



memorandum

TO Christchurch City Council FROM [REDACTED]
DATE 4 August 2023
RE Living Earth Odour Monitoring: 19th June 2023 to 21st July 2023 Summary

1.0 Background

Living Earth Limited (Living Earth) operates an organics processing plant and composting facility located at 40 Metro Place, Bromley, Christchurch (the LE Site). Living Earth's air discharges are subject to the conditions attached to air discharge consent CRC080301.1 ("the consent") from Canterbury Regional Council (CRC) to discharge contaminants (odour and dust) to air.

Specifically, Condition 27 of the consent states that:

"The discharges to air shall not cause odour or dust which is offensive or objectionable beyond the boundary of the site on which this consent is exercised."

While Living Earth operates the composting facility, Christchurch City Council (CCC) holds the consent.

Pattle Delamore Partners Limited (PDP) has been providing assistance to CCC and Living Earth regarding the assessment and management of odour effects from the site. This has included regular odour scouting. The objectives of the odour scouting are to:

- ∴ Correlate the intensity and characters of observed odour (where possible) to:
 - Odour sources in the Bromley area.
 - Specific activities and/or sources on the LE Site.
 - Meteorological conditions.
 - Time of day.
- ∴ Undertake FIDOL assessments to determine if offensive or objectionable odours are present beyond the site boundary.
- ∴ Corroborate the content of community (i.e., Smelt-It) complaints.

This letter provides a summary of PDP's observations of off-site odour scouting for the period between the 19th of June 2023 and the 21st of July 2023.

2.0 Summary of Methodology

Odour observations are made by PDP odour scouts. To ensure consistency between scouts, PDP ensures the following:

1. Scouts periodically undertake parallel odour assessments with each other in the field.
2. Scouts periodically visit the LE Site and familiarise themselves with the character of the odour from the various onsite sources.
3. Scouts undergo nose calibration via direct dilution olfactometry according to the requirements of AS/NZS 4323.3:2001 Section 9.7.2.

During an assessment, scouts walk at a comfortable pace through the area downwind of the LE Site, making note of odours detected. PDP has defined a series of observation points in the area where the scout makes more detailed observations, shown in **Figure 1**. The exact route and observation points visited in an assessment depend on the meteorological conditions (wind speed and direction) and the odour (if any) detected by the scout on the route.

Sites H and M are immediately downwind of the site, located along Dyers Road with sites G and F. Sites I, J, K, and N are located in the heavy industrial zone. Sites A, C, B, D, and P are located in the residential zone around Bayswater Reserve. Site R (Munich Place) has been added to collect data further into the residential zone in easterly conditions. Sites E, L, O, D and Q are located roughly along the residential-industrial boundary. In assessments, Sites E, O, D and Q are in the residential zone, while Site L is in the general industrial zone.



Figure 1: Odour Observation Locations

In key areas where odour is detected, or at known sensitive areas, a full 10-minute odour observation is taken. Where 10-minute observations are taken at a site, a FIDOL assessment is completed by the scout and a determination made as to whether the odour is offensive or objectionable.

Determinations made are necessarily the opinion of the odour scout at that time to the conditions they encounter. They are based upon observations in the field but may also include consideration of wider factors such as meteorological conditions and patterns of site activity when considering the potential for offensive or objectionable odour over longer time periods.

Each scout makes their determination with reference to other determinations made, both within PDP, and more widely amongst the air quality profession.

Summaries for each odour scout are included in Section 3.0. Detailed analysis of specific observations is included, where necessary. Results of all 10-minute odour observations, summarised by observation location, are appended to this memorandum.

This memorandum presents the results of the odour scouting undertaken. This report does not analyse odour trends across time.

2.1 FIDOL Analysis

As per Ministry for the Environment's Good Practice Guide for Assessing and Managing Odour (MfE GPG), odours were assessed against the FIDOL factors to determine if they are offensive or objectionable. The FIDOL factors are:

- ∴ Frequency;
- ∴ Intensity;
- ∴ Duration;
- ∴ Offensiveness/Character¹; and
- ∴ Location.

