BCTT Comments Received as of 9/7/22 at 11am

From: Sam Imperati
To: Benton County Talks Trash
Subject: FW: Condensed background
Date: Tuesday, September 6, 2022 11:08:14 AM
Attachments: image001.png

From: Sam Imperati
Sent: Thursday, September 1, 2022 8:59 AM
To: N Whitcombe [redacted]
Subject: RE: Condensed background

Nancy,

Good stuff… Thanks!

Please give me a call to discuss after you've scanned your "homework" assignment.

Sam

From: N Whitcombe [redacted]
Sent: Wednesday, August 31, 2022 6:02 PM
To: Sam Imperati <samimperati@icmresolutions.com>
Subject: Condensed background

> "Talking Trash" Workgroup -- Common Understandings: Coffin Butte Landfill Land Use History
>
> What are we doing, and why?
>
> What happened?

> Coffin Butte landfill has been in legal operation as a waste disposal facility since 1974. Over the years, the landfill operator has applied for and obtained many permissions dealing with land use. These include: building permits, land partitions, conditional use permits, subdivision actions, comprehensive plan amendments, zoning code amendments, and zoning map amendments.
>
> In 2021, the landfill operator applied for another conditional use permit (CUP in land-use lingo). This application was to allow the landfill operator to expand the area that was permitted for waste placement onto a 59 acre parcel south of Coffin Butte Road that had historically been precluded from being used as a disposal area.
>
> This application additionally asked the County to abandon ownership of a public road (or “vacate” the road, in land-use lingo) Coffin Butte Road, and give ownership of this road to the landfill operator, so that the area of the road also could be used as a disposal area.
>
> This permit was unanimously denied by the Planning Commission, which expressed dissatisfaction about the applicant’s proposal as well as the process of evaluating the proposal. The landfill operator appealed the Planning Commission decision to the Board of Commissioners, but withdrew the appeal before a hearing was scheduled.
>
> Why are we here?
>
> The landfill operator is generally expected to be planning to modify the 2021 proposal and re-submit a modified expansion proposal in the near future.
>
> The first task of the workgroup is to recommend additional criteria and processes that will enable a more efficient and effective review of potential future landfill expansion applications.
>
> The second task of the workgroup is to help Benton County plan for what comes next after the landfill reaches capacity (whenever that is). The last long-term Solid Waste Management Plan was produced in 1977 and is obsolete (it says, for example, that the landfill will be closed by the year 2000). A guiding document will help the County plan for the future, allocate funds, identify regional partners, etc.
>
> The third task of the workgroup includes some housekeeping measures relating to solid waste management in Benton County including waste hauling agreements, better ways to streamline review criteria, and other subjects that may arise in the process of discussing the first two tasks.

Is this useful for you? I was thinking about doing another page "what is land use". Or I could stop, if this is a waste of time.

--
N J Whitcombe

From: Sam Imperati
To: Benton County Talks Trash
Subject: FW: Benton County Talks Trash" Workgroup Update
Date: Tuesday, September 6, 2022 11:05:54 AM
Attachments: image001.png

From: N Whitcombe [redacted]
Sent: Friday, September 2, 2022 4:41 PM
To: Sam Imperati <samimperati@icmresolutions.com>
Subject: Re: Benton County Talks Trash" Workgroup Update

Sam, the "survey monkey" is bad. The fields for commenting on the various issues with "common understandings" only show about 8 words at one time.

You can't ask people to use tools that don't work.

On Fri, Sep 2, 2022 at 4:28 PM Sam Imperati <samimperati@icmresolutions.com> wrote:

> Happy Friday!
>
> A big thanks to those who have had time to finish the survey… very useful feedback!
>
> The County and I have received helpful emails about finetuning the schedule, prioritizing the tasks, missing topics, and missing documents, etc. Much appreciated! In hopes of making the process run efficiently, please consider the following protocols, which are designed to help us manage the Workgroup's workflow effectively. Based upon my past experience with processes like these, they are essential given the iterative nature of the process and the short turnaround time between meetings.
>
> 1. Please send process-related emails to the project email, BentonCountyTalksTrash@Co.Benton.OR.US, with a copy to SamImperati@ICMresolutions.com. That way, we have everything in one place. We will compile the communications received by Noon the day before meetings. Soon thereafter, we will post them to the website, and send a link to the Commissioners, Workgroup Members, and Interested Parties.
>
> 2. The "homework" survey, https://www.surveymonkey.com/r/3D3FXWZ, asks specific questions about several topics, including those commented upon in the emails we have received so far. (Please see attached survey questions.) For the reasons noted above, please use the survey tool

instead. Like the compiled emails, the survey results will be made available the day before the meeting for discussion during the relevant agenda items. When there is more time between meetings, we will send the results further in advance.

Unfortunately, we will not be able to update the "Common Understandings" document before the next meeting because next week is a short one and the Community Development Department is moving offices on Wednesday. In part, this is why our Thursday agenda is designed to tee-up the subsequent changes to the "Common Understandings" document and the schedule, etc. It is not designed to finalize the "Common Understandings" document.

In addition to appearing at the top of each agenda, here are the meeting details for this coming Thursday's kickoff.

