigation measures.
- Fire Department plan check, and inspection of active methane systems integrating sensors and alarm systems is required. The alarm and sensor mitigation plans can be provided as a deferred submittal for fire plan review to confirm supervisory and alarm level activation, wiring, response relay, and battery backup calculations. The methane sensors shall report low- and high-level alarms to the methane panel. A low-level shall indicate a supervisory response to the on-site engineering office and a high-level shall sound a local alarm in the area of methane detection and an evacuation of the area.

Project construction/inspection phase:

- Following the completion of plan review and issuance of project grading or building permits, a preconstruction meeting shall be requested by the Applicant. City inspection staff will attend the meeting to establish requirements for the project, such as membrane installation, smoke testing of the membrane, and other inactive or active methane system/s inspection requirements. Methane active systems requires Fire Dept staff attendance at the preconstruction meeting.

- The project Applicant will proceed with the methane mitigation installation and calls for inspection. City inspection staff will provide the necessary inspections, including a methane barrier leak test inspection.
- Project Applicant will submit a recorded covenant (Attachment 5) to the City prior to grading/building final inspection, whichever occurs first. The City inspector will attach the covenant to the project in Hansen prior to project final.

Project post-construction phase:

- The Applicant or project owner will be responsible for all post-construction monitoring of methane gas on site.
- An Operation, Monitoring, and Maintenance (OMM) Plan is required. The monitoring and maintenance of all methane mitigation systems shall remain the responsibility of the property owner. The Applicant or project owner is ultimately and solely responsible for the subsequent tenancies and maintaining the integrity of the methane gas mitigation system. The City of Long Beach does not conduct such services.
- Methane detection systems inspection and testing of methane gas detection systems shall be conducted not less than annually. Sensor calibration shall be confirmed at the time of sensor installation and calibration shall be performed at the frequency specified by the sensor manufacturer." After the initial acceptance test, the annual tests are required to be conducted by the Applicant or project owner.
- The Qualified Professional shall be responsible for evaluating other agencies permit requirements, such as the County of Los Angeles Health Department and South Coast Air Quality Management District (SCAQMD). For more information regarding SCAQMD permit requirements and possible exemptions, contact the permitting staff at <http://www.aqmd.gov/nav/contact/permitting-staff>. The typical exemption from this requirement is as follows:

Rule 219(c)(10) – Passive and intermittently operated active venting systems used at and around residential structures to prevent the accumulation of naturally occurring methane and associated gases in enclosed spaces.

Rule 219(c)(11) – Sub-slab ventilation systems including associated air pollution control equipment with an aggregate flow rate of less than 200 standard cubic feet per minute (scfm) where vacuum suction pits do not penetrate more than 18 inches below the bottom of the slab, provided the inlet total organic compounds concentration does not exceed 15 parts per million by volume (ppmv), measured as hexane, and provided the ventilation system is connected to air pollution control equipment consisting of a carbon absorber sized to handle at least 200 scfm, or equivalent air pollution control.

Testing, Design, and other technical provisions of Methane Gas Mitigation:

Site soil testing – (Referenced in LBMC Section 18.79.030)

- Initial, Shallow Soil Testing:

- o Minimum of two (2) tests per site or one (1) per ten thousand (10,000) square feet of site area, or portion thereof. Probes shall be installed no less than four (4) feet below ground surface (ft bgs). Where groundwater is less than four (4) ft bgs, probes shall be installed above the ground water level
- o Probes shall be constructed in accordance with Department of Toxic Substances Control (DTSC) Advisory – Active Soil Gas Investigations dated July 2015 (DTSC Active Soil Gas Investigation Advisory), or any subsequent applicable Advisory
- o Probes shall be sampled a minimum of once, two (2) to forty-eight (48) hours after installation, depending on installation methods in accordance with the DTSC Active Soil Gas Investigation Advisory
- o Methane and pressure shall be recorded for each sample location during each sampling event

Soil Gas Probe Test:

