



# memorandum

TO Christchurch City Council FROM [REDACTED]  
DATE 12 June 2023  
RE Living Earth Odour Monitoring: 24<sup>th</sup> April 2023 to 21<sup>st</sup> May 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 for the period between the 24<sup>th</sup> of April 2023 and the 21<sup>st</sup> of May 2023.

Four weeks' observations are summarised in this document as weather conditions and illness<sup>1</sup> amongst the odour scouts resulted in a 10-day window where no scouting trips were undertaken.

<sup>1</sup> Affecting the ability to detect odour.

### 3.0 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.

### 3.1 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>2</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.

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<sup>2</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)

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.

#### **4.0 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:

- ∴ 28<sup>th</sup> April 2023;
- ∴ 9<sup>th</sup> May 2023;
- ∴ 13<sup>th</sup> May 2023; and,
- ∴ 18<sup>th</sup> May 2023.

#### 4.1 28<sup>th</sup> April 2023

██████ was the PDP odour scout. The scout was present for approximately 30 minutes. The weather was clear, with a temperature of 15 °C and east-north-easterly winds ranging from 5.6 m/s to 5.7 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. When odour was not identified in the residential area, a loop was taken through the industrial area to positively locate the odour plume. The odour scout route (blue dots) and key scouting locations are shown in **Figure 2**.



**Figure 2: 28<sup>th</sup> April 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: 28<sup>th</sup> April 2023 - Odour Scouting Summary**

Site	Time	Observations
D	11:10	No odour (0) detected.
P	11:14	No odour (0) detected.
P to E	11:15	Intermittent weak (2) marine odour detected.
E	11:18	Intermittent weak (2) marine odour detected.
E to F	11:20	Intermittent very weak (1) indeterminate odour detected.
F	11:22	Continuous weak (2) to distinct (3) compost odour detected.
G	11:23	Continuous weak (2) to distinct (3) compost odour detected.

**Table 1: 28<sup>th</sup> April 2023 - Odour Scouting Summary**

Site	Time	Observations
H	11:24	Continuous weak (2) to distinct (3) compost odour detected.
I	11:26	No compost odour (0) detected.
J	11:29	No compost odour (0) detected.
K	11:33	No compost odour (0) detected.
K to L	11:34	Intermittent weak (2) compost odour detected.
L	11:37	Very intermittent weak (2) compost odour detected.

Compost odour, detected in the industrial zone, indicated the odour plume was approximately passing along the line created by Sites H and L. The compost odour was not detected reaching the residential zone at Site D.

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.

### 4.2 9<sup>th</sup> May 2023

██████████ was the PDP odour scout. The scout was present for approximately 30 minutes. The weather was overcast, with a temperature of 16 °C and north-easterly to east-north-easterly winds ranging from 3.9 m/s to 4.8 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. When odour was not identified in the residential area, the industrial area was scouted to positively locate the southern boundary of the odour plume. The odour scout route (blue dots) and key scouting locations are shown in **Figure 3**.



**Figure 3: 9<sup>th</sup> May 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: 9 <sup>th</sup> May 2023 - Odour Scouting Summary		
Site	Time	Observations
D	09:36	No odour (0) detected.
O	09:39	No odour (0) detected.
Q	09:42	No odour (0) detected.
Q to P		No odour (0) detected.
P	09:51	Intermittent very weak (1) indeterminate odour detected.

**Table 2: 9<sup>th</sup> May 2023 - Odour Scouting Summary**

Site	Time	Observations
E	09:52	Intermittent weak (2) rural/manure odour detected.
F	09:55	Intermittent weak (2) rural/manure odour detected.
G	09:56	Intermittent weak (2) compost odour detected.
E	09:59	Intermittent weak (2) rural/manure odour detected.
L	10:02	No odour (0) detected.
D	10:03	No odour (0) detected.

Compost odour, positively identified at Site G in the industrial zone was not detected within the residential zone.

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.



4.3 13<sup>th</sup> May 2023

██████ was the PDP odour scout. The scout was present for approximately 1.5 hours. The weather was clear, with a temperature of 12 °C and northeast to east-northeast winds ranging from 3.9 m/s to 4.8 m/s as a 10-minute average. The scout started and finished near Site D. The objective was to undertake odour monitoring in the area downwind of the LE Site. The odour scout route (blue dots) and key scouting locations are shown in **Figure 4**.