<table>
<tr><th>In-Person (Preferred)</th><th>Zoom Video</th><th>Zoom Phone Audio</th></tr>
<tr><td rowspan="3">Benton County Fairgrounds Auditorium
110 SW 53rd Street, Corvallis, Oregon</td><td>Click for Zoom link</td><td>Dial: 1 (253) 215-8782</td></tr>
<tr><td colspan="2">Zoom Meeting ID: 856 9977 5642</td></tr>
<tr><td colspan="2">Zoom Passcode: 246250</td></tr>
</table>

Happy to chat… even after hours.

Enjoy the weekend!

Thanks, Sam

--
N J Whitcombe

From:	Sam Imperati
To:	Benton County Talks Trash
Subject:	FW: Modified email without detail describing initial reaction to draft document prepared by Staff (and Republic Services, apparently)
Date:	Tuesday, September 6, 2022 11:07:16 AM
Attachments:	image001.png

From: N Whitcombe [redacted]
Sent: Friday, September 2, 2022 9:07 AM
To: Sam Imperati <samimperati@icmresolutions.com>; NICHOLS Darren <darren.nichols@co.benton.or.us>
Cc: nancy.wyse@co.benton.or.us; AUGEROT Xanthippe <xanthippe.augerot@co.benton.or.us>; MALONE Patrick <Pat.Malone@co.benton.or.us>
Subject: Modified email without detail describing initial reaction to draft document prepared by Staff (and Republic Services, apparently)

I have spoken with a number of people who have carefully reviewed portions of the draft document that has been produced, the reviews are in, and they are not good.

This larded-with-unnecessary-detail, 99-page read starts out with a "Major Theme" that we had terrible times prior to the enlightened era of 1970, there was a "landfill site search" and, happy ending! Coffin Butte saves us all from vermin! Huzzah!

This start of the document -- "Major Theme" -- is a terrible start, and the document is a terrible start to the process. Shouldn't the workgroup be the ones decided what the "Major Themes" are, not County Staff, or you, or the intern at Republic Services, or whatever highschool student compiled the 114 Gazette Times articles -- all preceding 1973, mind you, not a single one critical of the landfill -- that are included as an aperitif to this unappetizing meal?

Here are some Gazette Times articles I note were not included:

- Corvallis Gazette Times: 7/23/1976 "Wah Chang waste ignites, landfill operator cannot use water for fear of explosion"
- Corvallis Gazette Times: 5/25/1977 "Radioactive material found at Coffin Butte, Radium 222, as deadly as plutonium, concerns about groundwater contamination"
- Corvallis Gazette Times: 4/28/1979 "Dangerous acid dumped at landfill"

- Corvallis Gazette Times: 7/19/1979 "Commissioners require home developer to notify buyers of proximity of homes to dump"
- Corvallis Gazette Times: 9/24/1979 "Diesel soaked pot plants to be taken to landfill"
- Corvallis Gazette Times: 4/11/1996 "Local Landfill got OK to pump polluted water into Willamette"
- AP News: 8/10/2022 "Missing woman's body found in Oregon Landfill"

Sam, putting a 99-page document that begins with a this out to the workgroup, to people who are interested in this issue, this is embarrassing. This is not what the people who felt snookered by the staff report on LU-21-047 need to see.

No neighbors, of all who applied, were seated as public members of the workgroup. None. Zero.

If the point of this whole process is to have County Staff and Republic Services feed the public a bunch of pablum about how dogs will roam the streets eating babies and rats will steal our baked goods if there is no landfill, so that we can in turn recommend the entire thing back to the Board, agree to a new expansion, and call it a day, then we have been sold a bill of goods.

This entire thing should be thrown away. If there isn't time to do this right on Republic's timeline, let's just not do it. They should submit their expansion proposal and it should wend its way through the broken process that we have in place.

There is important work to be done, but this document doesn't touch it.

I am ashamed to be associated with this.

Nancy Whitcombe

From: N Whitcombe
To: REDICK Daniel; NICHOLS Darren
Subject: Additions to the document library
Date: Friday, September 2, 2022 9:48:16 AM

I believe several land use actions are missing from the list. I believe there was another CUP in 1977 to expand the landfill (I believe by 22 acres). Because that was still zoned FC, each modification of the landfill had to go through the CUP process prior to 1983 and the LS zoning amendment. There was a vacation of an entire subdivision (Tampico Ridge). There was a vacation of the end of Coffin Butte Road. I do not see those actions in the list of prior-year land use actions, and I believe they should be included.

It would be interesting to know whether any other business in the history of Benton County has applied for so many land use actions. My guess is that there is not (by a large margin).

Documents that should be added to the library:

There is an "updated narrative" refereneced on page 36-37, referenced in items 1,2,3,4, and 5 (and improperly in items 6 & 7).

It is important for this this updated narrative to be posted in the document library.

It is important for all of the original applications for each of the land use actions to be placed in the document library. Applications frequently include the reasoning behind the request for a land use action, and, as such, are important as you look at the whole history of land use actions. The supporting documents for the 1983 Comp Plan Zoning amendment by consultant Jeffrey R Tross are particularly important as they are specifically included in the Findings of Fact Conclusions of Law and Order (Background Review and State Planning Goal Exception) because they establish what the basis was for the decision to accept the rezone application

It is important for all of the original staff reports for each of the land use actions to be placed in the document library. These are likewise useful.