- o Minimum of two (2) tests per Site or one (1) per twenty thousand (20,000) square feet of site area, or portion thereof, installed in the locations with the highest concentration of soil gas that was reported in shallow soil testing;
- o Probes shall be installed at depths of five (5), ten (10), and twenty (20) feet below the lowest building slab or footing elevation. Probes shall be a minimum of twelve (12) inches above the groundwater level; probes are not required to be installed within groundwater areas
- o Probes shall be constructed in accordance with the DTSC Active Soil Gas Investigation Advisory
- o Probes shall be sampled a minimum of two (2) times. The first sampling event shall be no sooner than two (2) to forty-eight (48) hours after installation depending on installation methods in accordance with the DTSC Active Soil Gas Investigation Advisory. The second sampling event shall be a minimum of twenty-four (24) hours after the first. Samples shall not be collected during increasing barometric pressure from a pre-frontal weather condition
- o Methane and pressure shall be recorded for each sample location during each sampling event
- o Reporting: results of shallow and soil gas probe tests shall be recorded on methane mitigation plans with corresponding site design levels indicated. Depth to groundwater, if encountered, shall be included in the report. The test results shall be stamped and signed by a Qualified Professional. Included with the test results shall be a site plan indicating the locations of shallow and soil gas tests, as well as the location(s) and dimension(s) of proposed and existing buildings or structures.

Exemptions – (Referenced in LBMC Section 18.79.040)

The following activities and uses are exempt from the provisions of this Chapter:

- o Open parking garage structures with permanent natural ventilation as defined by the California Building Code, Title 24, Section 406.5.2, or any successor section; however, on- or below-grade, enclosed building features, such as elevator pits, stairwells,

storage rooms, and/or elevator lobbies shall be equipped with methane mitigation features/measures as set forth in this Chapter; or

- o Modifications to existing buildings or structures that are less than fifty (50) percent of the existing structure area.

Methane mitigation design requirements – (Reference in LBMC Section 18.79.050)

Methane mitigation design requirements shall be based upon the results of the site soil gas investigation as prescribed in Section 18.79.030, and as contained in this Bulletin

Projects that are located within one thousand (1,000) feet from the refuse footprint of any existing or new landfill or disposal site shall obtain an approval pursuant to Title 27, California Code of Regulations from the Local Enforcement Agency (LEA); i.e., Los Angeles County Department of Public Health. The City of Long Beach Building and Safety Bureau or the City of Long Beach Health Department may require methane mitigation measures, regardless of the review or recommendation of the LEA. All oversight documentation shall be provided to the City of Long Beach within thirty (30) days of receipt by the Applicant

Methane mitigation design requirements are required in accordance with the following methane concentration levels (See Table 1):

1. No Action: Concentrations of methane gas less than one thousand (1,000) parts per million by volume (ppmv), and pressure less than or equal to zero
2. Level I: Concentrations of methane gas less than fifty-thousand (50,000) ppmv, and measured pressure less than two (2) inches of water column (2" WC)
3. Level II: Concentrations of methane gas up to fifty-thousand (50,000) ppmv with pressure greater than two (2" WC), or concentrations of methane gas between fifty-thousand (50,000) ppmv and three-hundred thousand (300,000) ppmv, at all pressures
4. Level III: Concentrations of methane greater than three hundred thousand (300,000) ppmv. Structures which are developed over or within proximity (as defined in Chapter 18.78) to abandoned oil wells shall comply with Level III methane mitigation requirements.

TABLE 1
SITE DESIGN LEVEL AND MITIGATION FEATURES

SITE DESIGN LEVEL	LEVEL I	LEVEL II		LEVEL III
METHANE CONCENTRATION	<50,000 PPMV	<50,000 PPMV	≥50,000 PPMV <300,000 PPMV	≥300,000 PPMV
PRESSURE	<2" WC	≥2" WC	ALL PRESSURES	ALL PRESSURES
MITIGATION REQUIREMENTS				
Gas Membrane Barrier (18.79.060 C)	X	X	X	X
Perforated Horizontal Pipes (18.79.060B.E.2)	X	X	X	X
Vent Risers (18.79.060.E.4)	X	X	X	X
Gas Detection System (in-room and vent risers) (18.79.060.F)		X	X	X
Alarm System (18.79.060.F)		X	X	X
Control Panel (18.79.060.F)		X	X	X
Mechanical Ventilation (18.79.060.G)		X	X	X
Mechanical Sub Slab Extraction (18.79.060.H)				X
Pavement Venting (18.79.060.I.1)		X	X	X
Signs (18.79.060.I.2)	X	X	X	X
Conduit or Cable Seal Fittings (18.79.060B.J.1)	X	X	X	X
Trench Dam (18.79.060B.J.3)	X	X	X	X