Figure 4: 13th May 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: 13 <sup>th</sup> May 2023 - Odour Scouting Summary		
Site	Time	Observations
O	15:22	FIDOL assessment completed. Very weak (1) odours of an indeterminate character were present 32% of the time. Weak (2) compost odour was present 52% of the time. Distinct (3) compost odour was present 17% of the time. <b>Odour assessed as offensive and objectionable.</b>
O to Q	15:32	Intermittent weak (2) compost odour detected.

**Table 3: 13<sup>th</sup> May 2023 - Odour Scouting Summary**

Site	Time	Observations
Q	15:34	FIDOL assessment completed. No odour (0) was detected 53% of the time. Very weak (1) odours of an indeterminate character were present 28% of the time. Weak (2) compost odour was present 18% of the time. <b>Odour assessed as not offensive or objectionable.</b>
Q to Munich PI	15:44	Intermittent weak (2) compost odour detected.
Munich PI	15:47	FIDOL assessment completed. No odour (0) was present 75% of the time. Very weak (1) odours of an indeterminate character were present 20% of the time. Weak (2) compost odour was detected 5% of the time. <b>Odour assessed as not offensive or objectionable.</b>
Munich PI to Q	15:57	No odour (0) detected.
Q to O	16:00	Intermittent weak (2) compost odour detected.
O to B	16:03	No odour (0) detected.
B to C	16:08	No odour (0) detected.
C to A	16:10	No odour (0) detected.
A to O	16:13	Intermittent weak (2) compost odour detected.
O to D	16:17	Intermittent weak (2) compost odour detected.
D to E	16:20	No odour (0) detected.
E to F	16:24	No odour (0) detected.
F to G	16:27	Continuous distinct (3) compost odour detected from corner of Edison PI to G.
G to H	16:29	Continuous distinct (3) compost odour detected.
H to I	16:31	No odour (0) detected.
I to N	16:33	No odour (0) detected.
N	16:35	Distinct (3) compost odour detected.
N to I	16:35	No odour (0) detected.
I to J	16:37	No odour (0) detected.
J to K	16:40	No odour (0) detected.
K to L	16:43	Continuous weak (2) to distinct (3) compost odour detected on Tanya St. No odour (0) detected on Newtown St.
L to O	16:48	Weak (2) compost odour detected near O.

Based on the locations where odour was detected, the odour plume was going through Sites H, N, K, O, and Q, with the centreline of the plume being near Site O. The plume extended into the residential zone

along St John's Street, with weak compost odour being detected at the southern intersection of Bayswater Cres and St Johns Street.

Odour of ranging intensities was present continually at Site O during the 10-minute observation. Weak (2) and distinct (3) odours, where the character of compost would be barely or distinctly recognisable, occurred for 69% of the observation. The odour character was not recognisable 32% of the time. This level of odour was offensive or objectionable for a residential zone.

Intermittent weak (2) compost odours, detected at Site Q and Munich PI indicate that the extent of the offensive odours was limited in the residential zone. The odour at these locations 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.

Living Earth have confirmed that on the day, one operator was onsite processing KSO and shredding green waste inside the processing hall. No screening of compost material was occurring.

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.

**4.4 18<sup>th</sup> May 2023**

██████████ was the PDP odour scout. The scout was present for approximately 1 hour. The weather was cloudy, with an average temperature of 13.7 °C and east-southeast to south-southeast winds ranging from 0.3 m/s to 1.3 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 (blue dots) and key scouting locations are shown in **Figure 5**.



**Figure 5: 18<sup>th</sup> May 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: 18<sup>th</sup> May 2023 - Odour Scouting Summary**

Site	Time	Observations
O to Q	13:10	No odour (0) detected.
Q to O	13:14	No odour (0) detected.
O to D	13:17	No odour (0) detected.
D to E	13:19	No odour (0) detected.
E to F	13:23	No odour (0) detected.
F to G	13:26	No odour (0) detected.

**Table 4: 18<sup>th</sup> May 2023 - Odour Scouting Summary**

Site	Time	Observations
G to H	13:28	No odour (0) detected.
H	13:30	FIDOL assessment completed. No odour (0) 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 detected 15% of the time. Distinct (3) compost was detected 3% of the time.  <b>Odour assessed as not offensive or objectionable.</b>
H to M	13:40	Intermittent weak (2) compost odour detected. Distinct compost odour detected at M.
M to H	13:44	Intermittent weak (2) rubbish and compost odour detected.
H to I	13:48	No odour (0) detected.
I to J	13:51	No odour (0) detected.
J to K	13:53	No odour (0) detected.
K to L	13:57	No odour (0) detected.
L to O	14:02	No odour (0) detected.

Intermittent, very weak (1) to distinct (3) compost odour was detected at Site H. This odour was not offensive or objectionable for a heavy industrial area. No odour was detected in the residential 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.

