



# memorandum

TO Christchurch City Council FROM [REDACTED]  
DATE 13/04/2023  
RE Living Earth Odour Monitoring: 13<sup>th</sup> March 2023 to 26<sup>th</sup> March 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 13<sup>th</sup> March 2023 to 26<sup>th</sup> March 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. Sites E, L, O and Q are located roughly along the residential-industrial boundary. In assessments, Sites E, O, and Q 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 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/Character<sup>1</sup>; 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.

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

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<sup>1</sup> "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)

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:

- ∴ 15<sup>th</sup> March 2023;
- ∴ 16<sup>th</sup> March 2023;
- ∴ 17<sup>th</sup> March 2023; and,
- ∴ 24<sup>th</sup> March 2023.

#### 3.1 15<sup>th</sup> March 2023

██████████ was the PDP odour scout. The scout was present for approximately 1 hour. The weather was clear, with a temperature of 18 °C and an easterly wind ranging from 7.8 m/s to 8.6 m/s as a 10-minute average. The scout started at Site D (Woburn Street) and finished at Site Q (Bromley Road). The object was to undertake odour monitoring across a full cross-section of the area downwind of the LE Site. The odour scout route (green dots) and key scouting locations are shown in **Figure 2**.



Figure 2: 15<sup>th</sup> March 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: 15<sup>th</sup> March 2023 - Odour Scouting Summary**

Site	Time	Observations
D	15:41	FIDOL assessment completed. No odour was present 53% of the time. Very weak (1) odours of an indeterminate character were present 33% of the time. Weak (2) compost odour was present 13% of the time.  <b>Odour assessed as not offensive or objectionable.</b>
D to B	15:51	No odour (0) detected.
B to P	15:52	No odour (0) detected.
P	15:54	FIDOL assessment completed. No odour was present 98% of the time. Very weak (1) odours of an indeterminate character were present 2% of the time.  <b>Odour assessed as not offensive or objectionable.</b>
P to E	16:04	No odour (0) detected.
E to F	16:07	No odour (0) to weak compost odour (2) detected.
F to G	16:10	No odour (0) to distinct compost odour (3) detected.
G to H	16:12	Distinct compost odour (3) detected.
H to I	16:14	No odour (0) to distinct compost odour (3) detected. A weak (2) sharp industrial odour was also detected.
I to N	16:17	No odour (0) to very weak indeterminate odour (1) detected.
N	16:18	Weak (2) compost odour detected.
N to I	16:19	No odour (0) to very weak indeterminate odour (1) detected.
I to J	16:21	No odour (0) to very weak indeterminate odour (1) detected.
J to K	16:25	No odour (0) to very weak indeterminate odour (1) detected.
K	16:29	FIDOL assessment completed. No odour was present 18% of the time. Very weak (1) odours of an indeterminate character were present 20% of the time. Weak (2) compost odour was present 62% of the time.  <b>Odour assessed as not offensive or objectionable.</b>
K to L	16:29	No odour (0) to distinct compost odour (3) detected. Distinct (3) solvent odour also detected.
L to O	16:44	No odour (0) to very weak indeterminate odour (1) detected.
O to Q	16:46	No odour (0) to very weak indeterminate odour (1) detected.
Q to O	16:50	No odour (0) to very weak indeterminate odour (1) detected.

**Table 1: 15<sup>th</sup> March 2023 - Odour Scouting Summary**

Site	Time	Observations
O	16:52	<p>FIDOL assessment completed. No odour was present 45% of the time. Very weak (1) odours of an indeterminate character were present 40% of the time. Weak (2) compost odour was present 15% of the time.</p> <p><b>Odour assessed as not offensive or objectionable.</b></p>

Intermittent, weak (2) compost odour was detected at Sites Q and E. This intermittent odour was not offensive or objectionable.

Distinct (3) compost odour was detected in the industrial zone along Dyers Rd, closest to the LE site. Being in a heavy industrial zone, this odour was not offensive or objectionable for the location.

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 16<sup>th</sup> March 2023

██████████ was the PDP odour scout. The scout was present for approximately 1 hour. The temperature was 20 °C with windspeeds ranging from 2.8 m/s to 3.9 m/s as a 10-minute average from an E to SE direction. The scout started and finished at Site A. The scout worked a loop through the residential zone following detected odour. The odour scout route (teal dots) and key scouting locations are shown in Figure 3.



Figure 3: 16<sup>th</sup> March 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: 16 <sup>th</sup> March 2023 - Odour Scouting Summary		
Site	Time	Observations
A	15:31	No compost odour detected. Intermittent, weak (2) bitumen odour detected (recent roadworks).
C	15:34	No odour detected.
B	15:37	Continuous, weak (2) grass odour detected.



**Table 2: 16<sup>th</sup> March 2023 - Odour Scouting Summary**

Site	Time	Observations
D	15:38	FIDOL assessment completed. No odour was present 77% of the time. Very weak (1) odours of an indeterminate character were present 10% of the time. Weak (2) compost odour was present 7% of the time. Weak (2) cut grass odour with a positive hedonic tone was present 7% of the time.  <b>Odour assessed as not offensive or objectionable.</b>
D to O		Intermittent, weak (2) compost odour detected.
O	15:51	FIDOL assessment completed. No odour was present 60% of the time. Very weak (1) odours of an indeterminate character were present 10% of the time. Weak (2) compost odour was present 30% of the time.  <b>Odour assessed as not offensive or objectionable.</b>
Q	16:07	FIDOL assessment completed. No odour was present 53% of the time. Very weak (1) odours of an indeterminate character were present 12% of the time. Weak (2) compost odour was present 20% of the time. Weak (2) rubbish odour was present 12% of the time. A weak (2) fragrant odour with a positive hedonic tone was present 3% of the time.  <b>Odour assessed as not offensive or objectionable.</b>
Q to Raupo St		Intermittent, weak (2) rubbish odour detected.
Munich Place	16:21	FIDOL assessment completed. No odour was present 85% of the time. Very weak (1) odours of an indeterminate character were present 5% of the time. Weak (2) compost odour was present 10% of the time.  <b>Odour assessed as not offensive or objectionable.</b>
Munich Pl to Q		Intermittent, weak (2) compost odour detected.
Q	16:35	Intermittent, weak (2) compost odour detected.
Q to O		No odour detected.
O	16:37	No odour detected.
O to D		No odour detected.
D	16:41	No odour detected.
D to C		No odour detected.
C to A		No compost odour detected. Intermittent, weak (2) bitumen odour detected (recent roadworks).