On page 37, item 6, there is reference to a "detailed reclamation plan" that sets form [sic] the anticipated physical characteristics of the "terracing" -- this would probably be a drawing, not a narrative. If it can be found (and it is very important, and should be searched for diligently), it should be placed on the web page

On page 37, item 7, there is reference to small ponds. These have been covered over with earth/waste, and so unless the "protection" plan was "destroy the small ponds", the landfill is not in compliance with this condition of approval.

On page 38, item 10, there is a reference to the screening provision, there is a 1983 letter from the Oregon Attorney General in the file that provides context and background for this requirement. This letter should be on the website.

Generally, it is my understanding that unless specific Conditions of Approval directly

reference DEQ or some other agency, that an approval by DEQ (or another agency) does not void the Condition of Approval. Conditions of Approval are land use actions carried out by the County. DEQ approvals are parallel regulatory processes. These should not be conflated.

Thank you,

Nancy Whitcombe

From: Sam Imperati
To: Benton County Talks Trash
Subject: FW: Benton County Talks Trash" Workgroup Update
Date: Tuesday, September 6, 2022 11:05:33 AM
Attachments: image001.png

From: Joel Geier [redacted]
Sent: Friday, September 2, 2022 9:23 PM
To: Sam Imperati <samimperati@icmresolutions.com>
Cc: Darren Nichols <Darren.Nichols@co.Benton.OR.US>; xanthippe augerot <xanthippe.augerot@co.benton.or.us>; nancy wyse <nancy.wyse@co.benton.or.us>; pat malone <pat.malone@co.benton.or.us>
Subject: Re: Benton County Talks Trash" Workgroup Update

Sam,

I just struggled through your Survey Monkey "poll." I'm including the folks who are hiring you for this project, because I think there needs to be accountability, and hopefully some swift action to get you back on track.

First off, this is a terrible format for getting input on a terrible first draft of a very important document.

To put it plainly, it's hokey. These are nuanced issues, but the text boxes on your form give no room for nuanced responses.

And you (or whichever county staff or Republic people put this together) have missed most of the most basic topics that should go into an assessment of any disposal facility. No description even of basic geology or climate setting? This would not be even remotely acceptable, in any of the European countries where I work on waste issues. It's frankly embarrassing, as a professional in the field.

Then to be told that there can be no changes in this shoddy document before the group next meets, because county staff are moving their offices? Who planned this schedule? Didn't they know that was going to happen?

This is really getting the whole thing off on the wrong foot. I suggest pushing the whole schedule back by a week, and regrouping until we can do something at least a little more professional-looking.

Joel

From: "Sam Imperati" <samimperati@icmresolutions.com>
To: "Duvall, Kathryn" [redacted] "john deuel" [redacted] "christopher mcmorran" [redacted] "Brian FULLER" [redacted] "Marge Popp" [redacted] "N Whitcombe" <[redacted] "Scott Kruger" <Scott.Kruger@Co.Benton.OR.US>, "REDICK Daniel" <daniel.redick@Co.Benton.OR.US>, "clearwater" [redacted]
Cc: "nancy wyse" <nancy.wyse@Co.Benton.OR.US>, "pat malone" <Pat.Malone@Co.Benton.OR.US>, "xanthippe augerot" <Xanthippe.Augerot@Co.Benton.OR.US>, "KERBY Joseph" <Joseph.Kerby@Co.Benton.OR.US>, "Darren Nichols" <darren.nichols@Co.Benton.OR.US>, "CRONEY" <Vance.M.CRONEY@Co.Benton.OR.US>, "Adam Meyer" [redacted] "Amelia Webb" [redacted] "Inga Williams" <Inga.Williams@Co.Benton.OR.US>, "REDICK Daniel" <daniel.redick@Co.Benton.OR.US>, "KWIATKOWSKI Maura" <maura.kwiatkowski@Co.Benton.OR.US>, "MAKEPEACE Amanda" <amanda.makepeace@Co.Benton.OR.US>, "MILO Erika" <Erika.Milo@Co.Benton.OR.US>, "GROGAN Cory" <cory.grogan@Co.Benton.OR.US>, "Linda Ray" <Linda.Ray@Co.Benton.OR.US>, "Adam Meyer" [redacted] "Amelia Webb" [redacted]
Sent: Friday, September 2, 2022 4:27:57 PM
Subject: Benton County Talks Trash" Workgroup Update

Happy Friday!

A big thanks to those who have had time to finish the survey… very useful feedback!

The County and I have received helpful emails about finetuning the schedule, prioritizing the tasks, missing topics, and missing documents, etc. Much appreciated! In hopes of making the process run efficiently, please consider the following protocols, which are designed to help us manage the Workgroup's workflow effectively. Based upon my past experience with processes like these, they are essential given the iterative nature of the process and the short turnaround time between meetings.

1. Please send process-related emails to the project email, BentonCountyTalksTrash@Co.Benton.OR.US, with a copy to SamImperati@ICMresolutions.com. That way, we have everything in one place. We will compile the communications received by Noon the day before meetings. Soon thereafter, we will post them to the website, and send a link to the Commissioners, Workgroup Members, and Interested Parties.

2. The "homework" survey, https://www.surveymonkey.com/r/3D3FXWZ, asks specific questions about several topics, including those commented upon in the emails we have received so far. (Please see attached survey questions.) For the reasons noted above, please use the survey tool instead. Like the compiled emails, the survey results will be made available the day before the

meeting for discussion during the relevant agenda items. When there is more time between meetings, we will send the results further in advance.