Methane mitigation components – (Referenced in LBMC 18.79.060)

- o The methane gas mitigation system shall be designed by a Qualified Professional
- o During Construction, a special inspection for the methane mitigation measures shall be conducted by the project Qualified Professional in order to certify the project's final inspection. The City of Long Beach will perform inspections of methane mitigation components in accordance with Section 18.79.090 of the LBMC

Gas membrane barrier:

- o A gas membrane barrier shall be continuous beneath the slab and foundations and vertically along subterranean building elements, except beneath footings and grade beams
- o Penetrations through the gas membrane barrier shall be booted to prevent gas migration

Gas membrane barrier protection:

- o A protection Layer shall be placed above and below the gas membrane barrier
- o Protection layers shall consist of one of the following:
 - a. A two (2) inch minimum sand layer
 - b. A two (2) inch minimum mud slab
 - c. A sixteen (16) oz/sy non-woven geotextile suitable for cushion application
 - d. Alternative non-woven geotextiles supported by analyses performed by a Qualified Professional

Subslab ventilation:

Subslab venting layer:

- o Placement shall be between the gas membrane barrier protection layer, subgrade, and pipe trenches;
- o Venting layer may consist of one of the following:
 - i. Gravel Blanket: A minimum thickness of two (2) inches. of gas collection aggregate or a thickness equal to two (2) times the largest particle size, whichever is greater, shall be placed above the subgrade and pipe trenches
 - ii. A two hundred (200) mil (minimum) thickness double-sided geo-composite;

Subslab vent piping:

- o Subslab vent piping shall be embedded in a pipe trench and backfilled with aggregate meeting the requirements of Gas Collection Aggregate. Aggregate shall surround the pipe with a minimum of four (4) inches of coverage in all directions
- o Vent piping shall be placed such that no portion of the foundation is more than twenty-five (25) feet from a horizontal, perforated vent pipe
- o Vent piping with a diameter of three (3) inches shall not be spaced greater than fifty (50) feet apart horizontally on center (OC)
- o Vent piping with a diameter of four (4) inches shall not be spaced greater than one hundred (100) feet apart horizontally on center (OC)
- o The total length of solid horizontal piping shall not exceed one hundred (100) feet
- o Solid horizontal vent piping shall maintain a minimum of one (1) percent positive slope toward the vent riser
- o Where piping transitions through building foundations, the penetration shall be accomplished in accordance with the California Building Code
- o Subslab venting shall be connected to vertical vent risers
- o Vertical risers shall always be equal to, or larger, in diameter than the horizontal pipes;

Groundwater:

The methane mitigation design shall account for groundwater in the design by one of the following methods:

- o Provide a combined gas collection and dewatering system by sloping subslab vent piping and collecting discharge water in accordance with Public Works permitting requirements, such as industrial waste or stormwater based on characterization and permit requirements
- o Eliminate sub slab vent piping and trenches and provide mat slab with under slab sloping one (1) percent toward the perimeter landscaping

Vertical Vent Riser:

