



memorandum

TO Christchurch City Council FROM [REDACTED]
DATE 17/03/2023
RE Living Earth Odour Monitoring: 13th February 2023 to 26th February 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 of 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 of the period between the 13th February 2023 and the 26th February 2023.

2.0 Summary of Methodology

Odour scouting is undertaken by PDP odour scouts. To ensure consistency between scouts, PDP undertakes 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, these are 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. Sites E, L, and O are located roughly along the residential-industrial boundary. In assessments, Sites E and O are used to represent the closest (to the LE Site) downwind edge of the residential zone. Site L is located in the general industrial zone - Site D is used as the closest (to the LE Site) downwind residential monitoring point in this area.



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 (MfE) guidance, 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 Good Practice Guide for Assessing and Managing 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.

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.

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)

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:

- ∴ 18th February 2023;
- ∴ 20th February 2023; and,
- ∴ 21st February 2023.

3.1 18th February 2023

[REDACTED] was the PDP odour scout. The scout was present for approximately one hour. The temperature was 21.5 °C with windspeeds ranging from 5.7 m/s to 6.1 m/s as a 10-minute average. The wind was predominately coming from an E direction. The scout started and finished at Site A. Broadly, the scout worked upwind towards the site, first through the residential zone, then the industrial zone along Dyers Rd. The odour scout route (blue dashed line) and key scouting locations are shown in **Figure 2**.



Figure 2: 18th February Odour Scout Route

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

Table 1: 18th February Odour Scouting Summary

Site	Time	Observations
A	11:37	No odour detected.
C	11:42	FIDOL assessment completed. No odour was present 90% of the time. Very weak (1) odours of an indeterminate character were present 5% of the time. Weak (2) compost odour was present 2% of the time (a single observation). Weak (2) floral odour with a positive hedonic tone was present 3% of the time. Odour assessed as not offensive or objectionable.
B	11:54	Constant weak (2) cut grass odour detected.
D	11:58	Intermittent weak (2) to distinct (3) burnt and faecal odours present. Character had not been observed previously in this location. Proceeded to move towards plant to compare odour characters.
D to E	12:01	No compost or burnt/faecal odour detected. Intermittent weak (2) marine and manure (cattle) odours detected.
E	12:02	Intermittent weak (2) marine and manure (cattle) odours detected.
E to F	12:05	Intermittent weak (2) marine odour detected.
F	12:09	Intermittent weak (2) to distinct (3) compost odour detected.
F to G	12:10	Continuous distinct (3) compost odour detected. At F and G, compost odour from site was familiar in character, and very different to odour detected at Site D prior.
L	12:19	FIDOL assessment completed. No odour was present 52% of the time. Very weak (1) odours of an indeterminate character were present 30% of the time. Weak (2) compost odour was present 3% of the time. Weak (2) solvent/chemical odours with a negative hedonic tone were present 15% of the time. Odour assessed as not offensive or objectionable.
D	12:32	Intermittent weak (2) solvent odour detected. Prior burnt/faecal odour not detected.
D to O	12:34	Intermittent very weak (1) odour, occasional weak (2) fishy odour detected.
O	12:36	FIDOL assessment completed. No odour was present 82% of the time. Very weak (1) odours of an indeterminate character were present 8% of the time. Weak (2) compost odour was present 2% of the time. Weak (2) solvent odour with a negative hedonic tone was present 8% of the time. Odour assessed as not offensive or objectionable.
O to A		No odour detected.

Odour levels were varied across the course of the scout. Distinct (3) compost odours were not detected in the residential zone. A single 10 second observation of weak (2) compost odour was detected at Site O and Site C. PDP does not consider the odour detected in the residential zone was offensive or objectionable.

Distinct (3) compost odours were detected in the industrial zone. PDP does not consider the odour detected in the industrial zone was 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.

An unusual burnt/faecal odour was present in the vicinity of Site D at 11:58. That odour character was not present closer to the downwind boundary of the LE site. As such, it is unlikely to have originated from the LE site. The specific source of this odour was not determined.

3.2 20th February 2023

[REDACTED] were present as PDP odour scouts. The scouts were present for approximately one hour. The temperature was 18 °C with windspeeds ranging from 5.4 m/s to 6.1 m/s as a 10-minute average. The wind was predominately coming from an E to ESE direction. The scouts started and finished at Site D. Broadly, the scouts walked a loop of the north end of the residential zone along Bayswater Cres and Maces Rd, then followed a loop through the industrial zone until the plume was encountered. The odour scout route (red dots) and key scouting locations are shown in **Figure 3**. A second loop was driven along Ruru Rd, Cuthberts Rd, Breezes Rd and Dyers Rd, stopping periodically to identify any compost odours present due to the material being spread near the wastewater ponds.



Figure 3: 20th February Odour Scout Route

Results from the odour scout are shown below. Entries within Table 2 that are highlighted blue denote locations within a high sensitivity residential zone and purple denotes locations within a low sensitivity industrial zone or low sensitivity road corridor.