Odour intensity is reported on a scale of (0-6) as per the MfE's GPG Odour. PDP applies the following descriptions to each odour intensity to ensure consistency between scouts:

0. No Odour: No odour.
1. Very Weak: Odour detectable but character not recognisable.
2. Weak: Odour detectable and barely recognisable.
3. Distinct: Odour readily recognisable.
4. Strong: Odour is strong but not causing discomfort to assessor.
5. Very Strong: The odour causes some discomfort; assessor can remain in area but will consider leaving/altering breathing patterns.
6. Extremely Strong: The odour causes assessor to feel nauseous or compelled to leave the area.

¹ "It is preferable to refer to the character of an odour, rather than its 'offensiveness' to avoid confusion between the inherent characteristics of an odour (i.e., whether it is pleasant or unpleasant) and whether there is an 'objectionable or offensive' effect occurring as a result of exposure to odour." (MfE GPG Odour)

When determining whether odour is having an offensive or objectionable effect, odour scouts make their determination with respect to the FIDOL factors. No regulatory standard exists for the specific combination of FIDOL factors that do or do not constitute an offensive or objectionable odour. However, as a broad litmus test when making determinations at the Living Earth site, PDP scouts consider intermittently distinct (3) or continuous weak (2) odours of a negative hedonic tone (such as compost) to be offensive or objectionable in a residential zone.

Within a heavy industrial zone, there is a lower expectation of amenity as it pertains to odour.

Based on PDP's understanding, this approach is generally consistent with that used by other air quality professionals.

3.0 Results Summary

Result summaries for each odour scout are reported below. Results of all 10-minute odour observations, summarised by observation location, are appended to this memorandum.

Scouts were present in the Bromley area on the:

- ∴ 26th of June 2023;
- ∴ 7th of July 2023;
- ∴ 11th of July 2023;
- ∴ 19th of July 2023; and the,
- ∴ 21st of July 2023.

3.1 26th June 2023

[REDACTED] were the PDP odour scouts. The scouts were present for approximately 1 hour. The weather was misty, with an average temperature of 12 °C and easterly winds ranging from 4.1 m/s to 4.6 m/s as a 10-minute average. The scouts started at Site Q, then drove to Site O and walked a loop, finishing back at Site O. The objective was to undertake odour monitoring in the area downwind of the LE Site. The odour scout route (purple dots) and key scouting locations are shown in **Figure 2**.



Figure 2: 26th June 2023 - Odour Scout Route

Results from the odour scout are shown below. Entries within **Table 1** that are highlighted blue denote locations within a residential zone and purple denotes locations within an industrial zone.

Table 1: 26th June 2023 - Odour Scouting Summary

| Site | Time | Observations |
|------|-------|--|
| Q | 13:29 | <p>A weak burnt odour was detected, then no odour was detected for several minutes. Compost odour was then detected, so FIDOL assessments were completed by all scouts.</p> <p>FIDOL assessment completed. No odour (0) was detected 36% of the time. Very weak (1) odours of an indeterminate character were detected 41% of the time. Weak (2) compost odour was detected 23% of the time.</p> <p>Odour assessed as not offensive or objectionable.</p> |

Table 1: 26th June 2023 - Odour Scouting Summary

| Site | Time | Observations |
|--------|-------|---|
| Q to O | 13:41 | No odour (0) detected. |
| O to C | 13:44 | No odour (0) detected. |
| C to B | 13:47 | No odour (0) detected. |
| B to P | 13:50 | No odour (0) detected. |
| P to E | 13:53 | No odour (0) detected. |
| E to F | 13:56 | No odour (0) detected. |
| F to G | 14:00 | No odour (0) detected. |
| G to H | 14:04 | Intermittent weak (2) compost odour detected. |
| H to I | 14:08 | Intermittent weak (2) to distinct (3) compost odour detected. |
| I to J | 14:12 | Intermittent weak (2) compost odour detected near I. |
| J to K | 14:16 | No odour at J. Intermittent weak (2) odour detected near K. |
| K to L | 14:21 | Intermittent weak (2) odour detected near K. |
| L to D | 14:27 | No odour (0) detected. |
| D to O | 14:30 | Intermittent very weak (1) indeterminate odour detected. |

Intermittent weak (2) compost odour was detected at Site O in the residential area. This odour was not considered offensive or objectionable.