- o Vent risers shall be connected to horizontal ventilation piping and be provided at a frequency in accordance with Table 2
- o Riser length shall be a maximum of one hundred (100) feet measured along solid pipe (including bends) for design levels I and II
- o Vent Risers max spacing shall be one hundred (100) feet measured between vent risers for design levels I and II
- o When the application of the spacing and location requirement of Table 2 results in a fractional number of Vent Risers, any fraction thereof shall be construed as one Vent Riser
- o Building Footprint shall be defined as the area in square feet contained within the exterior walls, at or below the grade level
- o Perforated pipe shall be connected to the vertical vent riser pipe with a California Plumbing Code approved transition/adaptor and contain no more than five (5) feet of solid pipe from the outside edge of the footing to the perforated pipe transition under the building/structure. Exceptions may be made by the Development Coordinator for the specific structural conditions of a building
- o Transition to vertical riser pipe material shall occur no less than six (6) inches above grade
- o Solid, horizontal vent piping in trenches shall maintain a positive slope towards the vent riser
- o Vent riser pipes shall be located on the exterior of a structure except in Level I and II designs where structures are wider than two hundred (200) feet. Vent risers may be located within a structure for Level III mitigation if fans/blowers are located at the termination of the vent riser and fans are exterior to the structure. If within a structure, vent risers shall be within a sealed chase that does not communicate with other parts of the structure
 - a. Vent riser pipe shall not be installed within five (5) feet of electrical panels, water heaters, fireplaces or other sources of heat or ignition
 - b. Riser pipes shall be protected from damage

Terminations:

- a. Riser pipes shall terminate at a minimum of ten (10) feet above surrounding grade or not less than six (6) inches above the adjacent roof level;
- b. Riser pipe terminations shall be located at least one (1) foot away from a parapet wall;
- c. Riser pipe shall terminate at a minimum of ten (10) feet from, and three (3) feet above, any building opening or air intake and within the property line;
- d. The termination of all vent riser pipes shall be provided with a "T" connection or other approved rain cap to prevent the intrusion of rainwater. The rain cap shall be non-restricting to flow;

o Shut-off valve:

a. A valve shall be provided within the first three (3) feet of the vent riser to isolate the vent riser from the horizontal vent piping

b. Valves shall be chained or otherwise locked open unless vent risers are being tested or replaced

o Sampling Port:

a. A sampling port shall be designed and installed in the vent riser pipe

b. The sampling port shall be accessible and in the exterior wall surface near ground level for the purpose of testing the vent system

c. The port shall be provided with a threaded plug or cap. No flush plugs are allowed

d. A square metal brass tag or rigid plastic engraved sign identifying the tee as a methane collection system vent shall be installed adjacent to the test tee

e. The vertical riser shall be pressure tested in accordance with Section 712.0 of the California Plumbing Code (CPC), or any successor section, using the sampling port.

TABLE 2
VENT RISER FREQUENCY

MIN. VENT RISER PIPE DIAMETER (inches)	NUMBER OF VENT RISERS PER BUILDING FOOTPRINT AREA (square feet)
3	1/7,500 (min of 2 risers)
4	1/10,000 (min of 2 risers)

TABLE 3
FREQUENCY OF AUTOMATIC SENSORS

ROOM FLOOR AREA OR CONCEALED SPACE AREA (SF)	NUMBER OF SENSORS
10,000 and More	Minimum of 3 Sensors plus one for every 20,000 and fraction thereof in excess of 10,000
More than 5,000 and less than 10,000	3 Sensors
More than 1,000 and Up to 5,000	2 Sensors
0 and Up to 1,000	1 Sensor
Elevator Shafts and Enclosed Stairwells	1 Sensor
Vent Risers	1 Sensor per Vent Riser (Level III Only)

Methane Gas Detection and Alarm System (Level II and III)

Location: Sensors shall be installed in the lowest occupied spaces of the building to detect the possible presence of methane gas in the air as well as within vent risers for a Level III design. Sensors shall be placed at the ceiling line of the lowest building level. A minimum of one (1) sensor shall be required per room of the lowest level. Sensors shall be provided at the frequency shown in (Table 3)