Table 2: 20th February Odour Scouting Summary

Site	Time	Observations
D	13:45	No odour detected.
O		No odour detected.
D	13:54	No odour detected.
P	13:56	No odour detected.
E	14:01	No odour detected.
L	14:05	Intermittent weak (2) solvent odour detected.
L to K		Intermittent weak (2) compost odour detected.
K	14:13	FIDOL assessment completed. No odour was present 59% of the time. Very weak (1) odours of an indeterminate character were present 32% of the time. Weak (2) compost odour was present 8% of the time. Distinct (3) compost odour was present 1% of the time. Odour assessed as not offensive or objectionable.
K to I		Intermittent weak (2) compost odour detected.
I to H	14:33	Intermittent weak (2) to distinct (3) compost odour detected.
H	14:36	FIDOL assessment completed. No odour was present 19% of the time. Very weak (1) odours of an indeterminate character were present 33% of the time. Weak (2) compost odour was present 43% of the time. Distinct (3) compost odour was present 6% of the time. Odour assessed as not offensive or objectionable.
H to D		Nothing of note detected.
Compost Spreading Scout		
Ruru Rd		No compost odour detected.
Cuthberts Rd		No compost odour detected.
Breezes Rd		No compost odour detected.
South of Breezes Rd Roundabout on Dyers Rd	15:19	FIDOL assessment completed. No odour was present 5% of the time. Very weak (1) odours of an indeterminate character were present 20% of the time. Weak (2) compost odour was present 66% of the time. Distinct (3) compost odour was present 9% of the time. Odour assessed as not offensive or objectionable.
Dyers Rd		Intermittent weak (2) to distinct (3) compost odour detected near the Breezes Rd roundabout.

When scouting downwind of the plant, compost odours were detected close to the LE site and in the industrial zone. Compost odours were not detected along Maces Rd at the residential/industrial boundary

or further into the residential zone. PDP does not consider the odour detected was 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.

When scouting around the wastewater ponds, intermittent weak (2) to distinct (3) compost odour was detected just south of the Breezes Rd roundabout. This odour was not detected south of the wastewater ponds. Material had been spread on the paddocks immediately east of Dyers Road, and this appeared to be the source of the odour. The character of the odour was that of compost, but more earthy than that observed downwind of Living Earth.

3.3 21st February 2023

██████████ was the PDP odour scout. The scout was present for approximately one hour. The temperature was 17 °C with windspeeds ranging from 4.2 m/s to 4.7 m/s as a 10-minute average from an E direction. The scout started and finished at Site E. Broadly, the scout walked a loop of the north end of the residential zone along Bayswater Cres and Maces Rd. The odour scout route (teal dots) and key scouting locations are shown in **Figure 4**.



Figure 4: 21st February Odour Scout Route

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

Table 3: 21st February Odour Scouting Summary

Site	Time	Observations
E	15:56	FIDOL assessment completed. No odour was present 100% of the time. Odour assessed as not offensive or objectionable.
E to L	16:07	No odour detected.
L	16:08	FIDOL assessment completed. No odour was present 8% of the time. Very weak (1) odours of an indeterminate character were present 27% of the time. Weak (2) compost odour was present 58% of the time. Distinct (3) compost odour was present 7% of the time. Odour assessed as not offensive or objectionable.
L to D	16:18	No odour detected.

Table 3: 21st February Odour Scouting Summary

Site	Time	Observations
D	16:19	FIDOL assessment completed. No odour was present 37% of the time. Very weak (1) odours of an indeterminate character were present 38% of the time. Weak (2) compost odour was present 25% of the time. Odour assessed as not offensive or objectionable.
D to B	16:28	No odour detected.
B	16:28	FIDOL assessment completed. No odour was present 85% of the time. Very weak (1) odours of an indeterminate character were present 15% of the time. Odour assessed as not offensive or objectionable.
B to P	16:38	No odour detected.
P	16:39	FIDOL assessment completed. No odour was present 100% of the time. Odour assessed as not offensive or objectionable.

When scouting downwind of the plant, distinct (3) compost odours were detected in the industrial zone.

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.

Distinct (3) compost odours were not detected along Maces Rd at the residential/industrial boundary or further into the residential zone. Intermittent weak (2) compost odours were detected. PDP does not consider the odour detected was 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.

4.0 Summary

PDP undertook odour scouting on six occasions between the 13th February 2023 and the 26th February 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:

- ∴ 18th February 2023:

PDP does not consider the odour detected during the scout was offensive or objectionable.

- ∴ 20th February 2023:

No compost odours were detected in the residential zone. PDP does not consider the odour detected during the scout was offensive or objectionable.

- ∴ 21st February 2023:

Intermittent weak (2) compost odours were detected in the residential zone. PDP does not consider the odour detected during the scout was 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.