The odour detected in the industrial area was not considered offensive or objectionable for an industrial area.

The character of the compost odour matched PDP's experience with the odour generated by the outdoor material, namely the unscreened compost, oversize stockpiles and screened fines. The odour did not match PDP's experience with the odour from the processing hall or associated biofilter.

3.2 7th July 2023

██████ was the PDP odour scout. The scout was present for approximately 30 minutes. The weather was clear, with an average temperature of 10 °C and north-easterly to east-north-easterly winds ranging from 6.3 m/s to 6.9 m/s as a 10-minute average. The scout started and finished at Site D. The objective was to undertake odour monitoring in the area downwind of the LE Site. The scout’s route (purple dots) and key scouting locations are shown in **Figure 3**.



Figure 3: 7th July 2023 - Odour Scout Route

Results from the odour scout are shown below. Entries within **Table 2** that are highlighted blue denote locations within a residential zone and purple denotes locations within an industrial zone.

| Table 2: 7 th July 2023 - Odour Scouting Summary | | |
|---|-------|--|
| Site | Time | Observations |
| D | 15:27 | No odour (0) detected. |
| P | 15:31 | No odour (0) detected. |
| E | 15:35 | No odour (0) detected. |
| L | 15:38 | Intermittent very weak (1) indeterminate odour detected. |
| K | 15:43 | Intermittent weak (2) compost odour detected. |
| L | 15:44 | Intermittent weak (2) compost odour detected. |

Table 2: 7th July 2023 - Odour Scouting Summary

| Site | Time | Observations |
|------|-------|--|
| O | 15:50 | Intermittent very weak (1) indeterminate odour detected. |
| Q | 15:54 | Intermittent very weak (1) indeterminate odour detected. |
| O | 15:56 | No odour (0) detected. |
| D | 15:59 | No odour (0) detected. |

No offensive or objectionable odour was detected during the scout.

The character of the compost odour matched PDP’s experience with the odour generated by the outdoor material, namely the unscreened compost, oversize stockpiles and screened fines. The compost odour did not match PDP’s experience with the odour from the processing hall or associated biofilter.

3.1 11th July 2023

██████████ was the PDP odour scout. The scout was present for approximately 30 minutes. The weather was cloudy, with a temperature of 9 °C and east-north-easterly winds with a windspeed of 3.6 m/s as a 10-minute average. The scout started and finished near Site O. The objective was to undertake odour monitoring in the area downwind of the LE Site. The odour scout route (purple dots) and key scouting locations are shown in **Figure 4**.



Figure 4: 11th July 2023 - Odour Scout Route

Results from the odour scout are shown below. Entries within **Table 3** that are highlighted blue denote locations within a residential zone and purple denotes locations within an industrial zone.

Table 3: 11th July 2023 - Odour Scouting Summary

| Site | Time | Observations |
|--------|-------|---|
| O to Q | 21:10 | Intermittent very weak (1) indeterminate odour detected. |
| Q | 21:13 | Intermittent weak (2) soil odour detected. |
| Q to O | 21:14 | Intermittent very weak (1) indeterminate odour detected. |
| O to D | 21:17 | No odour (0) detected near O. Weak (2) compost odour detected near D. |
| D to E | 21:20 | Weak (2) compost odour detected near D. No odour (0) detected near E. |

Table 3: 11th July 2023 - Odour Scouting Summary

| Site | Time | Observations |
|--------|-------|--|
| E to D | 21:23 | No odour (0) detected near E. Very weak (1) odour detected near D. |
| D | 21:26 | FIDOL assessment completed. No odour (0) was detected 87% of the time. Very weak (1) indeterminate odour was detected 13% of the time. Odour assessed as not offensive or objectionable. |
| D to B | 21:36 | No odour (0) detected. |
| B to O | 21:37 | No odour (0) detected. |
| O | 21:40 | No odour (0) detected. |

Intermittent weak (2) compost odour was detected at Site D while walking and was not offensive or objectionable. When the scout returned to Site D six minutes later and did a FIDOL assessment, only very weak odour was detected, which was not offensive or objectionable.