Weak (2) rubbish and compost odours, both with a negative hedonic tone were present at Site Q during the FIDOL assessment. Intermittent, weak (2) compost odour was detected at Sites E, O, and on Munich Place. This intermittent odour 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.

The rubbish odour had a municipal waste character. This was similar to the character odour observed immediately downwind of the EcoDrop during previous site visits. However, it is also similar to odours observed near municipal rubbish bins. The specific source was not determined. The rubbish odours were not detectable on Munich Place.

### 3.3 17<sup>th</sup> March 2023

██████████ was the PDP odour scout. The scout was present for approximately one hour. The temperature was 23 °C with windspeeds ranging from 6.0 m/s to 6.6 m/s as a 10-minute average. The wind was predominately coming from an WNW direction. The forecast on the day was for a NE shift in the afternoon. Ground conditions on the afternoon were from a more W direction than expected. The scout started and finished at Site D. The odour scout route (blue dots) and key scouting locations are shown in Figure 4.

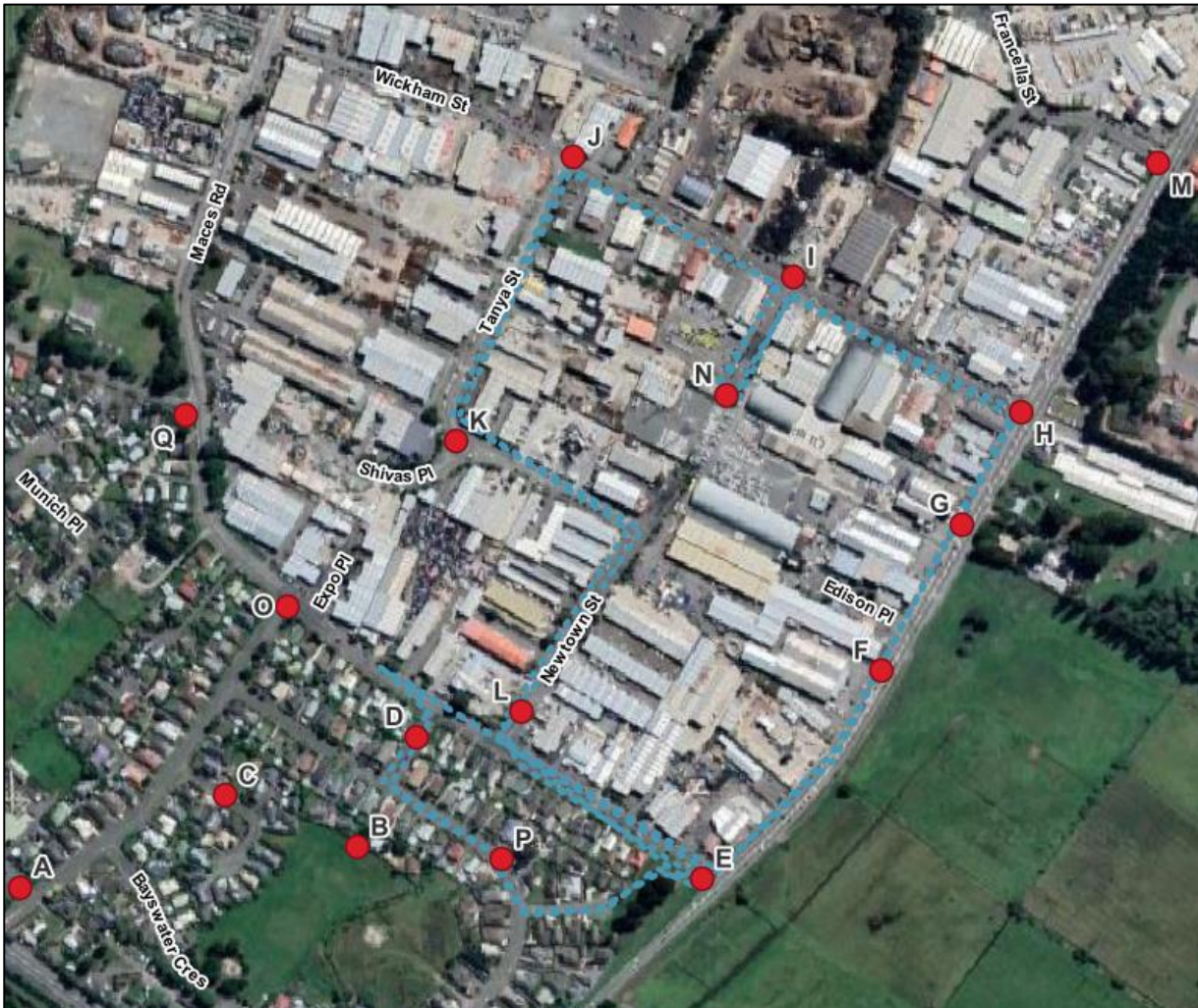


Figure 4: 17<sup>th</sup> March 2023 - Odour Scout Route

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: 17<sup>th</sup> March 2023 - Odour Scouting Summary

Site	Time	Observations
D to L	15:13	No odour (0) detected.
L to E	15:15	No odour (0) detected.
E to F	15:18	No odour (0) detected.

**Table 3: 17<sup>th</sup> March 2023 - Odour Scouting Summary**

Site	Time	Observations
F to G	15:21	No odour (0) detected.
G to H	15:23	No odour (0) detected.
H to I	15:26	No odour (0) detected.
I to N	15:29	Distinct solvent odour (3) detected.
N to I	15:30	No odour (0) detected.
I to J	15:32	No odour (0) detected.
J to K	15:35	No odour (0) detected.
K to L	15:38	No odour (0) detected.
L to E	15:43	No odour (0) detected.
E	15:46	FIDOL assessment completed. No odour was present 100% of the time. <b>Odour not offensive or objectionable during assessment.</b>
E to P	15:56	No odour (0) detected.
P to D	15:58	No odour (0) detected.
D	16:01	No odour (0) detected.