1. The sensors shall be able to detect explosive gas at concentrations between zero (0) and one-hundred (100) percent of the lower explosive limit (LEL) for methane five (5) percent methane by volume) with a sensitivity of one (1) percent of the LEL and a detection limit of five (5) percent of the LEL;
2. Detectors and wiring shall be immune to radio frequency and infrared remote-transmitter frequency interfaces;
3. Control Panel: The sensors shall be connected to a compatible control panel. The control panel shall issue an alarm, HVAC response, and/or autodial response following detection of methane. An auto dialer shall be required to allow a message alerting building maintenance of the alarm conditions, including gas alarms and fault conditions;
4. Backup Power: Backup power for the control panel shall be provided for a minimum of twenty-four (24) hours for standby mode plus five (5) minutes of alarm under full load conditions; backup should be available within sixty (60) seconds of power loss;
5. Detection and Response: The methane gas detection sensors shall detect methane in the air as well as within the vent riser:
 - a. The interior low-level alarm shall be for methane concentrations at or greater than ten (10) percent of the LEL. The low-level alarm shall trigger HVAC system activation to flush accumulated methane in the lowest level of the building. A warning annunciator shall illuminate on the control panel, and a notification shall be sent to building maintenance, the building owner, and/or engineering consultant to investigate the source of the alarm for the purpose of implementing an engineering solution to resolve the condition;
 - b. The interior high-level alarm should be for methane concentrations at or greater than twenty-five (25) percent of the LEL. The high-level alarm shall sound an audible/visible alarm, trigger an evacuation of the affected building, and alert building maintenance and a central station monitoring company. Building HVAC ventilation shall continue operation;
 - c. The vent riser sensor shall activate vent riser blowers upon detection of methane at seventy-five (75) percent of the LEL;
6. Alarms:
 - a. Visual and audible alarms shall be required to be provided at a minimum frequency of one (1) per ten- thousand (10,000) square feet of building space and one (1) per business unit in multi-unit commercial structures. Visual alarms shall meet NFPA 72 (adopted edition) standards;

- b. Audible alarms shall be a minimum of fifteen (15) decibels (db) above ambient noise;
- c. Visual alarms shall be fifteen (15) candelas;
- 7. Single-Station Gas Detection Sensor(s):
 - a. Single family and up to four (4) unit multi-unit residential structures may install single-station methane gas detection sensors with battery backup in the lowest occupied space of the structure;
 - b. The battery should be sized to operate the single-station gas detector at least twenty (20) hours in standby mode and five (5) minutes in alarm mode;
 - c. The location of the detector shall be provided on the plans;
 - d. Hard-wired sensors with a central control panel may be installed in lieu of single-station gas sensors;

Mechanical Ventilation.

- 1. In the event of an in-room sensor gas alarm activation, an automated mechanical ventilation system for the building shall be set to activate using one hundred (100) percent outdoor air makeup. The system may be designed to one of the following levels:
 - a. Ten (10) percent LEL detection of in-room sensor triggers ventilation that can achieve a minimum of four (4) air exchanges per hour (ACH). No battery backup is required for this system. Parts of fans in this option shall be of nonferrous or non-sparking materials, or their casings shall be lined or constructed of such materials;
 - b. Continuous operation of the mechanical ventilation system without connection to in-room sensors that can provide a minimum of one (1) ACH. Twenty-four (24) hour back up power is required for mechanical ventilation systems when sensors and alarms are not provided;
 - c. Mechanical ventilation systems that start up at least once every six (6) hours to provide a minimum of twenty-four (24) air exchanges per day. Twenty-four (24) hour back up power is required for mechanical ventilation systems when sensors and alarms are not provided;
- 2. In the event of concurrent fire alarm systems, the fire alarm shall override the methane alarm HVAC response;
 - A. Active Sub-Slab Ventilation Systems.
 - 1. Automatic gas sensors shall be installed to measure gas in the vent riser;
 - 2. Location: Sensors shall be installed within the vent risers;
 - 3. The forced sub-slab air venting system shall provide a minimum of three (3) air changes per hour of the vent piping and the gravel trench;
 - 4. The vent riser sensor shall not activate interior alarms;

5. Unless the porosity of the gravel is established by a test prepared by a Qualified Professional, the porosity of the gravel shall be taken as twenty-five (25) percent;

B. Miscellaneous Systems.

1. **Pavement Venting:** Hardscapes covering five-thousand (5,000) square feet or more and located within fifteen (15) feet of any structures requiring methane mitigation shall also be vented with pavement vents, or by installing landscaped areas immediately adjacent to the building exterior walls at least two (2) feet wide covering at least eighty (80) percent of the building perimeter;

2. **Signs:** Vent pipe shall be clearly marked with signage to indicate that the pipe may contain combustible gas. A warning sign shall be placed at the main building entrance

o Utilities and Trench Dams.