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



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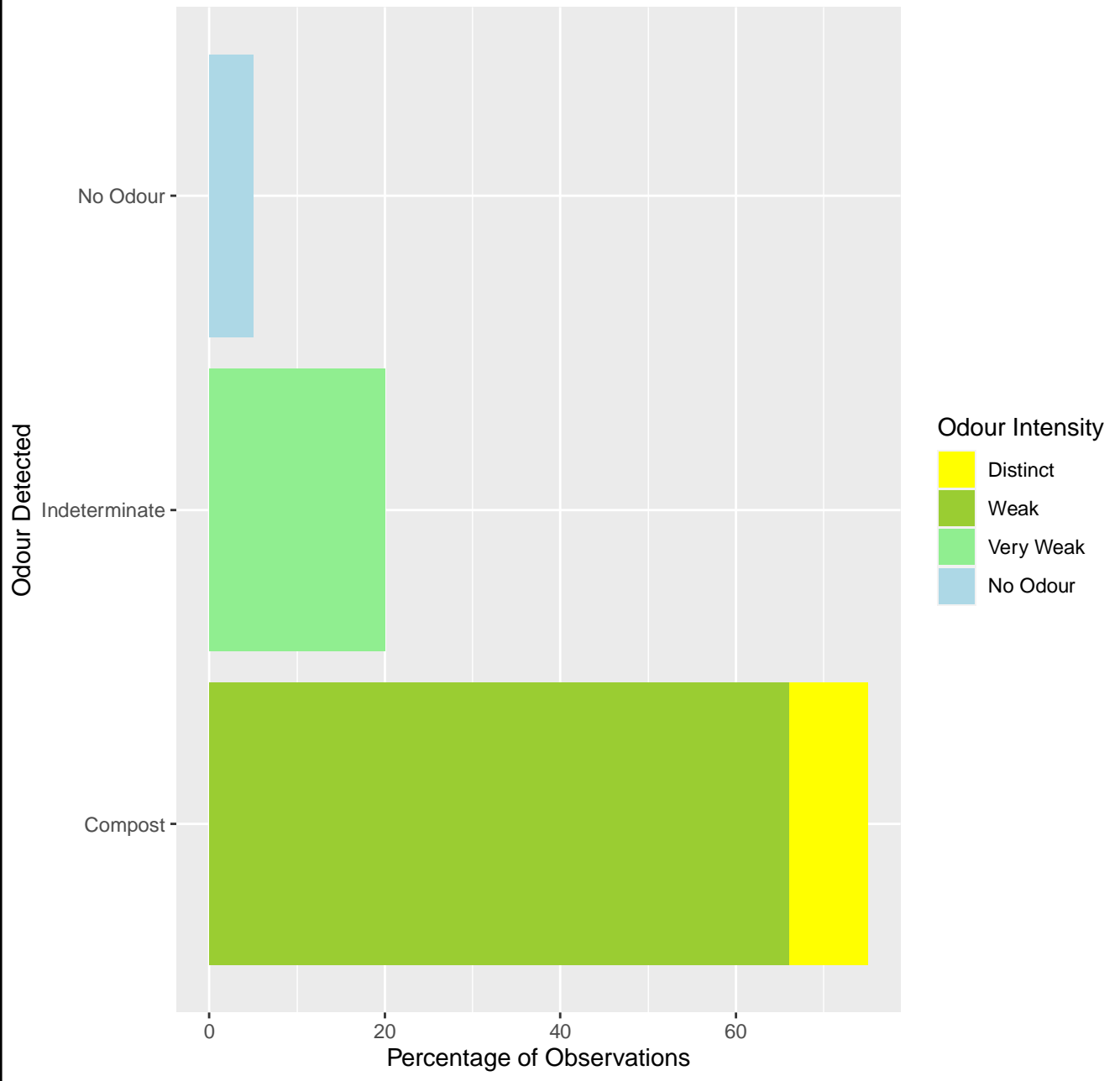
Air Quality Engineer