No compost odours were detected during the scout. This was due to the wind conditions having a NW component instead of the forecast NE direction.

### 3.4 24 March 2023

██████ was the PDP odour scout. The scout was present for approximately two hours. The temperature was 16 °C with windspeeds ranging from 6.6 m/s to 7.5 m/s as a 10-minute average from an ENE to E direction. The scout completed a loop through the industrial and residential areas, starting and finishing near Site O. The odour scout route (blue dots) and key scouting locations are shown in **Figure 5**.



**Figure 5: 24<sup>th</sup> March 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: 24 <sup>th</sup> March 2023 - Odour Scouting Summary		
Site	Time	Observations
Site O	14:29	FIDOL assessment completed. No odour was present 67% of the time. Very weak (1) odours of an indeterminate character were present 25% of the time. Weak (2) compost odour was present 8% of the time. <b>Odour assessed as not offensive or objectionable.</b>
O to D	14:39	Intermittent, weak (2) compost odour detected.

**Table 4: 24<sup>th</sup> March 2023 - Odour Scouting Summary**

Site	Time	Observations
D	14:42	FIDOL assessment completed. No odour was present 80% of the time. Very weak (1) odours of an indeterminate character were present 18% of the time. Weak (2) compost odour was present 2% of the time. <b>Odour assessed as not offensive or objectionable.</b>
D to B	14:52	No odour (0) detected.
B	14:59	FIDOL assessment completed. No odour was present 88% of the time. Very weak (1) odours of an indeterminate character were present 8% of the time. Weak (2) compost odour was present 3% of the time. <b>Odour assessed as not offensive or objectionable.</b>
B to P	15:09	Intermittent, weak (2) compost odour detected.
P	15:11	FIDOL assessment completed. No odour was present 100% of the time. <b>Odour assessed as not offensive or objectionable.</b>
P to E	15:21	No odour (0) detected.
E to F	15:23	Intermittent, very weak (1), indeterminate odour detected.
F to G	15:27	Intermittent, weak (2) to distinct (3) compost odour detected.
G to H	15:29	Continuous, weak (2) to distinct (3) compost odour detected.
H	15:31	FIDOL assessment completed. Weak (2) compost odour was present 25% of the time. Distinct (3) compost odour was present 75% of the time. <b>Odour assessed as not offensive or objectionable.</b>
H to I	15:41	Intermittent, weak (2) compost odour detected.
I to N	15:44	Intermittent, weak (2) compost odour detected.
N to I	15:45	Intermittent, weak (2) compost odour detected.
I to J	15:46	Intermittent, very weak (1), indeterminate odour detected.
J to K	15:50	Intermittent, distinct (3), solvent odour detected.
K to L	15:53	Intermittent, weak (2) compost odour detected.
L to Q	15:57	Intermittent, weak (2) compost odour detected.
Q	16:05	FIDOL assessment completed. No odour was present 72% of the time. Very weak (1) odours of an indeterminate character were present 22% of the time. Weak (2) compost odour was present 7% of the time. <b>Odour assessed as not offensive or objectionable.</b>
Q to L	16:15	Intermittent, weak (2) compost odour detected.

Intermittent, weak (2) compost odour was detected at Sites O, D, B, and Q. This intermittent odour was not offensive or objectionable.

Distinct (3) compost odour was detected in the industrial zone along Dyers Rd, closest to the LE site. Being in a heavy industrial zone, this odour was not offensive or objectionable for the location.

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 four occasions between the 13<sup>th</sup> March 2023 and the 26<sup>th</sup> March 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:

∴ 15<sup>th</sup> March 2023:

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

∴ 16<sup>th</sup> March 2023:

Intermittent weak (2) compost and rubbish odours in the residential zone. PDP does not consider the odour detected during the scout was offensive or objectionable.

∴ 17<sup>th</sup> March 2023:

No compost odour detected due to westerly component of wind direction.

∴ 24 March 2023:

Intermittent weak (2) compost odour 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.

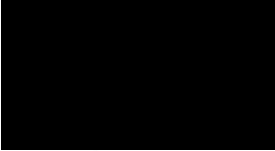


This memorandum has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Christchurch City Council and Living Earth. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing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

This memorandum has been prepared by PDP on the specific instructions of Christchurch City Council for the limited purposes described in the memorandum. PDP accepts no liability if the memorandum is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

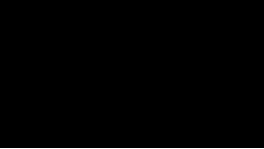
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Prepared by