Unfortunately, we will not be able to update the "Common Understandings" document before the next meeting because next week is a short one and the Community Development Department is moving offices on Wednesday. In part, this is why our Thursday agenda is designed to tee-up the subsequent changes to the "Common Understandings" document and the schedule, etc. It is not designed to finalize the "Common Understandings" document.

In addition to appearing at the top of each agenda, here are the meeting details for this coming Thursday's kickoff.

<table>
<tr><th>In-Person (Preferred)</th><th>Zoom Video</th><th>Zoom Phone Audio</th></tr>
<tr><td rowspan="3">Benton County Fairgrounds Auditorium
110 SW 53rd Street, Corvallis, Oregon</td><td><u>Click for Zoom link</u></td><td>Dial: 1 (253) 215-8782</td></tr>
<tr><td colspan="2">Zoom Meeting ID: 856 9977 5642</td></tr>
<tr><td colspan="2">Zoom Passcode: 246250</td></tr>
</table>

Happy to chat… even after hours.

Enjoy the weekend!

Thanks, Sam

From: Joel Geier
To: Sam Imperati
Cc: REDICK Daniel; NICHOLS Darren; AUGEROT Xanthippe; WYSE Nancy; MALONE Patrick
Subject: Re: Benton County Talks Trash" Workgroup: Welcome, 9-8-22 Agenda, Materials, and Homework
Date: Friday, September 2, 2022 11:41:08 AM
Attachments: image001.png

Hi Sam,

Thanks for sending over the agenda and meeting materials.

I have a lot of comments on major topics that are missing from the "common understandings" document, which I'll try to send over the weekend. Very briefly, there is no site description, nor any history of the site or setting in the local North Benton community, other than its use as a dump and later as a landfill.

But while I'm working on those comments -- which will be lengthy -- I wanted to alert you to another major and important gap, which will likely require staff time to remedy before the first meeting.

The only examples of planning criteria of "other Oregon jurisdictions" come from two northeastern Oregon counties -- both very different from Benton County in terms of climate, geologic setting, population, local economy, and environmental attitudes. Gilliam County's entire population of 1,995 souls could practically fit into the City of Adair Village, once the Caldwell Creek subdivision is finished.

Why aren't there any examples from western Oregon counties that would be more comparable to Benton County -- for example Lane County which hosts Short Mountain Landfill, or Yamhill County which hosts Riverbend Landfill?

I hope that by bringing this up now, you and/or county staff can find time to fix this problem before the first meeting of the group.

Thanks,
Joel

From: "Sam Imperati" <samimperati@icmresolutions.com>
To: Joel Geier [redacted]
Sent: Thursday, September 1, 2022 5:53:39 PM
Subject: FW: Benton County Talks Trash" Workgroup: Welcome, 9-8-22 Agenda, Materials, and Homework

From: Sam Imperati
Sent: Wednesday, August 31, 2022 10:42 PM
To: Duvall, Kathryn [redacted]; [redacted] Scott.Kruger@Co.Benton.OR.US; daniel.redick@Co.Benton.OR.US; [redacted]
Cc: WYSE Nancy <nancy.wyse@Co.Benton.OR.US>; MALONE Patrick <Pat.Malone@Co.Benton.OR.US>; AUGEROT Xanthippe <Xanthippe.Augerot@Co.Benton.OR.US>; KERBY Joseph <Joseph.Kerby@Co.Benton.OR.US>; NICHOLS Darren <darren.nichols@Co.Benton.OR.US>; CRONEY Vance M <Vance.M.CRONEY@Co.Benton.OR.US> [redacted] WILLIAMS Inga <Inga.Williams@Co.Benton.OR.US>; REDICK Daniel <daniel.redick@Co.Benton.OR.US>; KWIATKOWSKI Maura <maura.kwiatkowski@Co.Benton.OR.US>; MAKEPEACE Amanda <amanda.makepeace@Co.Benton.OR.US>; MILO Erika <Erika.Milo@Co.Benton.OR.US>; GROGAN Cory <cory.grogan@Co.Benton.OR.US>; RAY Linda <Linda.Ray@Co.Benton.OR.US>; [redacted]
Subject: Benton County Talks Trash" Workgroup: Welcome, 9-8-22 Agenda, Materials, and Homework
Importance: High

Good Evening:

Welcome to the “Benton County Talks Trash” (BCTT) Workgroup! I am the process facilitator, and I am looking forward to meeting you next Thursday and working with you over the coming months. The project website is at https://www.co.benton.or.us/cd/page/solid-waste-process-work-group, and all relevant

documents will be posted there as they become available.

Please forward this email to others and ask them to send an email to BentonCountyTalksTrash@Co.Benton.OR.US if they want to be added to our developing Interested Parties List. It will also include your alternates, members of SWAC, and members of the Planning Commission, etc., to keep folks in the loop. Please know I have and will continue to reach out to the Tribes.

I have attached the Agenda, which contains the meeting details and links to the meeting materials. As you will see, we have a lot topics to cover next Thursday. Please read the materials in advance so we can get right to work on this important project. I recommend you start by reviewing the Charter because it provides our charge, a draft workplan, a draft schedule, and other important process details like "Polling" for the development of Workgroup recommendations.