Reviewed by

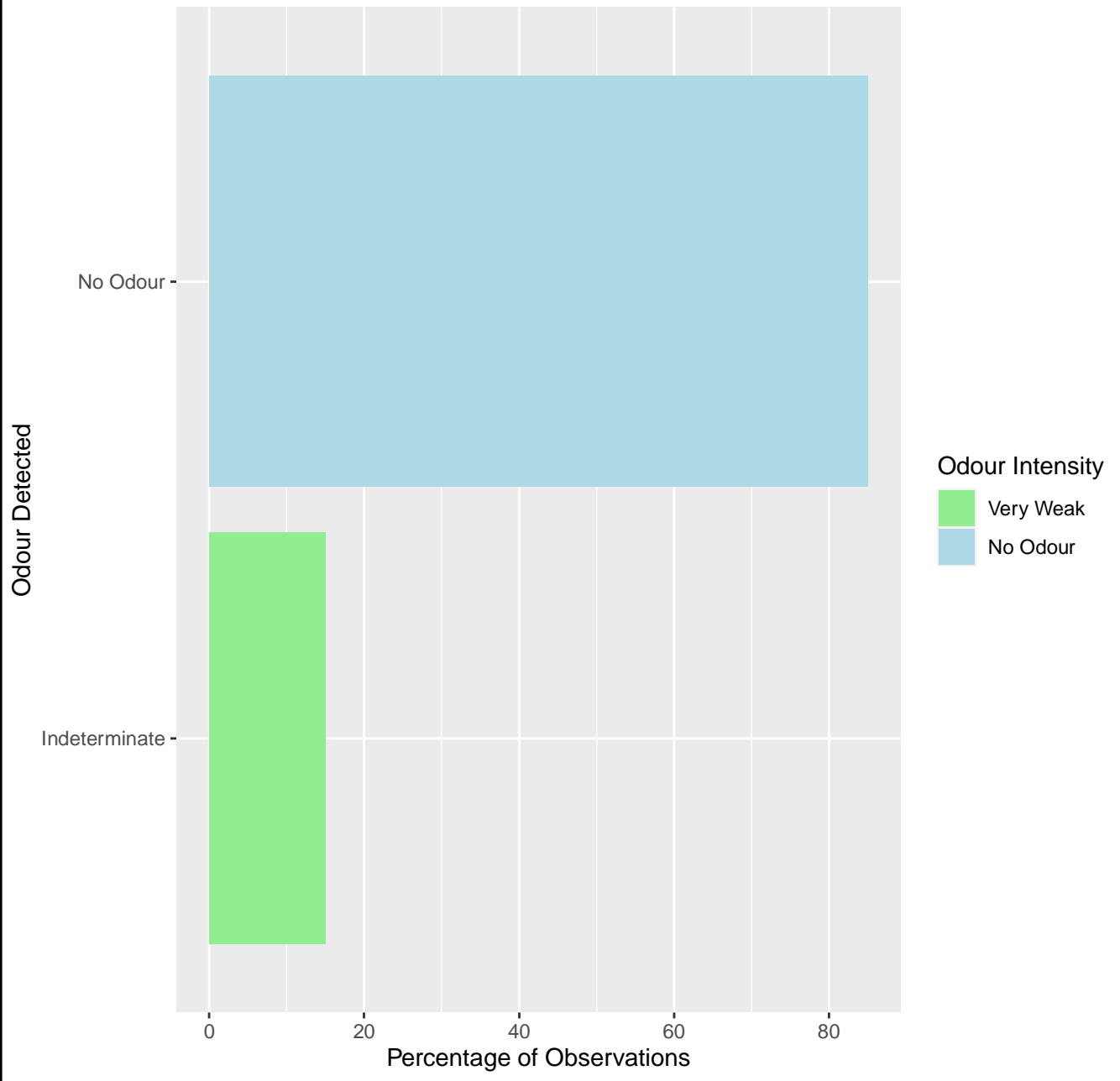


Technical Director

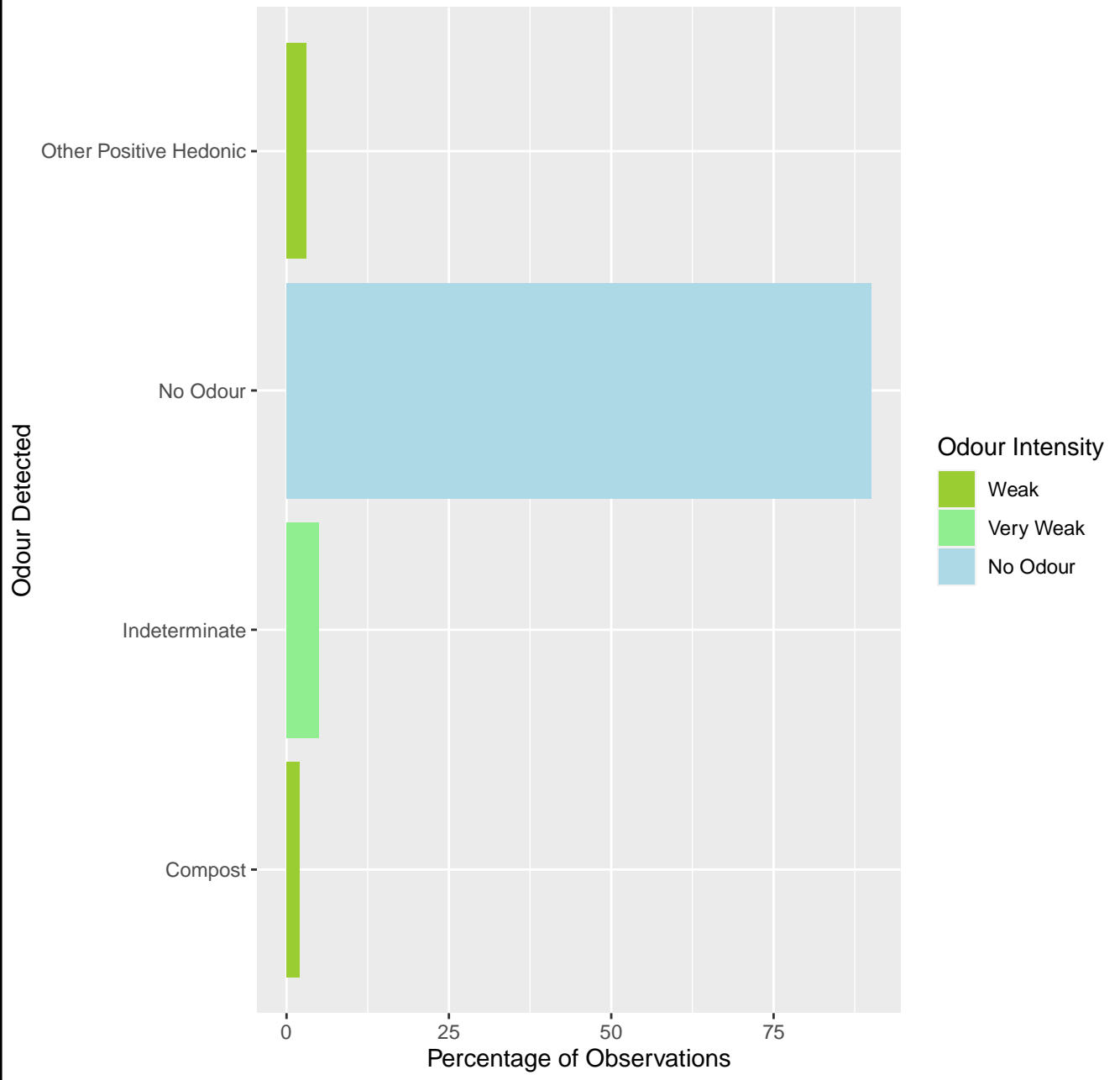
Breezes Rd Roundabout : Summary of Odours Detected at Site