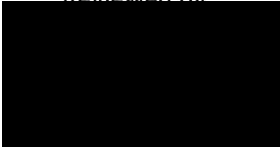
Senior Environmental Engineer

Prepared by



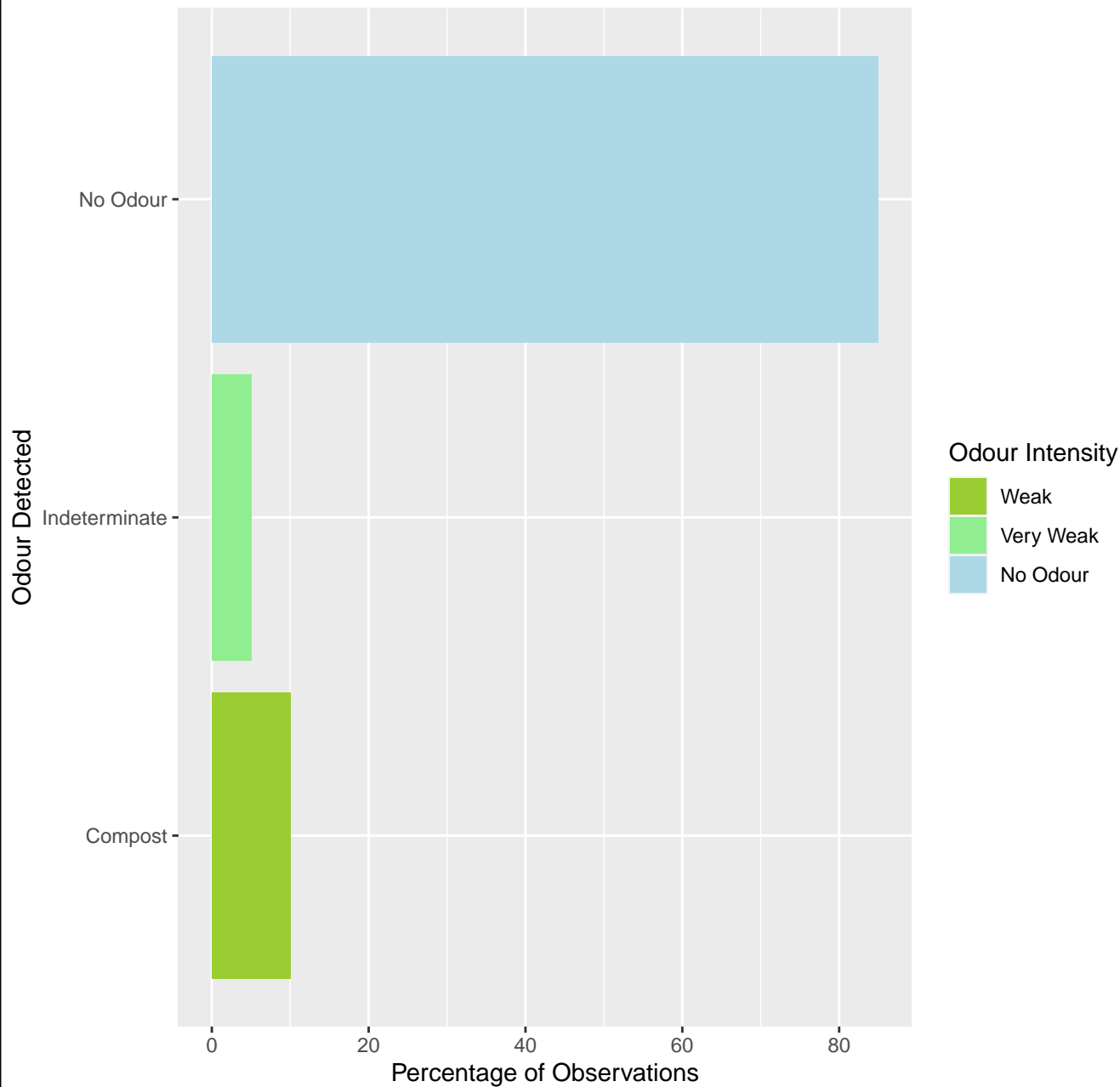
Air Quality Engineer

Reviewed by