## 6.0 Summary

PDP undertook odour scouting on four occasions between the 24<sup>th</sup> April and the 21<sup>st</sup> May 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:

- ∴ 28<sup>th</sup> April 2023

Compost odour was not detected within the residential zone. Compost odour in the industrial areas was not offensive or objectionable.

- ∴ 9<sup>th</sup> May 2023

Compost odour was not detected within the residential zone. Compost odour in the industrial areas was not offensive or objectionable.

- ∴ 13<sup>th</sup> May 2023

Distinct (3) compost odour was detected at Site O, at the boundary of the residential zone. This odour was offensive or objectionable. Observations at Sites Q, D and Munich Place indicate the extent of the offensive or objectionable odour in the residential zone was limited during the observations.

- ∴ 18<sup>th</sup> May 2023

Intermittent, very weak (1) to distinct (3) compost odour was detected at Site H. This odour was not offensive or objectionable for a heavy industrial area. No compost odour was detected in the residential 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.

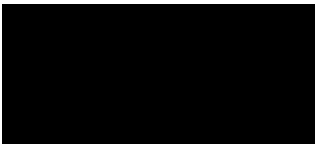
## 7.0 Limitations

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.

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.

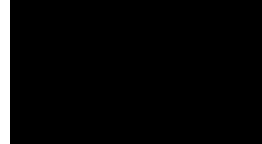
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Prepared by



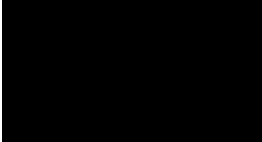
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Prepared by