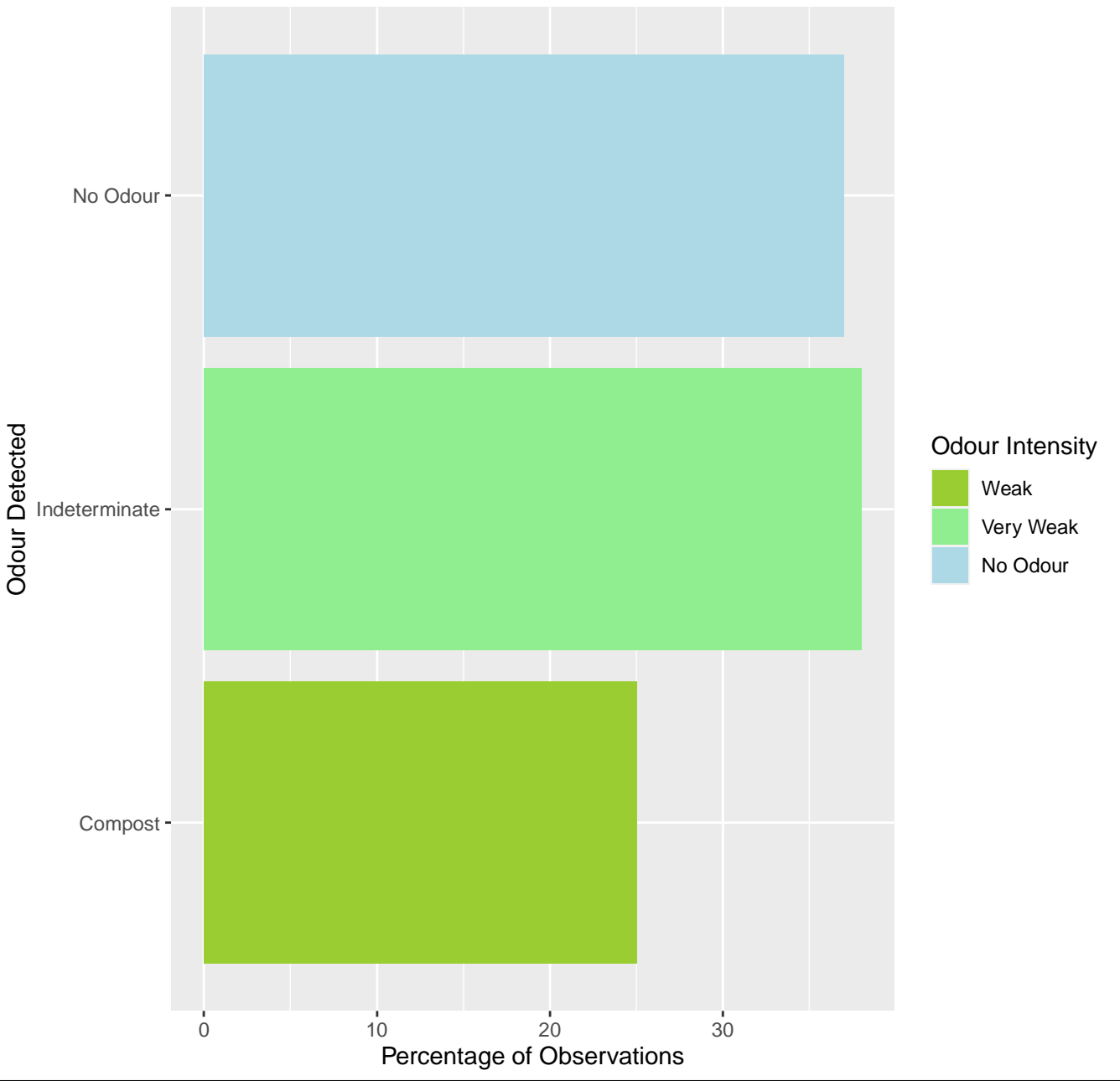
Site B : Summary of Odours Detected at Site



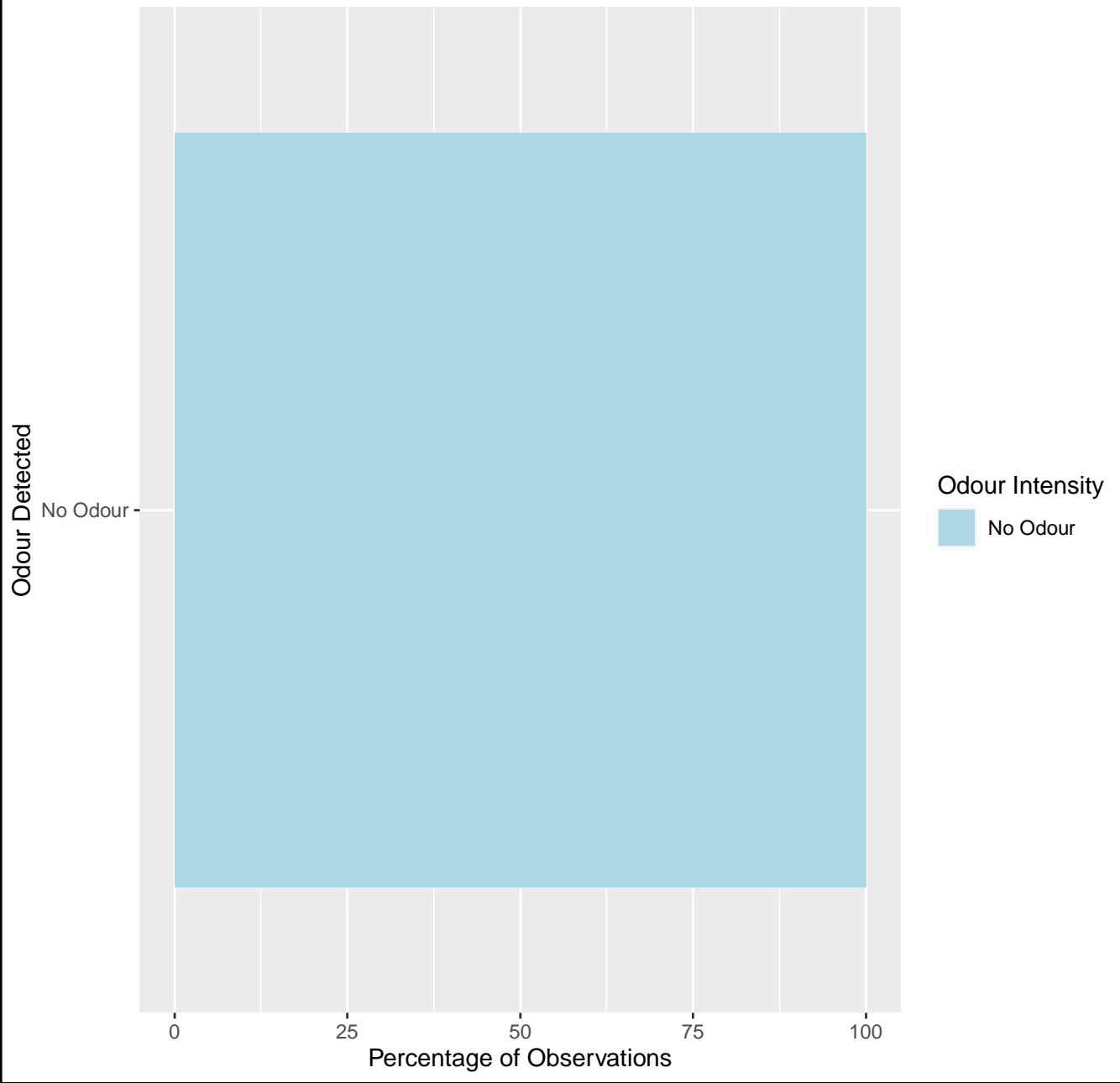
Site C : Summary of Odours Detected at Site