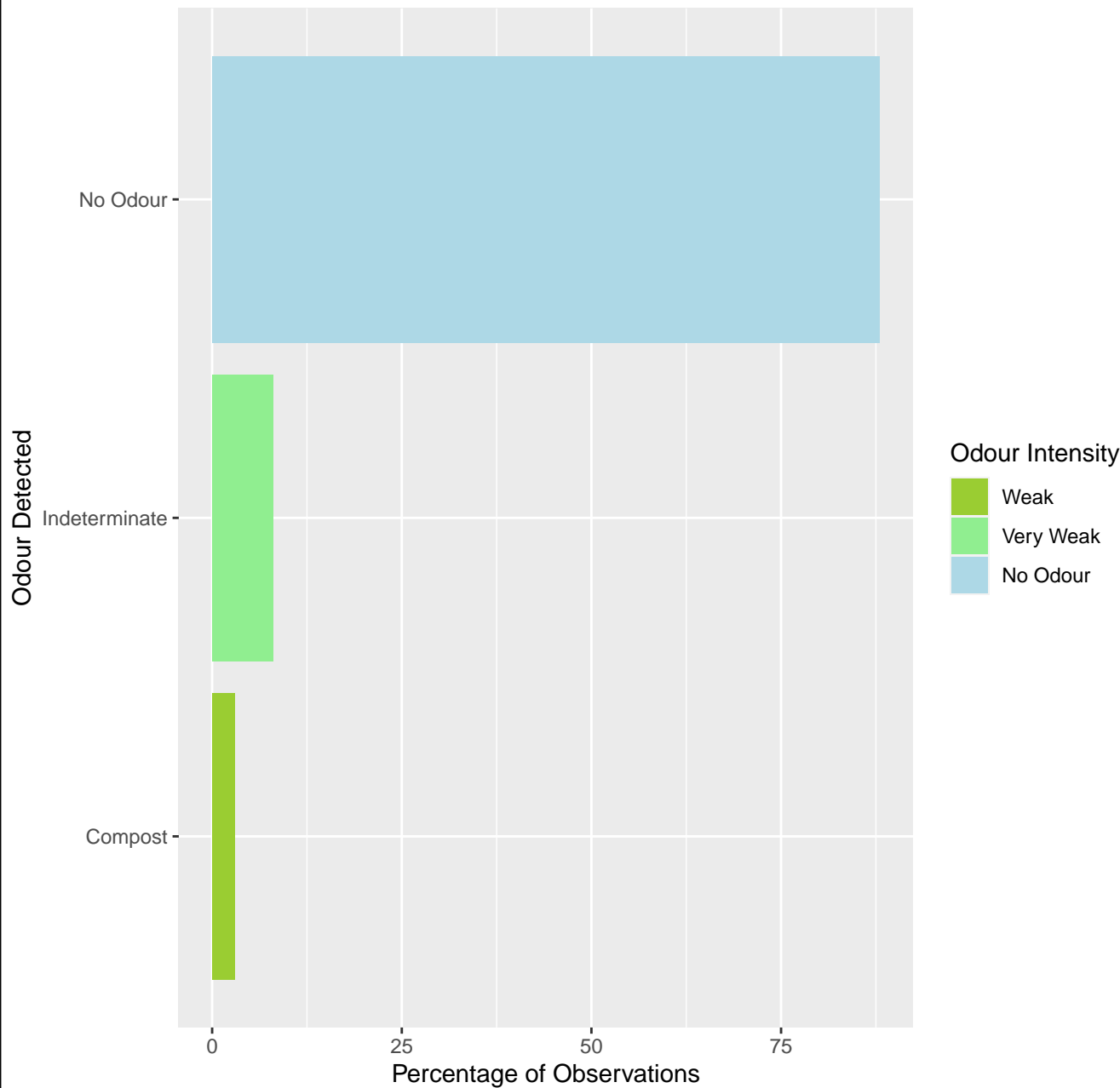


Technical Director

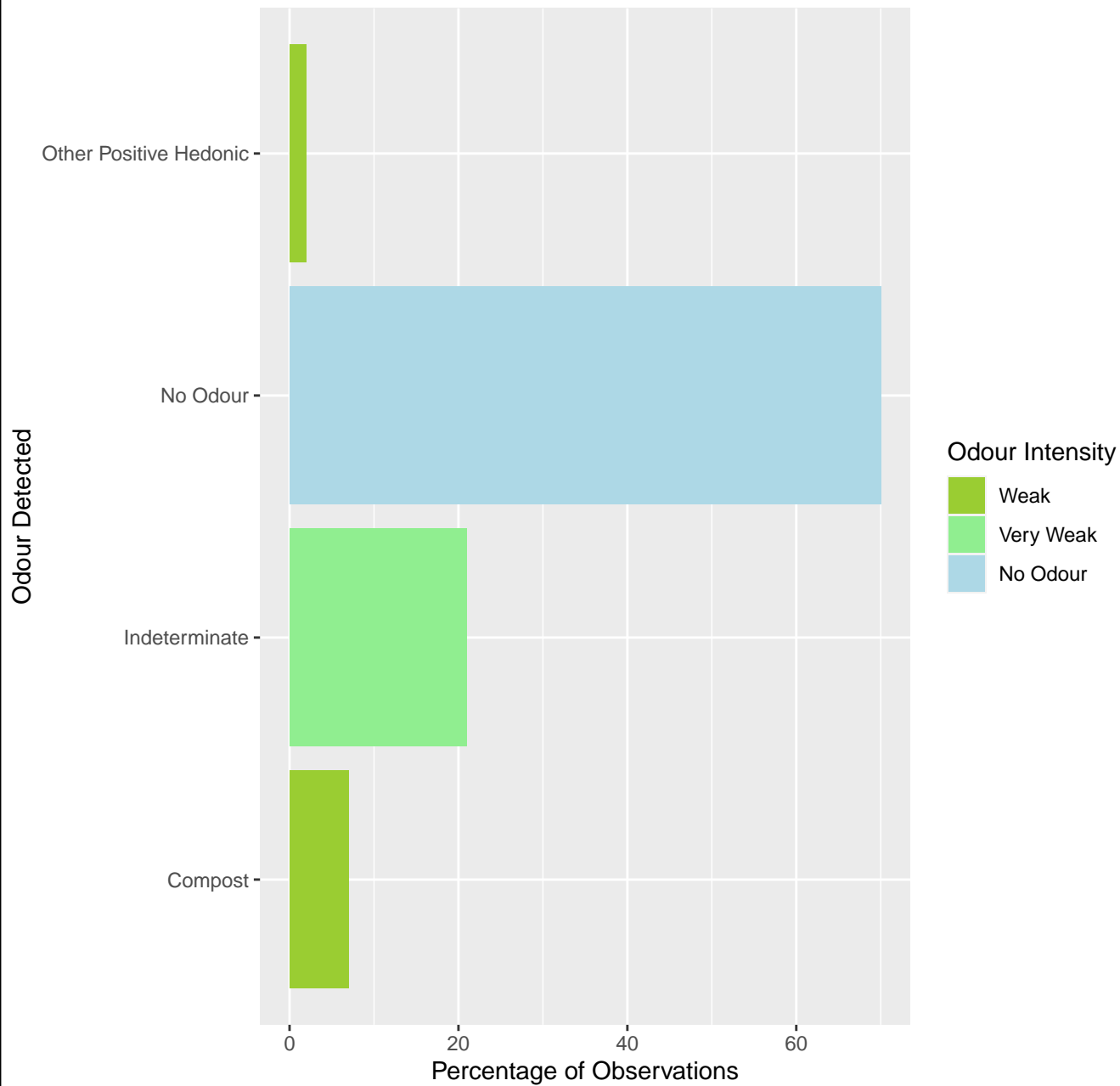
# Munich Place : Summary of Odours Detected at Site