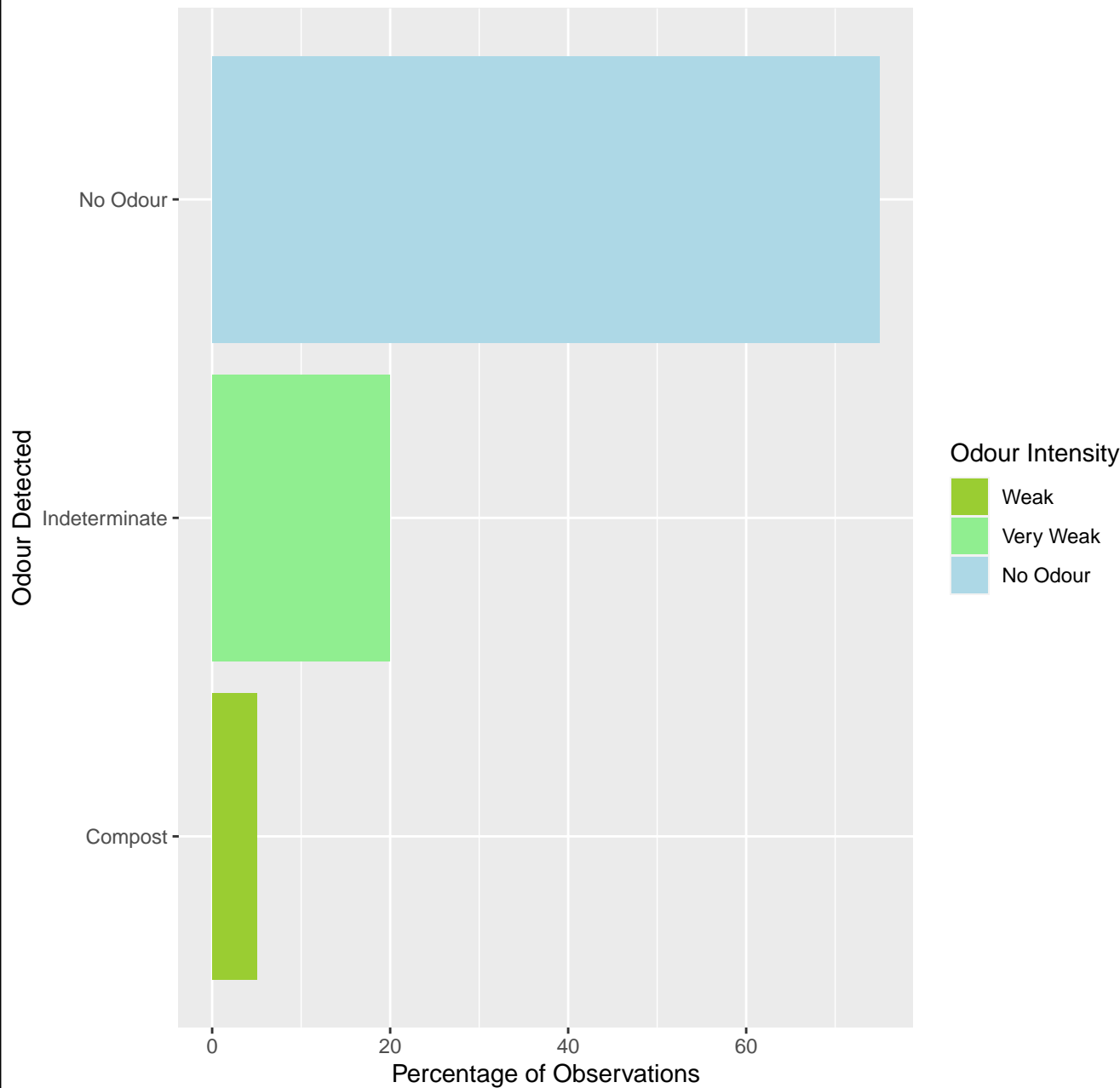
Air Quality Engineer

Reviewed by



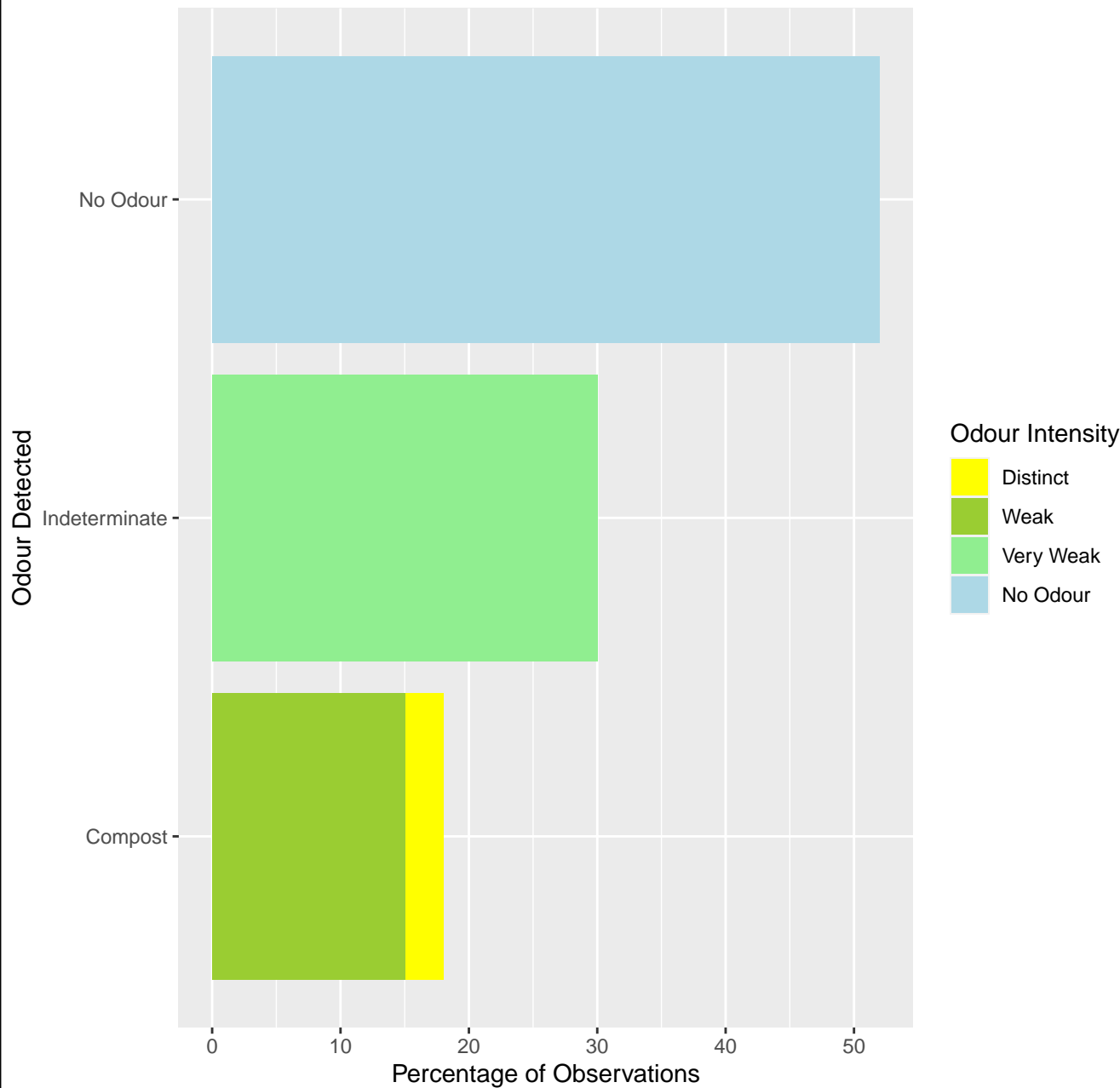
Technical Director

# Munich PI : Summary of Odours Detected at Site