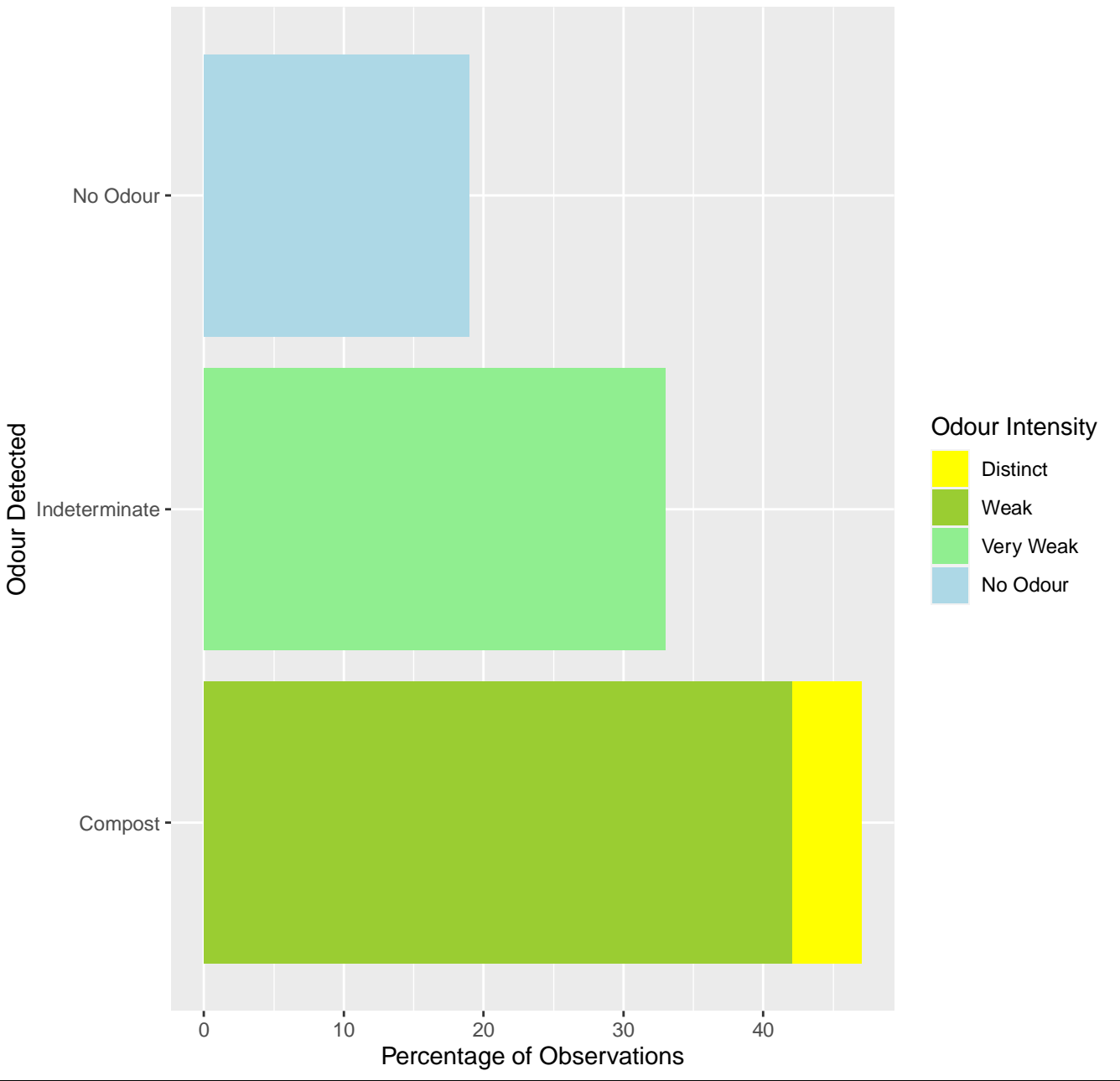
Site D : Summary of Odours Detected at Site