1. All underground electrical conduit penetrating the slab or foundation of the building shall be provided with a seal-off device

2. Manholes, tanks, or other intermediately occupied structures shall be mitigated in accordance with the following requirements

3. **Trench Dams:** Utilities entering a structure shall have a trench dam constructed.

4. **Electrical Classifications:** For determining the appropriate electrical wiring method and equipment required, boundaries of the outdoor hazardous area classifications are set forth in Tables 4, 5, and 6

TABLE 4
OUTDOOR HAZARDOUS AREA CLASSIFICATIONS

LOCATION	MEASURED SOIL GAS CONCENTRATIONS (PPMV)	HAZARDOUS AREA CLASSIFICATION
Below finished grade	<12,500	Unclassified
	>12,500	Class I, Div 1
Sumps	Total submerged	Unclassified
	Partially submerged	Class I, Div 1
Above grade	NA	Unclassified

TABLE 5
BUILDING HAZARDOUS AREA CLASSIFICATIONS

LOCATION	MEASURED SOIL GAS CONCENTRATIONS (PPMV)	HAZARDOUS AREA CLASSIFICATION
Below Membrane	<1,000	Unclassified
	>1,000	Class I, Div 1
Below grade within the raised floor foundation or lowest building slab without gas barrier membrane	NA	Class I, Div 1
Above grade within the raised floor foundation footing without gas barrier membrane but with adequate ventilation	<12,500	Unclassified
	>12,500	Class I, Div 2
Above membrane but below lowest building slab or raised floor foundation	<12,500	Unclassified
	>12,500	Class I, Div 2
Within building	NA	Unclassified
Sumps	Totally Submerged	Unclassified
	Partially Submerged	Class I, Div 1

TABLE 6
VENT RISER HAZARDOUS AREA CLASSIFICATIONS

LOCATION	DISTANCE	HAZARDOUS AREA CLASSIFICATION
Passive System Vent Outlet	0 to 3 feet	Class I, Div 1
	3 to 5 feet	Class I, Div 2
	>5 feet	Unclassified

LOCATION	DISTANCE	HAZARDOUS AREA CLASSIFICATION
Active System Vent Outlet	0 to 5 feet	Class I, Div 1
	5 to 10 feet	Class I, Div 2
	>10 feet	Unclassified
Joints and fittings not enclosed within wall spaces*	0 to 3 feet	Class I, Div 2
	>3 feet	Unclassified
Joints and fittings in framed walls*	Any distance within the frame stud bay	Class I, Div 1
In the vent system	NA	Class I, Div 1
Gas sampling port	0 to 3 feet	Class I, Div 2
	>3 feet	Unclassified

* The hazardous area designation for these areas is considered as unclassified under the following conditions:

1. All joints and fittings are welded in an approved manner,
2. Approved double walled vent risers are provided, or
3. Approved four (4) inch or smaller threaded steel pipe venting system, or equivalent approved piping system is installed.

Methane Mitigation Plan Requirements:

- o Projects with No Action methane mitigation shall submit the results of soil gas testing in accordance with Section 18.79.030 of the LBMC, together with foundation plans
- o Methane mitigation design plans signed and stamped by a Qualified Professional shall be submitted to the City of Long Beach for Design Levels I, II, and III, and shall include, at a minimum, the following:
 - o Plan view layout(s) of:
 - i. Horizontal venting pipes with solid and perforated pipes
 - ii. Locations of vent riser pipes
 - iii. Vent riser termination
 - iv. Pavement venting
 - v. Mat slab sloping direction(s), if applicable
 - vi. Signage
 - vii. Sensors
 - viii. Alarms
 - o Plan view layouts shall be provided with structural (horizontal and vertical vent riser pipes) or architectural backgrounds (pavement venting signage, sensors, alarms, and vent riser terminations);