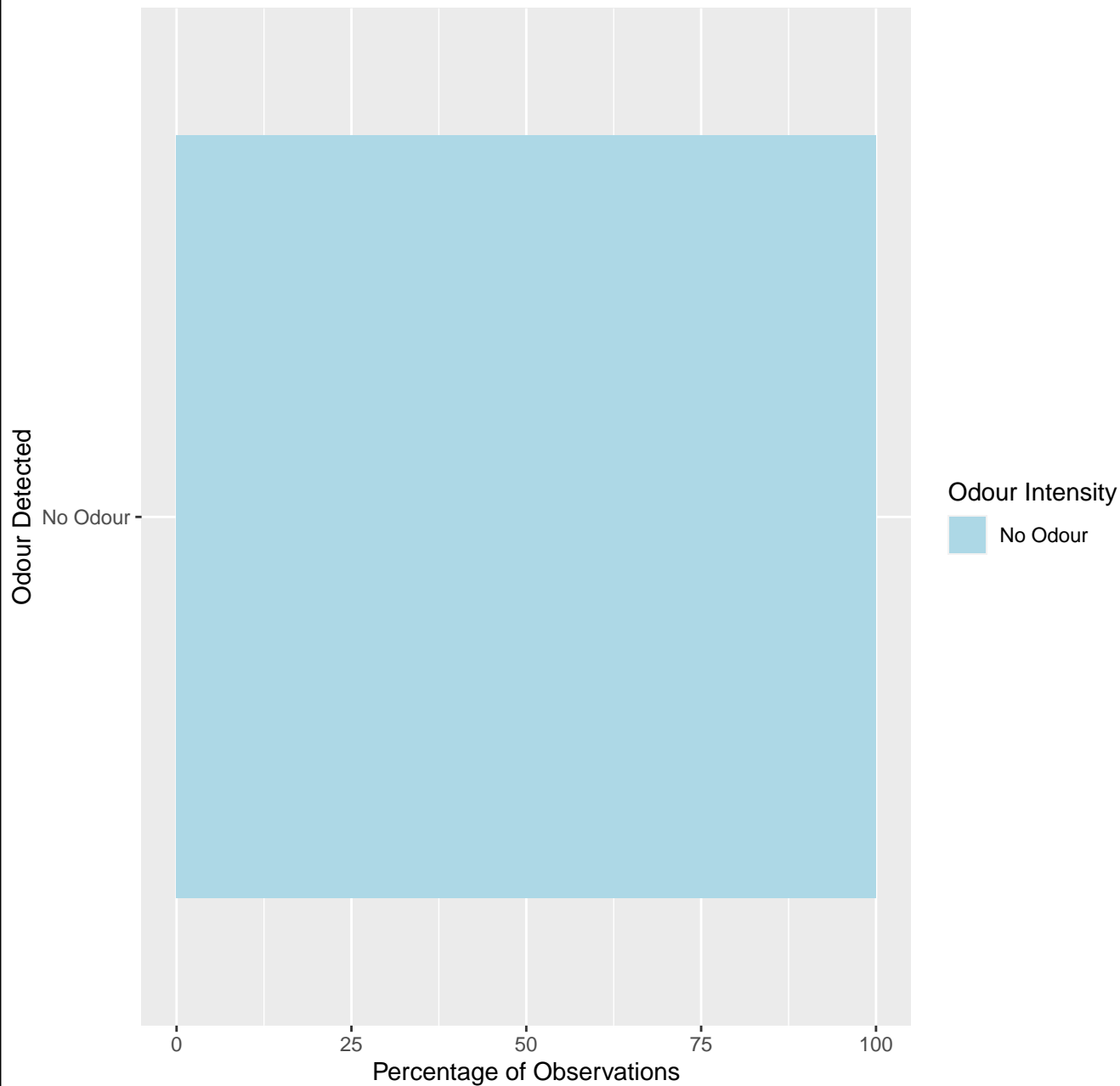
# Site B : Summary of Odours Detected at Site



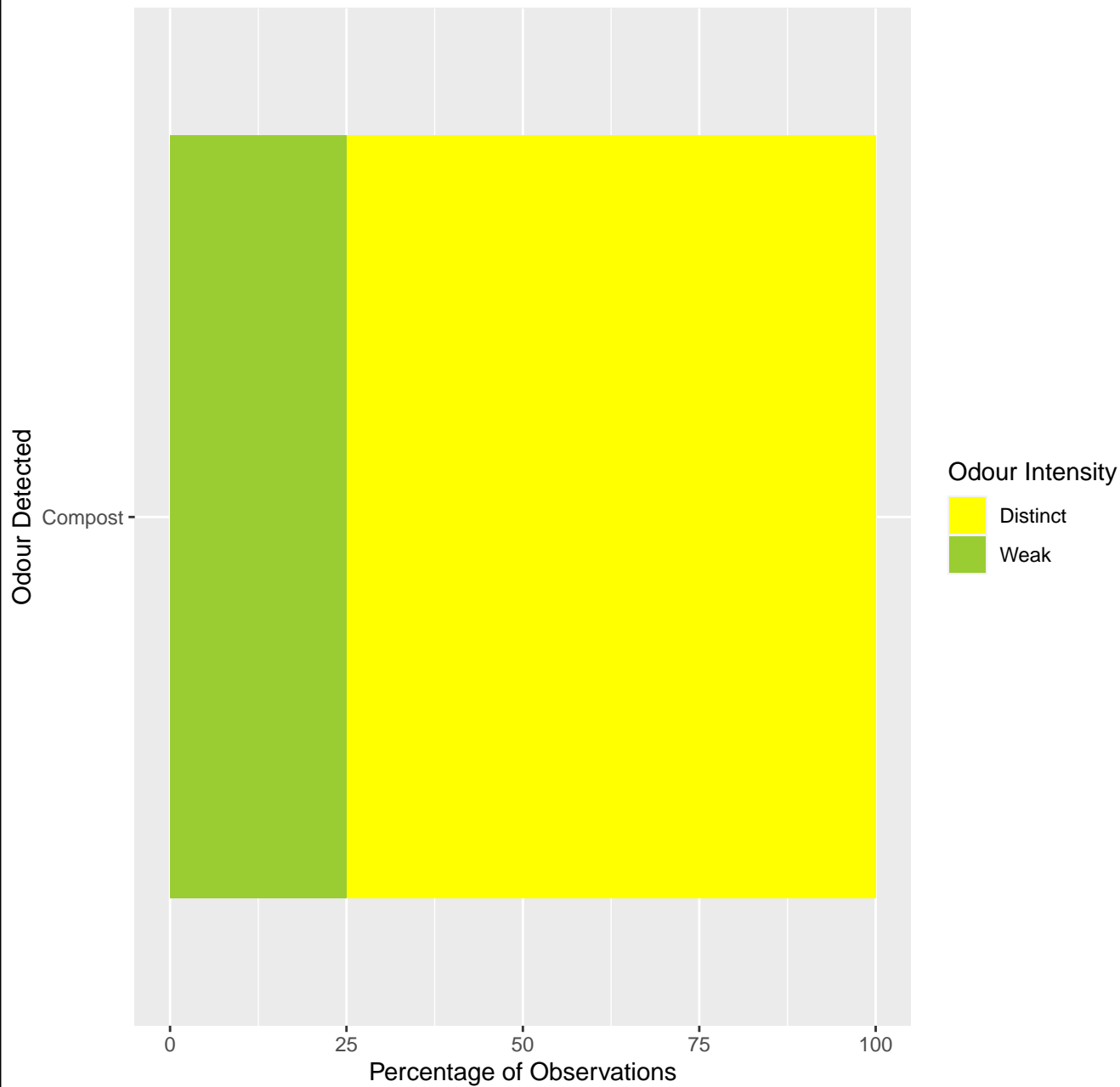
# Site D : Summary of Odours Detected at Site