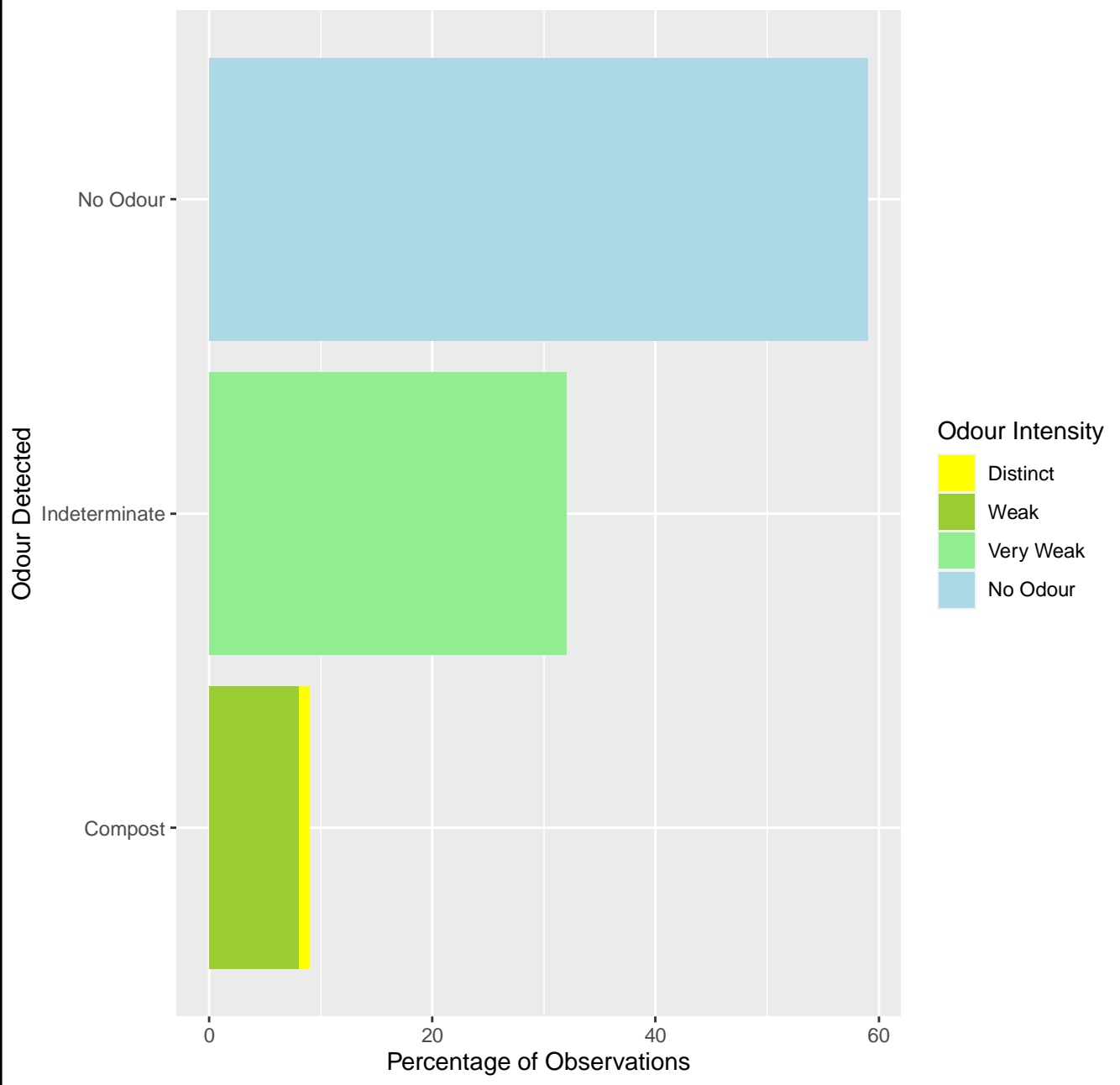
Site E : Summary of Odours Detected at Site