The materials also include the first draft of the eventual Workgroup Report, which is due to the Board of Commissioners on December 15, 2022. These processes work best when we start writing the Workgroup Report from the start, and revise it as we progress. It will be an iterative process. Restated, it will not be final until our last meeting.

Once you review our draft process workplan/schedule, you will see we have a lot to accomplish in the next 3.5 months. In order to be maximally successful, we will need to make progress between Workgroup meetings. I call this activity, "Homework," and it is for Polling and Ex-Officio members. The first "assignment" is found here: https://www.surveymonkey.com/r/3D3FXWZ. The majority of the survey asks process-related questions (meeting times, topic priority, schedule refinement, etc.) It should take about 30 minutes to complete.

The current Workplan has us starting by establishing common understandings from which to build your subsequent recommendations to the Board of Commissioners. The final survey question asks you to identify what topics/questions are missing from staff-drafted, Section IV. A., "Common Understandings." Finetuning that section is a critical first step, and that is why the final question could take an additional one to two hours.

Because there are always "growing pains" when launching a public policy process, I

am simply asking you to do the best you can before the September 6, 200 3:00 PM deadline… especially in light of the upcoming weekend. We will summarize the survey responses received by the due date, and send them to you on September 7, 2022 for discussion at our first meeting. Recognizing the tight turnaround, there will be a subsequent, "last call" deadline of September 12th for you to supplement your "missing topics/questions" feedback on the last question. The first Workgroup opportunity to comment on the specific statements in "Common Understandings" section will start during meeting two on September 15, 2022.

Please email or call me with any questions, comments, suggestions, or concerns. I can be reached at (503) 244-1174 during the day and (503) 314-1156 after hours, even over the weekend.

Thank you for helping make Benton County even better!

Sam

From: Sam Imperati
To: Benton County Talks Trash
Subject: FW: Comments regarding the Work group Charter and Bylaws
Date: Tuesday, September 6, 2022 11:06:39 AM
Attachments: image001.png

From: Marge [redacted]
Sent: Friday, September 2, 2022 2:50 PM
To: Sam Imperati <samimperati@icmresolutions.com>
Cc: Darren Nichols <darren.nichols@co.benton.or.us>; AUGEROT Xanthippe <Xanthippe.Augerot@co.benton.or.us>; patrick.malone@co.benton.or.us; nancy.wyse@co.benton.or.us
Subject: Comments regarding the Work group Charter and Bylaws

Hi Sam,

Here are my comments regarding the Workgroup Charter and Bylaws

General comment:

As a general comment, it was my understanding that this workgroup would be a step in the direction of Benton County actually taking steps to look forward into the future and make actual plans and decisions and devote resources to the process of constructing a materials and solid waste plan for the future. Such a plan, by its nature, would not be centered on the current landfill franchisee but would look a decade or two into the future and having agreed on a vision for the county then backtrack to make a plan to get from here to there.

Specific comments:

Meeting Two: The Coffin Butte tour will take up a significant amount of time and doesn't seem necessary at this point for us to discuss Benton County future plans. I vote we strike that tour from the schedule.

Meeting Three and Four: Spending 25% of our time on a Land Use Review which can lead to no outcome (since any change of the code is likely outside the timeframe of a new CUP discussion) seems irrelevant and counterproductive to our aim of envisioning a future posture for Benton County's solid waste infrastructure.

Meeting Five: Finally, at the half-way mark, we are scheduled to spend 12% of our time on the subject that I believed was the purpose of this workgroup.

Meeting Six: I think the land use review process could appropriately be listed as one of the steps under Additional Topics.

Meeting Seven and Eight: These meetings which are scheduled for 25% of our time (editing and finalizing) are apparently designed as a wrap-up of discussion that we spent only 12% of our time formulating.

Does this make sense to you?

Thanks,

Marge Popp

From:	Joel Geier
To:	Benton County Talks Trash
Cc:	Sam Imperati
Subject:	Common Understandings document: Suggested draft text to be added to "history" section
Date:	Saturday, September 3, 2022 11:16:52 AM
Attachments:	CommonUnderstandingAdditions-History.pdf

Sam,

Here's a first draft of my attempt to address one of the gaping holes in the "history" section of your document.

There are quite a few parts here that still need to be fleshed out, but it's a lot of work for one individual to do in the short time you've given us. Perhaps the county could spend some of their "trash money" to hire a local historian who could do a far better job on this than either you or me.

Once again, I'll also urge you and the county to engage the Grand Ronde and Siletz Tribes in an appropriate consultation process. That should include -- but certainly not be limited to -- commenting on this document and any later revisions.

I'll be supplying other pieces as I continue to work on this.

Joel

1. A brief history of communities in the Coffin Butte/Tampico Ridge area

Themes:
- *Residents of North Benton County repeatedly displaced, mistreated, misrepresented and ignored by outside interests*
- *Cultural resources threatened by landfill expansion*
- *County's conservation commitments; conservation and outdoor recreational lands impacted by landfill expansion.*

Indigenous people

Coffin Butte and Tampico Ridge are part of the homeland of the Kalapuya people, represented today by citizens of the Confederated Tribes of the Grand Ronde Community of Oregon, and of the Confederated Tribes of Siletz Indians.

[add more here on current situation, treaty rights and cultural concerns of the Tribes based on consultation]

The Kalapuya managed lands in this area as prairie and oak savanna, using traditional agricultural methods including annual burning to maintain camas and other food and medicinal plants. Examples of these culturally important plants can still be found in prairie/savanna remnants around the neighborhood, including on the portion of Coffin Butte currently under state ownership, as part of E.E. Wilson Wildlife Area.