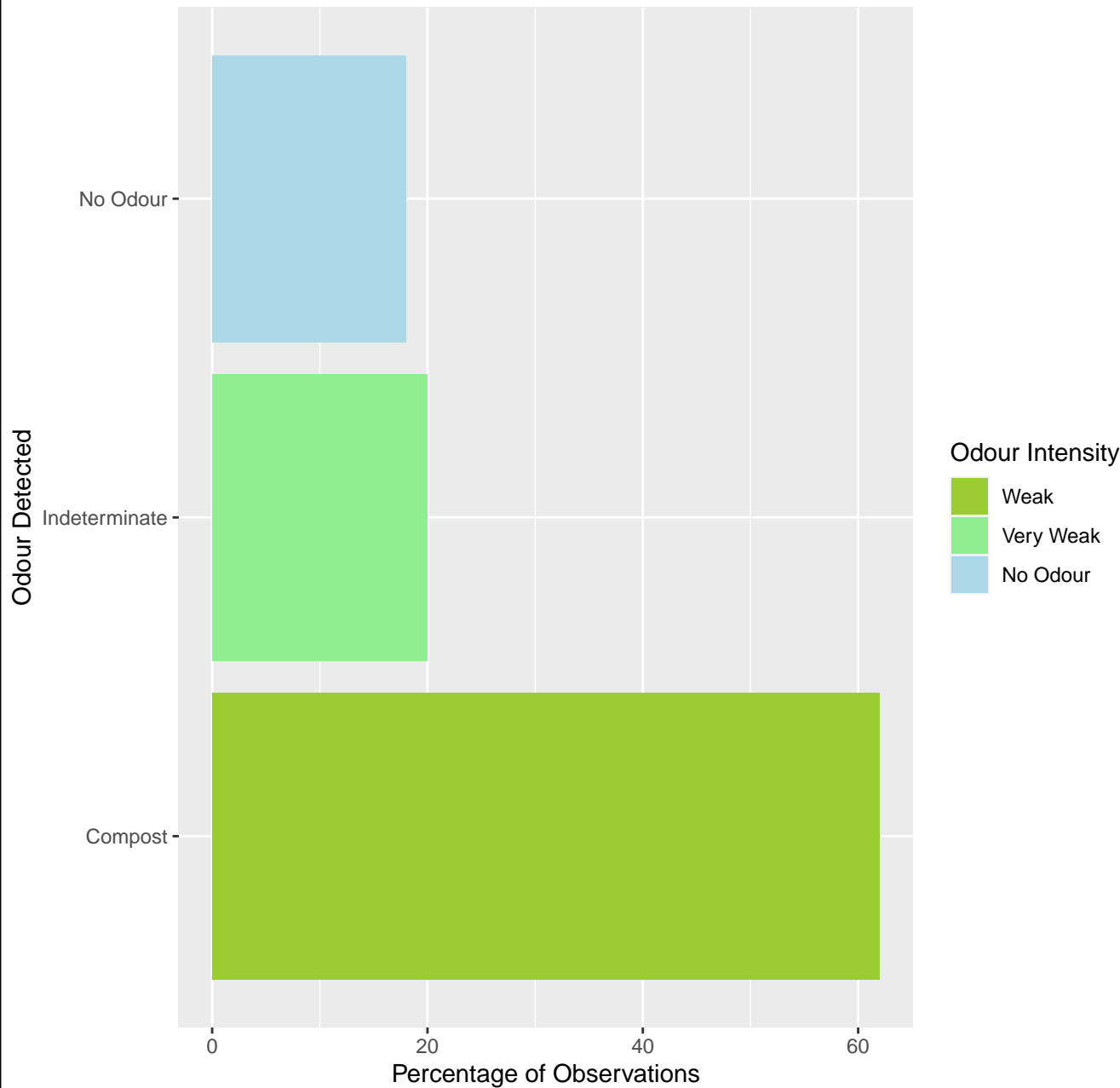
# Site E : Summary of Odours Detected at Site