The character of the compost odour matched PDP's experience with the odour generated by the outdoor material, namely the unscreened compost, oversize stockpiles and screened fines. The odour did not match PDP's experience with the odour from the processing hall or associated biofilter.

3.2 19th July 2023

██████████ were the PDP odour scouts. The scouts were present for approximately 1 hour. The weather was clear, with an average temperature of 17 °C and north-east winds averaging 1 m/s. An observation was made at Site R, then the scouts walked a loop from Site O to Site L through the residential and industrial zones. The odour scout route (blue dots) and key scouting locations are shown in Figure 5.



Figure 5: 19th July 2023 - Odour Scout Route

Results from the odour scout are shown below. Entries within Table 4 that are highlighted blue denote locations within a residential zone and purple denotes locations within an industrial zone.

Table 4: 19th July 2023 - Odour Scouting Summary

| Site | Time | Observations |
|------|-------|--|
| R | 14:40 | FIDOL assessment completed. No odour (0) was detected 81% of the time. Very weak (1) odours of an indeterminate character were detected 8% of the time. Weak (2) floral/cut grass odour, with a positive hedonic tone was detected 8% of the time. Weak (2) solvent odour, with a negative hedonic tone was detected 3% of the time. Odour assessed as not offensive or objectionable. |
| O | 15:05 | No odour (0) detected. |

Table 4: 19th July 2023 - Odour Scouting Summary

| Site | Time | Observations |
|------|-------|---|
| C | 15:10 | Intermittent very weak (1) indeterminate and weak (2) burnt rubber odours detected. |
| B | 15:13 | No odour (0) detected. |
| D | 15:15 | No odour (0) detected. |
| P | 15:17 | No odour (0) detected. |
| E | 15:21 | Intermittent weak (2) manure odour detected. |
| F | 15:25 | Intermittent very weak (1) indeterminate odour detected. |
| G | 15:27 | Intermittent very weak (1) indeterminate and weak (2) compost odours detected. |
| H | 15:29 | Intermittent very weak (1) indeterminate and weak (2) compost odours detected. |
| M | 15:30 | Constant weak (2) rubbish odour detected. |
| I | 15:35 | Intermittent weak (2) industrial odours detected. |
| J | 15:39 | Intermittent weak (2) industrial odours detected. |
| K | 15:44 | Intermittent weak (2) industrial odours detected. |
| L | 15:49 | No odour (0) detected. |

A very low level of compost odour was observed during the scout. This may be due to the very low windspeeds, which limited odour transport from the LE site.

The character of the compost odour matched PDP’s experience with the odour generated by the outdoor material, namely the unscreened compost, oversize stockpiles and screened fines. The odour did not match PDP’s experience with the odour from the processing hall or associated biofilter.

3.3 21st July 2023

_____ were the PDP odour scouts. The scouts were present for approximately 1 hour. The weather was clear, with an average temperature of 10 °C and easterly winds ranging from 5.7 m/s to 6.3 m/s as a 10-minute average. The scouts started and finished near site O. The objective was to undertake odour monitoring in the area downwind of the LE Site. The odour scout route (purple dots) and key scouting locations are shown in **Figure 6**.



Figure 6: 21st July 2023 - Odour Scout Route

Results from the odour scout are shown below. Entries within Table 4 that are highlighted blue denote locations within a residential zone and purple denotes locations within an industrial zone.