Ridgeline trail system

A system of ridgeline trails (see historical documents by Zybach) connected from the Willamette Valley all the way to the Oregon coast had its eastern end at the north end of Tampico Ridge. This was likely an important route for trade, by which people starting from annual encampments in the Willamette Bluffs area near the Luckiamute-Willamette confluence could travel to exchange goods with coastal communities in the Yaquina, Siletz, and Alsea areas.

Local residents have observed cultural items including obsidian spear points along the ridgeline, particularly in the vicinity of an artesian spring that still flows year-round, near the north end of the ridge. Thus far no surveys for cultural/archaeological resources have been conducted on the land proposed for landfill expansion at the north end of Tampico Ridge.

Arrival of European-Americans

European-American presence in the area began in the early 1800s. One of the first visitors to record their experiences was the Scottish botanist David Douglas, who traveled south along the west side of the Willamette Valley in late 1826, documenting the native plants along the way. Douglas' journals indicate that he passed through the Coffin Butte neighborhood on October 5, 1826, camping beside a small wooded creek due east of Mt. Jefferson (likely Soap Creek), and near where he could glimpse the tops of two other peaks (likely two of the Three Sisters which are visible from the slopes of Coffin Butte and Tampico Ridge).

Numbers of European-American settlers increased dramatically in the 1840s as wagon trains began to travel west, initially along the Oregon Trail and by 1846, also on the Applegate Trail. A section of the

Applegate Trail crossed from the Willamette Valley into Soap Creek Valley via the topographic saddle at the south end of Tampico Ridge, along the current route of Tampico Road.

Letitia Carson: An early Black pioneer

One of the earliest settlers in the area was Letitia Carson, a Black woman, formerly enslaved, who traveled to Oregon from Missouri with her Scottish immigrant husband David Carson in 1845, giving birth to a daughter along the way. The Carsons settled on a 640-acre claim near the present-day intersection of Tampico Road and Soap Creek Road, on land which is now mainly part of OSU's Soap Creek Beef Ranch. The Applegate Trail passed right through the Carsons' claim. Letitia Carson ran a successful farm stand, selling produce to later migrants headed for Kings Valley and the Dallas area farther north in Polk County.

Following David Carson's untimely death in 1853, a wealthy pro-slavery Corvallis landowner, Greenberry Smith took control of the Carsons' property, selling their land, cattle, and even personal belongings at public auction, pocketing the proceeds for himself.
[https://www.tillamookheadlightherald.com/community_paid/offbeat-oregon-neighbor-s-theft-of-widow-and-orphans-home-was-too-much-for-jury/article_9e5bee8e-1b77-11ea-a436-27f1f68d91de.html]
Letitia Carson left Benton County in favor of the Cow Creek Valley in Douglas County, where she started all over and successfully homesteaded for a second time. More of her remarkable story can be found in this article by the Salem Statesman Journal (which also includes a photo of the current landfill less than a mile away, looming over a team of OSU archaeologists as they investigate the area of her homestead):
[https://www.statesmanjournal.com/story/news/local/2022/06/20/letitia-carson-legacy-project-honors-oregon-only-black-homesteader-pioneer-juneteenth/65361235007/]

Forced relocation of Kalapuya and other Indigenous people to reservations at Grand Ronde and Siletz
[need more text here; mention Fort Hoskins]

Soap Creek community
[Need more here on the later history of the Soap Creek Valley, including stagecoach routes along the Territorial Road, and the historic Soap Creek Schoolhouse].

Historic town of Tampico
[need more text here, note plaque at intersection of Tampico and Soap Creek Roads]

Historic town of Wellsdale
[add text here; including Rohner family farm on Coffin Butte]

Historic town of Palestine
[add text here]

Town of Airlie
[add text here]

Camp Adair period 1942-1945
[add text here: Eviction of farm families, relocation of cemeteries, construction of Camp Adair, psychiatric imprisonment of legendary blues singer Howling Wolf in 1943

[https://www.counterpunch.org/2019/05/24/the-army-aint-no-place-for-a-black-man-how-the-wolf-got-caged/]
Exploitation of Coffin Butte as crushed rock quarry, then later as army dump; ditching of natural stream courses]

Post-war military presence
[Conversion of Camp Adair to a prisoner-of-war camp for captured German and Italian soldiers;
early Cold War period and BOMARC missile project]

Reestablishment of farming and residential communities
[Farmland for returning GIs; establishment of OSU research forests and Soap Creek Beef Ranch in 1948; conversion of Adair Village to a residential community]

Growth of North Benton County
[Growth of North Albany, Adair Village, and Lewisburg; rural residential development;
currently home to >10,000 people who live within 7 miles of the landfill;
North Benton County Advisory Council discontinued by county planners since 2008(?)]

Conservation, preservation, and outdoor recreation
Establishment of E.E. Wilson Wildlife Area including Coffin Butte Annex: Per acre, most intensively used wildlife area in state of Oregon.
Establishment of Willamette River Greenway including Luckiamute State Natural Area
Oregon Conservation Plan and Benton County's (forgotten?) commitments in area

From:	Mary Parmigiani
To:	Benton County Talks Trash; samimperati@icmresolutions.com
Subject:	Supporting Material for Suggestion Made for Draft Report
Date:	Saturday, September 3, 2022 1:51:15 PM
Attachments:	As I See It Kicking the (trash) can down the road Local gazettetimes.com.pdf

Hi,
My name is Mary Parmigiani and I am a polling member on the workgroup. Most of the comments I made were questions but I did have a suggestion that has supporting material.