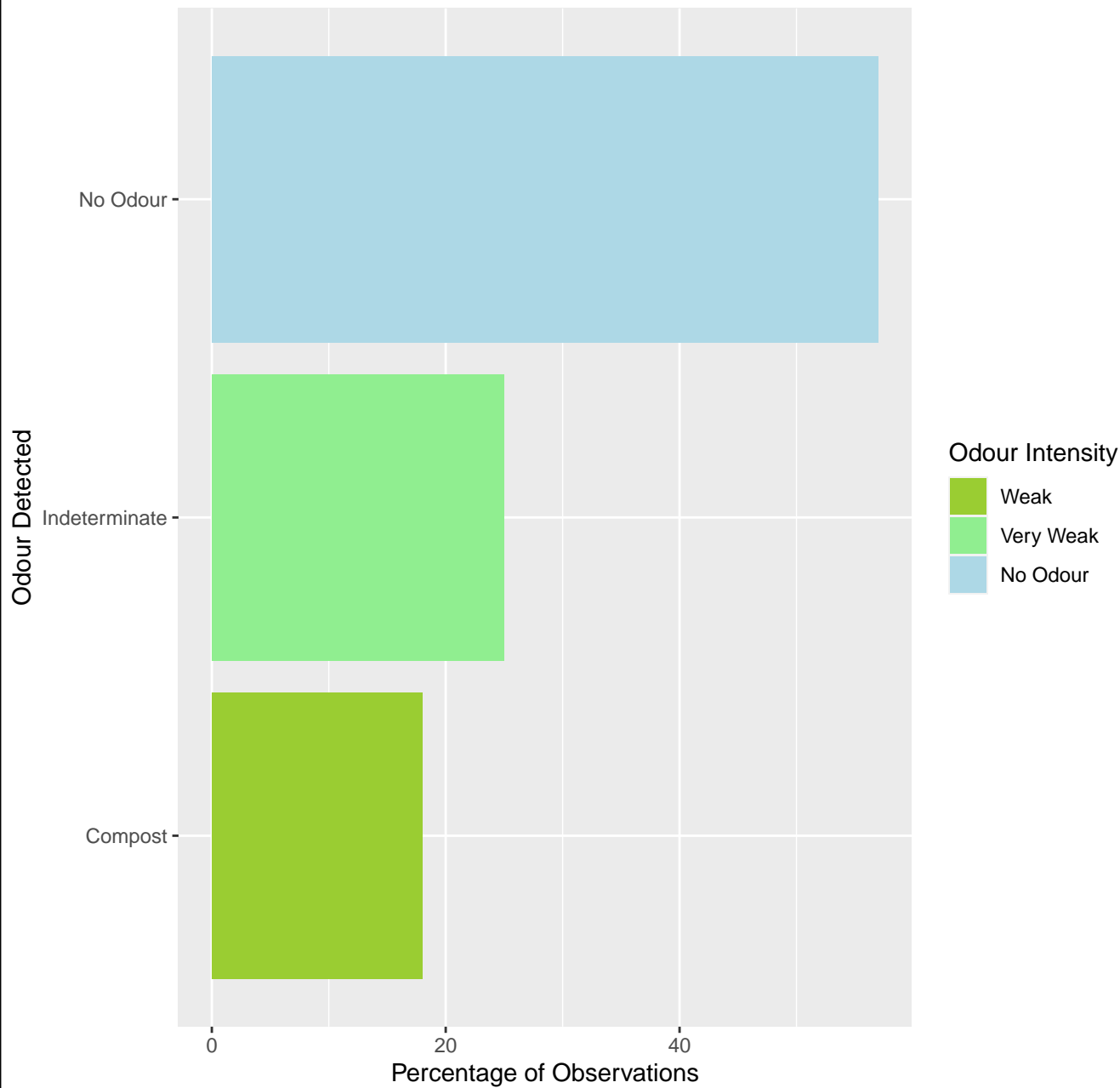
# Site H : Summary of Odours Detected at Site



# Site K : Summary of Odours Detected at Site

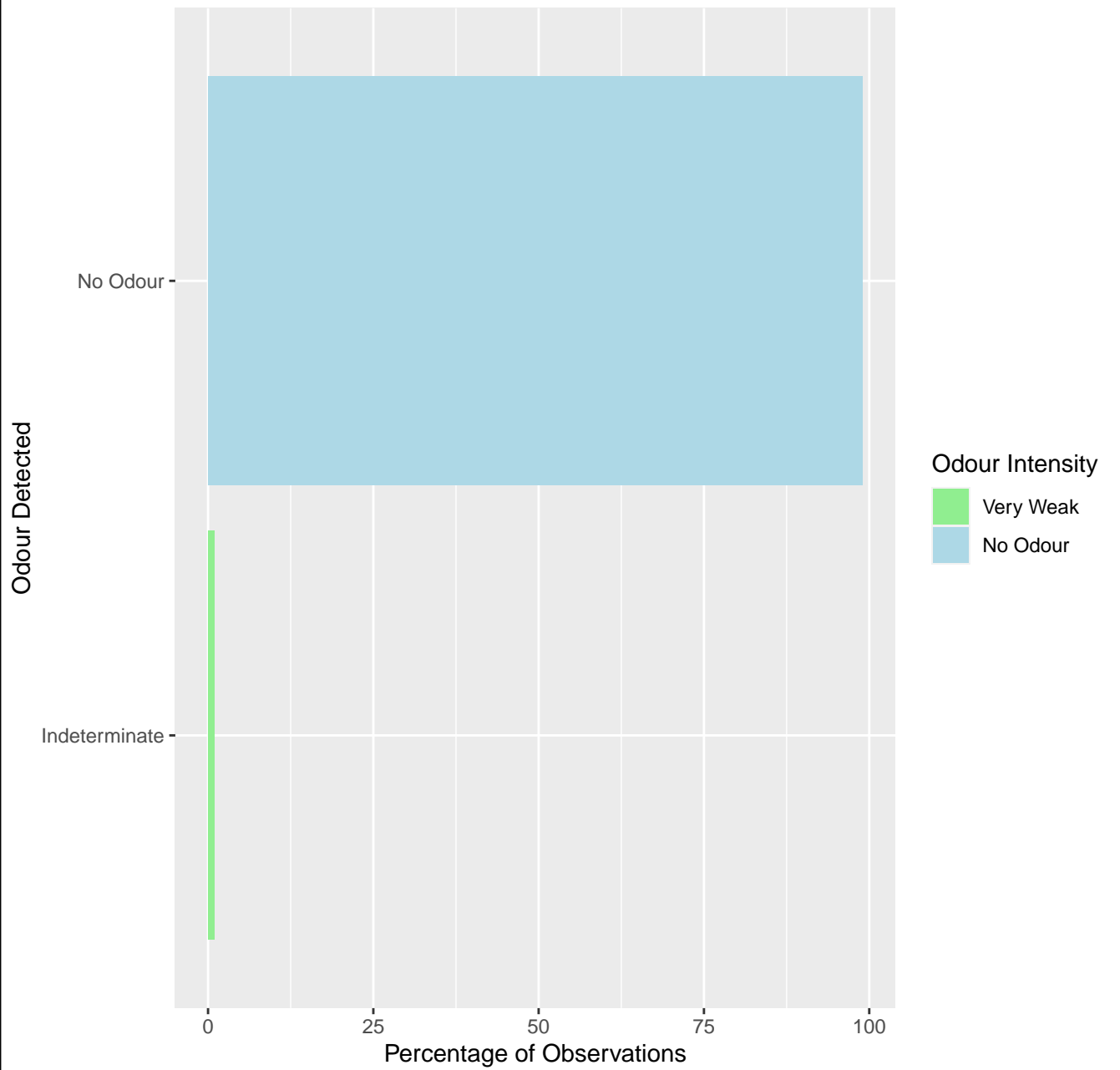


# Site O : Summary of Odours Detected at Site





# Site P : Summary of Odours Detected at Site



# Site Q : Summary of Odours Detected at Site