Table 5: 21st July 2023 - Odour Scouting Summary

| Site | Time | Observations |
|--------|-------|---|
| O to Q | 14:53 | No odour (0) detected. |
| Q | 14:59 | FIDOL assessment completed. No odour (0) was detected 27% of the time. Very weak (1) odours of an indeterminate character were detected 42% of the time. Weak (2) compost odour was detected 30% of the time. Distinct (2) compost odour was detected 1% of the time. Odour assessed as not offensive or objectionable. Note: Exact location of assessment was NE corner of Bromley Old School Reserve |

Table 5: 21st July 2023 - Odour Scouting Summary

| Site | Time | Observations |
|-------------------------------|-------|--|
| Q to Cr Wickham St & Maces Rd | 15:09 | No odour (0) detected. |
| Cr Wickham St & Maces Rd to J | 15:14 | Weak (2) compost odour detected near J. |
| J to I | 15:18 | Intermittent distinct (3) compost odour detected. |
| I to H | 15:24 | Continuous distinct (3) compost odour detected near H. |
| H to G | 15:29 | Continuous weak (2) compost odour detected near H. No odour (0) detected near G. |
| G to F | 15:32 | No odour (0) detected. |
| F to E | 15:34 | No odour (0) detected. |
| E to O | 15:38 | No odour (0) detected. |

Intermittent, weak (2) compost odour was detected slightly north of Site Q, at the north-east corner of Bromley Old School Reserve. One observation of distinct compost odour was made by one of the scouts at this location. This odour was not considered offensive or objectionable.

Continuous distinct compost odour was detected near Site H. This odour was not offensive or objectionable for an industrial area.

The character of the compost odour matched PDP's experience with the odour generated by the outdoor material, namely the unscreened compost, oversize stockpiles and screened fines. The odour did not match PDP's experience with the odour from the processing hall or associated biofilter.

4.0 Summary

PDP undertook odour scouting on five occasions between 19th June and 21st July 2023. Plots of the raw results from each 10-minute assessment, summarised by monitoring location, are appended to this memorandum.

Typically, PDP considers that intermittent distinct (3) or continuous weak (2) odours of a negative hedonic tone (such as compost) are offensive or objectionable in a residential zone.

Based on PDP's observations:

∴ 26th June 2023

Intermittent weak (2) compost odour was detected at Site O in the residential area. This odour was not considered offensive or objectionable. The odour detected in the industrial area was not considered offensive or objectionable for an industrial area.

∴ 7th July 2023

No compost odour detected in the residential zone. Intermittent, weak (2) compost odour was detected in the industrial zone. This odour was not offensive or objectionable.

∴ 11th July 2023

Intermittent weak (2) compost odour was detected at Site D while walking and was not offensive or objectionable. When the scout returned to Site D six minutes later and did a FIDOL assessment, only very weak odour was detected, which was not offensive or objectionable.

∴ 19th July 2023

A very low level of compost odour was observed during the scout. This may be due to the very low windspeeds, which limited odour transport from the LE site.

No compost odour was detected in the residential zone. Intermittent, weak (2) compost odour was detected in the industrial zone. This odour was not offensive or objectionable.

∴ 21st July 2023

Intermittent, weak (2) compost odour was detected slightly north of Site Q, at the north-east corner of Bromley Old School Reserve. One observation of distinct compost odour was made by one of the scouts at this location. This odour was not considered offensive or objectionable. Continuous distinct compost odour was detected near Site H. This odour was not offensive or objectionable for an industrial area.

The character of the compost odour matched PDP's experience with the odour generated by the outdoor material, namely the unscreened compost, oversize stockpiles and screened fines. The odour did not match PDP's experience with the odour from the processing hall or associated biofilter.