This suggestion is for Section 1, my suggestion here was to add more about how the surrounding community felt about the landfill as there has been a lot of tension for many years between the community and the landfill. I've attached a Gazette Times article from a concerned citizen that describes some of the tension between local communities and the landfill over the last few decades.

Thanks,
Mary P.

https://democratherald.com/corvallis/news/local/as-i-see-it-kicking-the-trash-can-down-the-road/article 9c9c6516-1cc7-11ed-a2e1-4f3ea7781dfb.html

e It: Kicking the (trash) can d
ıd

Corvallis, Benton County, is literally the “heart of the (Willamette) valley,” known for its fertile soil, clean air and water quality.

If you value these things about our county, you will understand why North Benton County residents have been worried about the Coffin Butte Landfill.

Here is a quote from a letter written in opposition to landfill expansion:

“Although the date of closing the present operations has been delayed time after time, the people felt the commitment was made in good faith and therefore have demonstrated patience, tolerance and understanding concerning the difficulties entailed in finding an alternate site.”

Was that from the 2021 expansion request … which would have covered over Coffin Butte Road with a 270-foot-tall mountain of garbage, blocking essential emergency access?

People are also reading…

1 **Heat advisory issued for Albany, Corvallis, Lebanon**

2 **Granger Avenue to close at Highway 20 for three days**

3 **Northern Calif. wildfire forces thousands to flee on Labor Day weekend**

4 **Highway 20 east of Sweet Home to close in September**

It was not.

Was it from the 2003 expansion … when the landfill added another 20 or so acres, and promised that by doing so, the county extended the estimated life of the landfill until the year 2070?

It was not.

Was it from the 1983 request by the dump applicant to amend the code to add a new "landfill" zone where one of the promises included a requirement that landfill operations be screened so that they " … cannot be seen from the county road or adjacent properties?"

It was not.

No, that letter, from the North Benton Advisory Committee, is dated Nov. 5, 1973.

Promises broken

Even back in 1973, the dump was controversial. North Benton County residents had been repeatedly promised that it would be closed. Because there had been little planning for where trash would go after closure, an expansion was approved as an emergency stopgap (sound familiar?).

To win over residents, the dump was mandated to serve only two small areas outside our county's boundaries, to close by the year 2000 (it was to be made obsolete by a waste-to-energy facility), and volumes were to be small (88,000 tons). Traffic was a negligible 30 to 40 vehicles per day.

And of course, there was the requirement that landfill operations, again, not be seen. Today, the landfill is visible from many locations in North Albany and along Independence Highway.

Volumes have grown 1,250% from the date of the letter quoted above in 1973; currently Republic Services is limited to hauling in 1,100,000 tons a year. If another expansion, any expansion at all, is approved, that cap is removed. That means there would be no limit to the amount of waste or the sources of waste that Republic Services can haul into our county.

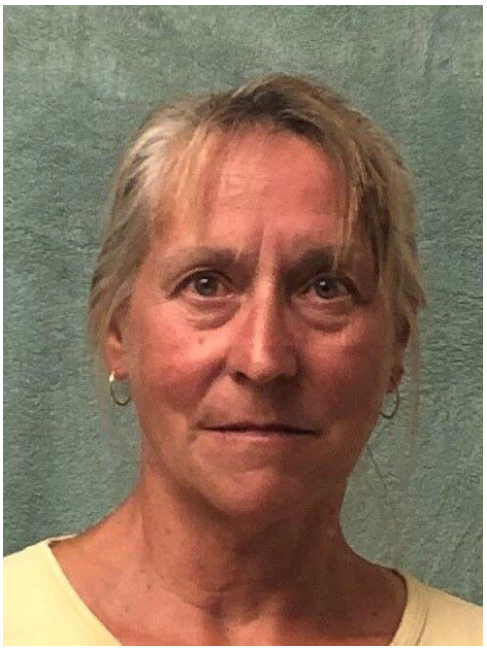
The increase in waste also relates to more trucks on our roads, increasing wear and tear and decreasing safety of the highways, more roadside trash. That the landfill many times had promised that the operations would not be seen means nothing.

Back in 1973, North Benton County had reason to be worried. Now all of Benton County has reason to worry. The corporate policy of Republic Services (an Arizona corporation), which acquired the landfill, is continuous expansion to match incoming volumes. That means that we could be looking at an expansion on the order of last year's request every nine years or so.

What comes next?

Benton County has been kicking this can down the road for 45 years, allowing repeated incremental expansions without considering the long-term impacts for our county.

Now that the county commissioners have finally taken a step back and authorized a work group to look at the long-term perspective, we can hope for an outcome that will be in the best interests of Benton County's residents, now and for future generations.



Becky Merja

Becky Merja was Corvallis' first city forester, with a 32-year career in natural resources and managing public land. Now retired, she has been a Willamette Valley resident since 1973 and believes that site history is important.

Around The Web

Doctor: if You Suffer from Tooth Decay or Gum Disease Do This Immediately!