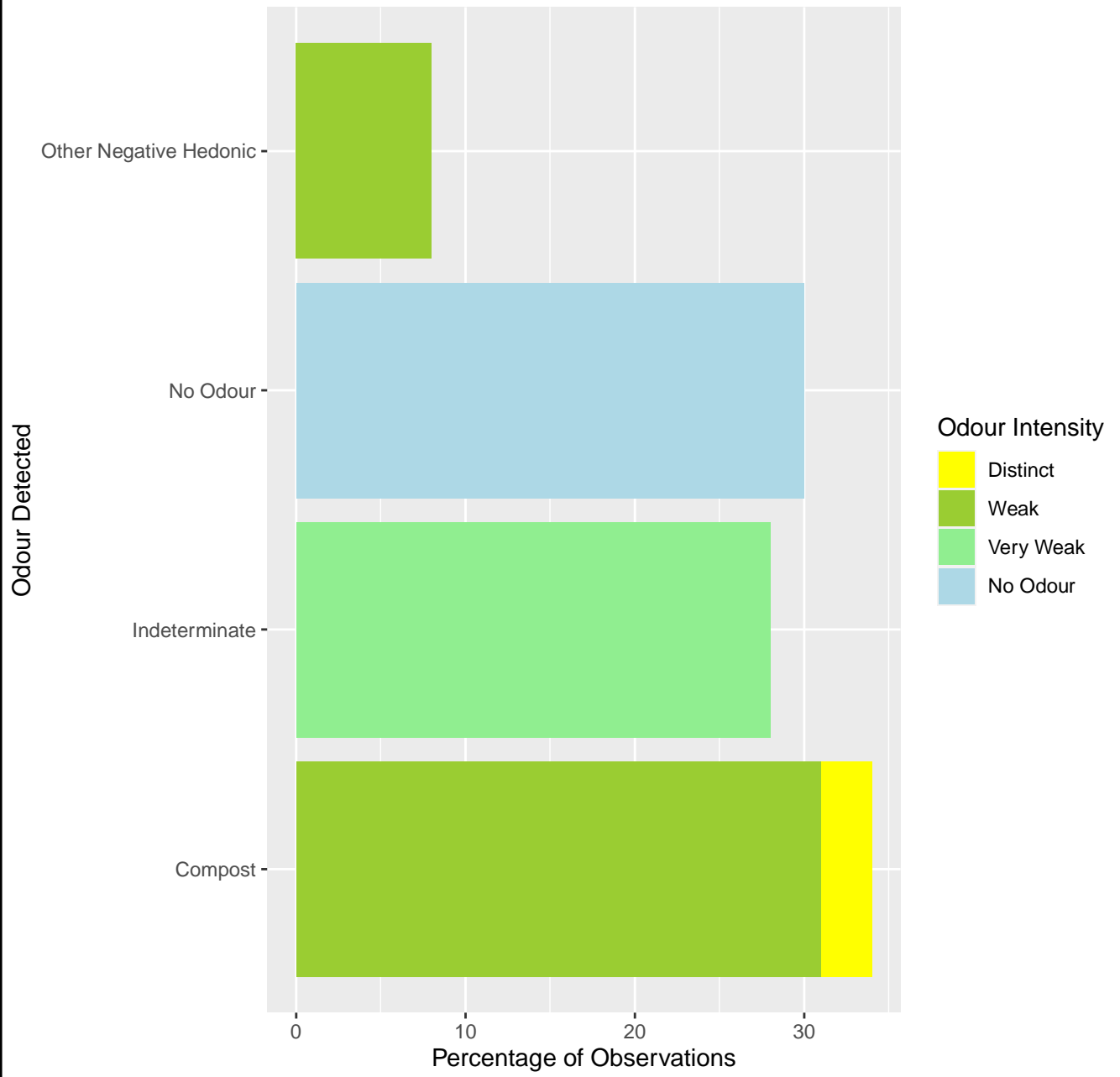
Site H : Summary of Odours Detected at Site



Site K : Summary of Odours Detected at Site



Site L : Summary of Odours Detected at Site



Site O : Summary of Odours Detected at Site

Odour Detected

Other Negative Hedonic

No Odour

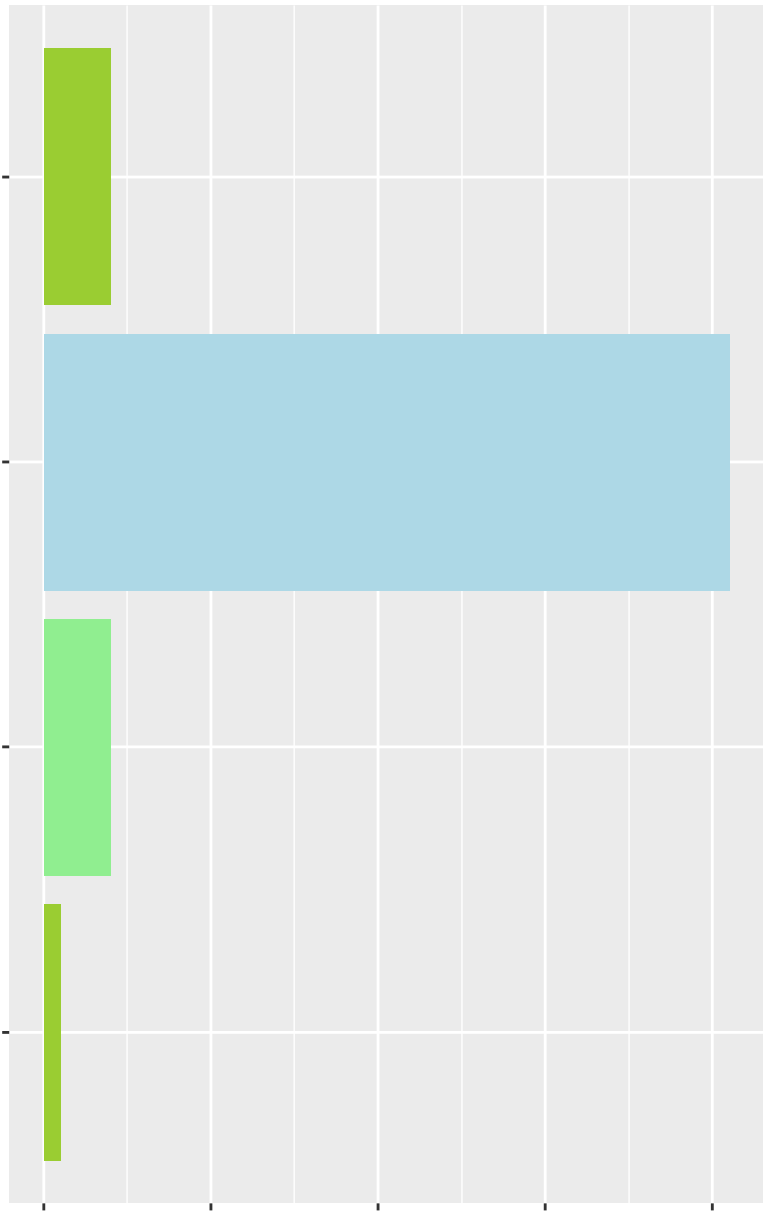
Indeterminate

Compost

Odour Intensity

- Weak
- Very Weak
- No Odour

Percentage of Observations



Site P : Summary of Odours Detected at Site