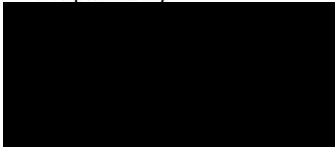
5.0 Limitations

This memorandum has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Christchurch City Council and Living Earth. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the memorandum. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

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Prepared by



Senior Environmental Engineer

Prepared by



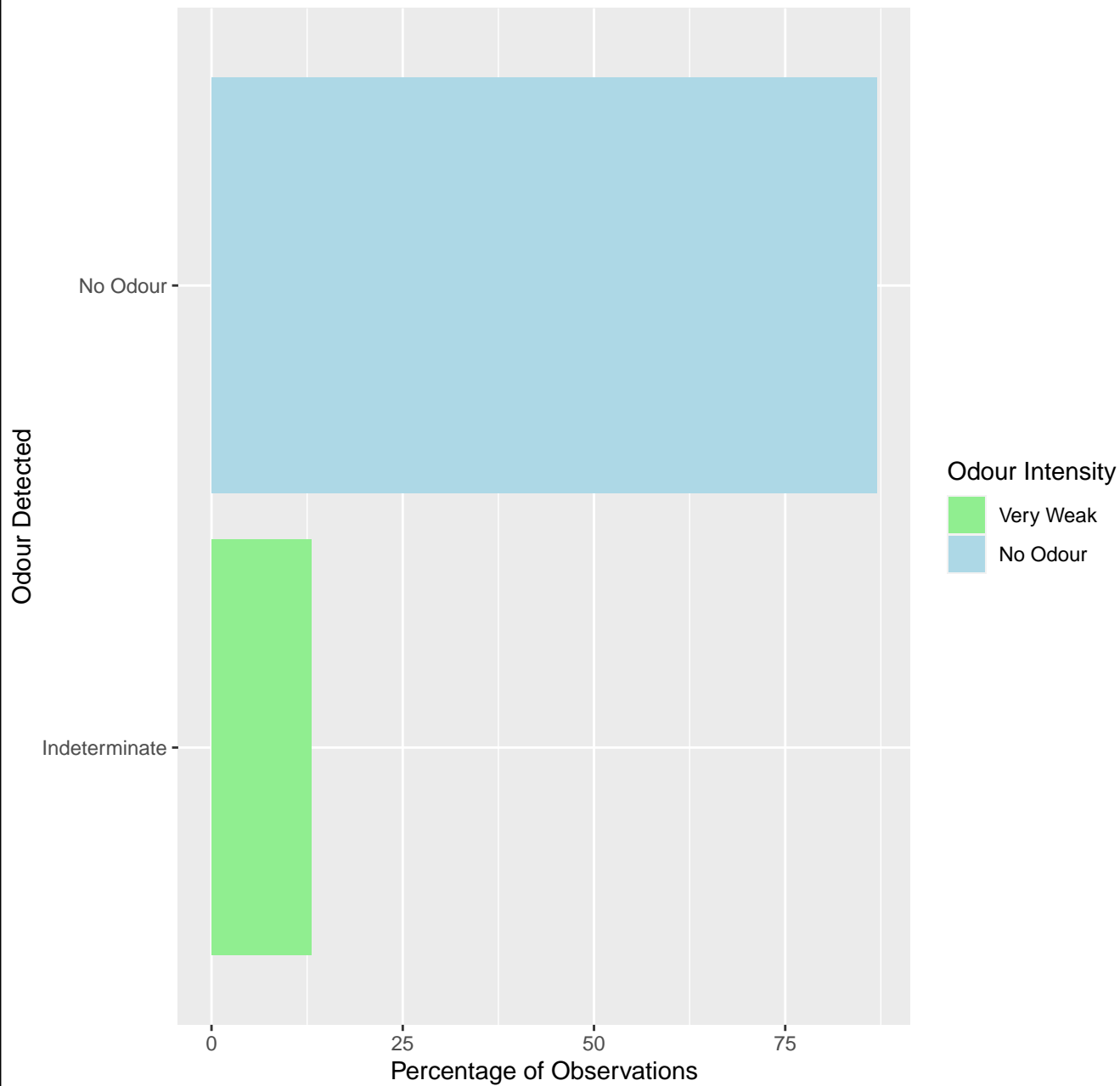
Air Quality Engineer

Reviewed by

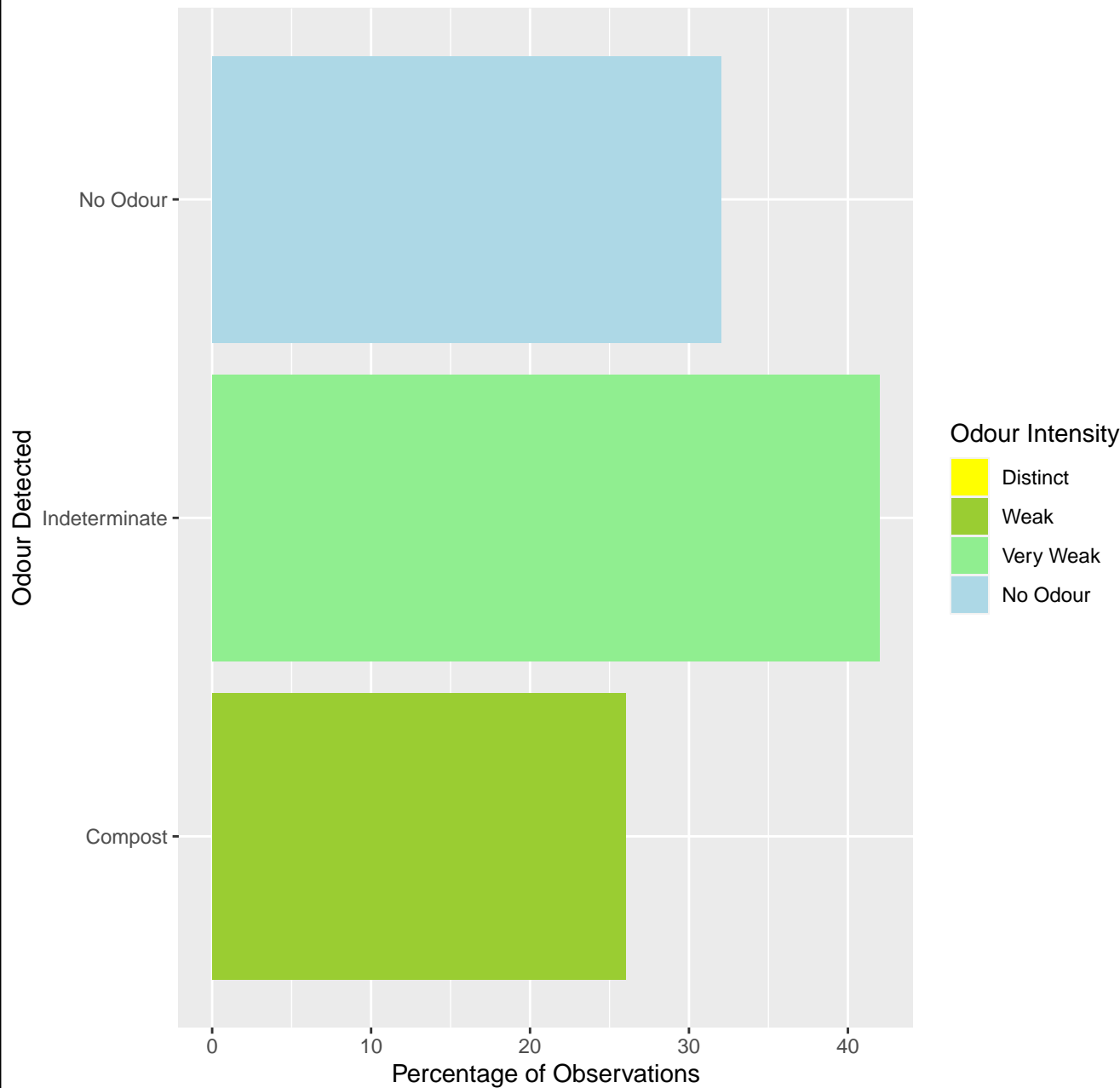


Technical Director

Site D : Summary of Odours Detected at Site



Site Q : Summary of Odours Detected at Site



Site R : Summary of Odours Detected at Site