- o Landscaping shall be indicated on plans incorporating landscaping into the mitigation design (e.g., in lieu of pavement venting and/or if mat slab sloping is utilized)
 - a. Details shall be provided that show the following:
 - i. Typical horizontal and vertical cross-sections
 - ii. Typical grade beam and footing tie-ins
 - iii. Geo-composite overlaps and seaming, if applicable
 - iv. Typical boots
 - v. Overlaps and repairs
 - vi. Vertical terminations (if applicable)
 - vii. Future slab and membrane penetration repairs (post-slab pours)
 - viii. Mat slab sloping
 - ix. Utility trench dams
 - x. Utility conduit seals
 - xi. Vent riser signage, sampling port, shut off valve, and termination
 - xii. Aggregate gradation
 - xiii. Typical sensor height and mounting
 - xiv. Typical alarm height and mounting
 - xv. Typical signage with lettering height and color
 - b. Notes. Notes shall be included which indicate:
 - i. Results of methane site testing
 - ii. Material specifications (geomembrane gas barrier, geo-composite, piping, strip composite)
 - iii. Gas Collection Aggregate gradation
 - iv. Calculations, if applicable (e.g., puncture, head loss)
 - v. Headloss calculation for subslab blower sizing
 - vi. Battery backup calculations for sensors and alarms
 - vii. Fan specifications, including fan curves
 - viii. Geomembrane Gas Barrier smoke testing requirements and frequency including a note indicating:

“All systems shall be final smoke tested under the observation of the project inspector or specialty inspector approved by the Building Official prior to covering.”

Operations and Maintenance – (Referenced in LBMC Section 18.79.070)

- o Emergency/Contingency Plan.
 - o A plan shall be prepared by a Qualified Professional indicating emergency response procedures, location of the control panel, and automatic sensors
 - o Specifications for repair of the membrane shall be included, as well as “as-built” information for the sub slab system
 - o The Emergency/Contingency Plan shall be included in the building’s final Commissioning Report
- o Methane gas detection sensor and alarm testing shall be performed annually, and the results shall be maintained by the owner for a minimum period of five (5) years and shall be made

available to the City Building and Safety and Fire Department upon request. Additional testing may be required by Long Beach Fire Department

- o All methane gas detection and alarm system testing shall be submitted to the Long Beach Fire Department electronically, via a method approved by the Fire Code Official

Inspections – (Referenced in LBMC Section 18.79.090)

All methane mitigation components shall be inspected by the City's inspection staff. The Contractor shall provide a minimum of twenty-four (24) hours advance notice, and shall provide access for inspections, including the following construction activities:

Foundation - Before placement of the methane barrier, an integrity check of the vent collector and inspection of the sub-slab vent pipe routing shall be conducted. The elbow connecting perforated pipe to solid pipe beneath the riser pipe shall be left unconnected for this inspection and connected after the inspection and prior to backfill

- o Methane Barrier - Smoke testing of the methane barrier shall be performed before placement of the concrete slab or protection layer above the methane barrier. The installer shall provide certification of installation and, where applicable, membrane thickness documentation or proof (e.g., membrane coupons)
- o Exterior Wall Vent Riser (Prior to Screening) - A visual inspection of vent pipe joint integrity and routing shall be conducted
- o Final Inspections before building occupancy shall be conducted to verify the following:
 1. Caution Sign - Caution signs shall be located on the vent riser at each floor level and above the roofline
 2. Warning Sign - A warning sign shall be located at the main building entry
 3. Rain Caps - shall be fitted to the top of the vent risers
 4. Test Tee - A two (2) inch diameter test tee with plug (no flush plugs) shall be installed and painted red
 5. Test Tee Signage - A permanent metal or rigid plastic placard shall be installed to the wall immediately above or adjacent to the test tee plug or cap. Signage shall be red with white letters and shall read "Methane Vent Test Location;"
 6. Testing of sensors/alarms/auto dialer/HVAC, and venting relay. Certification that the system is installed per plans and operates as designed will be acceptable. The Long Beach Fire Department shall observe testing of methane detection sensors, alarms, dialer, and HVAC response.