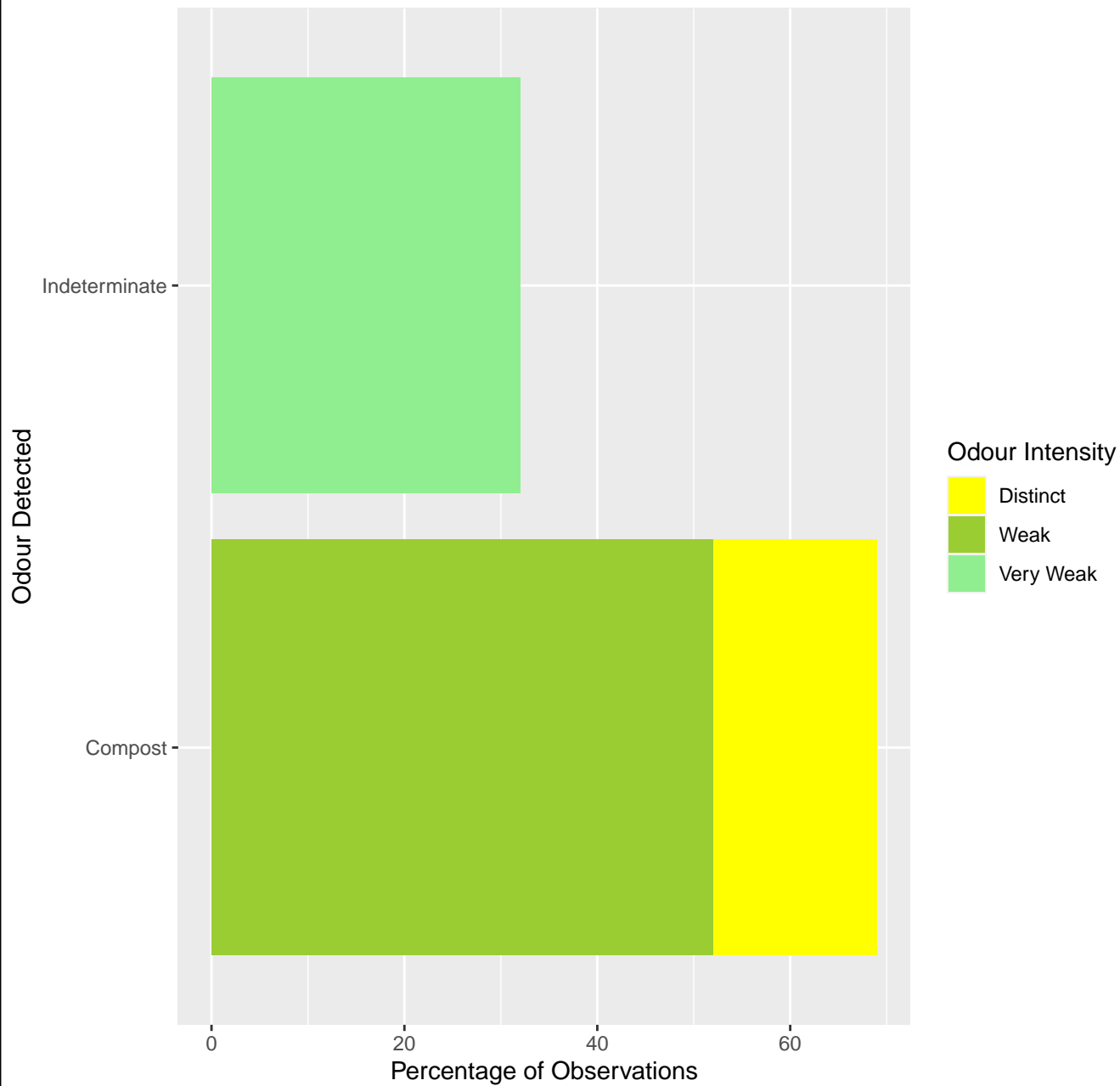




# Site H : Summary of Odours Detected at Site



# Site O : Summary of Odours Detected at Site



# Site Q : Summary of Odours Detected at Site