Qualified professional project certification – (Referenced in LBMC Section 18.79.100)

The Qualified Professional is required to submit a certification to the City inspector prior to final approval of the grading/building Certificate of Occupancy stating the following:

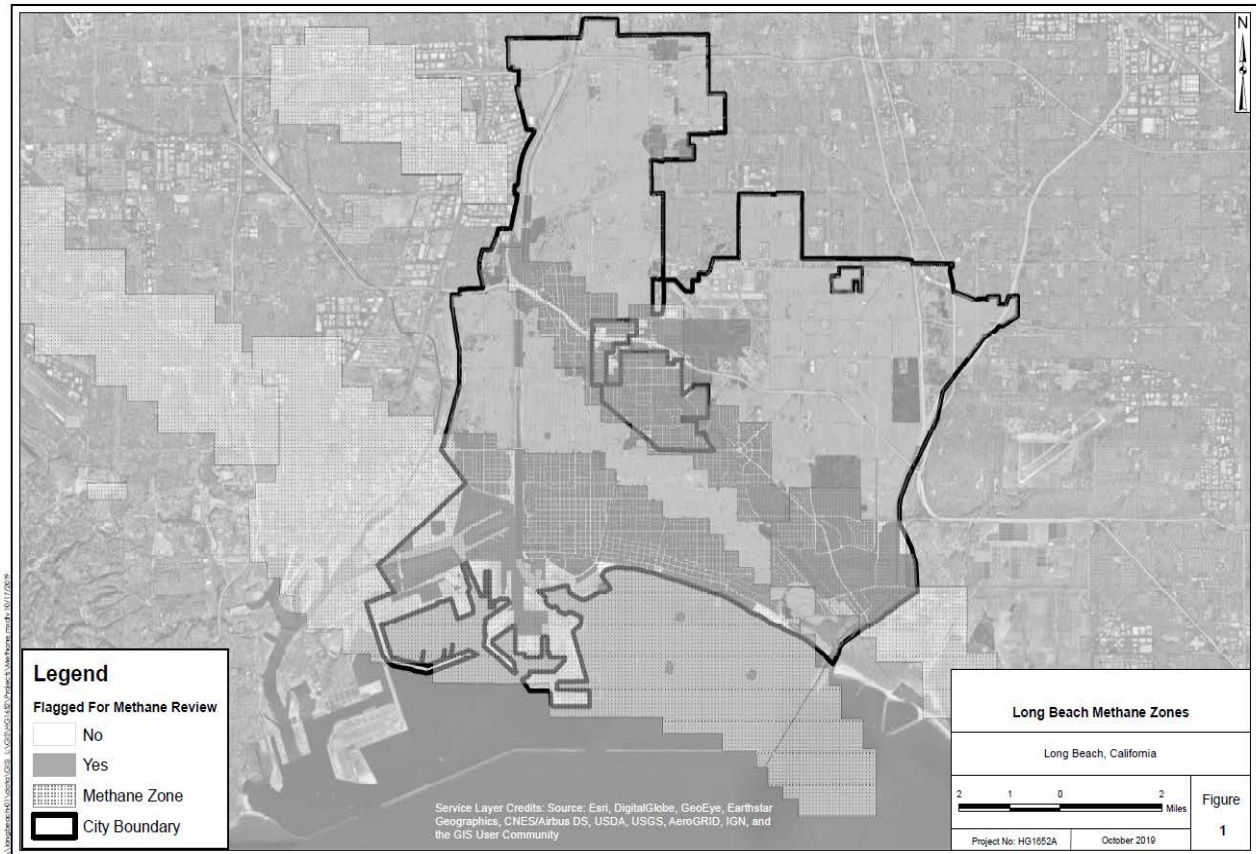
- o I am a Qualified Engineer/Geologist in the State of California, and that I am knowledgeable in the field of methane gas mitigation systems
- o The methane gas mitigation system has been constructed and installed under my direct supervision and in accordance with the approved plans (a copy of the "as-built" plans shall be

provided)

- o The structure is free from methane gas and can be safely occupied (a copy of the test results must be provided).

Attachment 1

Long Beach Methane Zone Map (LINK)



Attachment 2

Standard Details

Attachment 3

Certificate of Compliance for Methane Test Data

Attachment 4

Covenant and Agreement

To request this information in an alternative format or to request a reasonable accommodation, please contact the Development Services Department at longbeach.gov/lbds and 562.570.3807. A minimum of three business days is requested to ensure availability; attempts will be made to accommodate requests with shorter notice.