Trend ng Reports

Doctors Stunned: This Removes Wrinkles and Eye-bags Like Crazy! (Try Tonight)

We ness Gu de 101

25 Gifts That Will Sell Out in 2022

Barga n Fans

Always Put a Crayon in Your Wallet when Traveling, Here's Why

Sogood y

Homeowners Are Trading in Their Doorbell Cams for This.

The Security Camera That Works Without Wires-now 60% off

Ke n

This Lightbulb Security Camera is Sweeping Seattle Now!

Ke n

Ke n

From:	Joel Geier
To:	Benton County Talks Trash
Cc:	Sam Imperati
Subject:	Common Understandings document: Roles and responsibilities of the different corporations involved
Date:	Sunday, September 4, 2022 6:41:49 PM

Hi again Sam,

I appreciate that you've acknowledged the format issues in your "Survey Monkey" poll. Here's one of the most important issues that I meant to comment on, but seem to have missed due to struggles with the format:

The section on "rights and obligations" of Republic Services Inc. (RSI) vs. Benton County does not distinguish between RSI and their subsidiaries, including Valley Landfills Incorporated (VLI).

Apparently RSI's corporate lawyers see the distinction as legally significant, as recent filings (including the 2021 CUP application) distinguished between these two corporations.

One key question for us "locals" is, which obligations are vested in VLI, rather than in the parent company? Because we understand that corporate subsidiaries could be sold at some future date, for example, after the landfill enters post-closure stage and ceases to be a source of profit to the parent corporation.

So I'm requesting here that you seek to clarify, which of the "responsibilities" are vested in RSI, and which ones are vested in VLI, as a subsidiary that could be sold off at some point in the future (whether in the wake of a corporate buyout of RSI by some larger corporation interested in "restructuring," or through bankruptcy proceedings).

We really need a clear enumeration of which "responsibilities" are immutably those of RSI, as opposed to responsibilities that could still legally be shunted off to VLI at some point when the landfill becomes a liability, rather than a source of profits.

Thanks,
Joel

From:	Joel Geier
To:	Benton County Talks Trash
Cc:	Sam Imperati
Subject:	Common Understandings document: Suggested draft text to be added as a "site description" section
Date:	Sunday, September 4, 2022 3:58:07 PM
Attachments:	CommonUnderstandingAdditionsSiteDescription.pdf

Sam,

Here's some further suggested text to address another major gap in the "Common Understandings" document.

This gives a brief description of the site in terms of geology, climate, surface waters, groundwater, vegetation etc.

This could be useful especially for members of the group who are not acquainted with the natural history of northern Benton County. Coffin Butte and Tampico Ridge are rather unique as the easternmost extensions of the Coast Range into this part of the Willamette Valley. I've included a link to a short video by the Western Oregon U. research group who've been looking at restored oak woodlands along Tampico Ridge.

Joel

SECTION A: Develop Common Understandings

2. Description of the site

a. Geological setting

The **bedrock** of Coffin Butte and Tampico Ridge is mainly of basalt formed by underwater volcanoes on the seafloor during the Eocene (~50 million years ago). These were originally formed as "pillow lavas" similar to what can be seen along the coast of Hawai'i, when lava from erupting volcanoes flows into the sea.

These rocks, along with other marine volcanic rocks and sediments, eventually became part of the Oregon Coast Range, as they were scraped off the top of the slab of oceanic crust sliding below the western edge of North America. This process is continuing today as what we now call the Cascadia Subduction Zone.

These rocks are considered part of the Siletz River Volcanics formation. Similar rocks belonging to this formation can be found in most of western Benton County, but Coffin Butte and Tampico Ridge are the easternmost exposures.

A good place to see this rock is in the old ODOT quarries along Coffin Butte Trail (now part of E.E. Wilson Wildlife Area). In these exposures, the rock is highly fractured, with extensive alteration indicating past circulation of water through the basalt.

Local sediments come mainly from near the end of the last ice age, when the Willamette Valley was flooded repeatedly by waters surging down the Columbia River from the Missoula Floods, from 15,000 to 13,000 BC. Coffin Butte and Tampico Ridge formed a peninsula on the western shoreline of "Lake Allison," the temporary lake that formed periodically during these floods. As this lake gradually drained out through the Columbia River, it left behind silt deposits.

These silts (mapped as the "Willamette Silts" by OSU geologist Ira S. Allison in 1953) are the source of the fertile soils in much of what today is prime Willamette Valley farmland. On the Coffin Butte site, prior to landfill construction these silts were found to the east of the topographic saddle between Coffin Butte and Tampico Ridge. On the west side of the saddle are younger alluvial sediments, deposited by Soap Creek as it flowed out of the hills and mountains which are now part of OSU's McDonald-Dunn research forests.

Earthquake hazards on a regional scale are mainly related to the threat of a "subduction zone megathrust" earthquake on the Cascadia Subduction Zone, which can produce quakes of magnitude 9.0 or greater. Geologic evidence indicates that seven "great" earthquakes have occurred on this system in the past 3500 years, on intervals ranging from 210 to 910 years. The last of these occurred around 9 PM on January 26, 1700 AD, based on records of a tsunami that struck Japan 10 hours about later.

Recent studies indicate a 10% to 14% probability that the Cascadia Subduction Zone will produce an event of magnitude 9.0 or higher in the next 40 years. The risk could be as high as 37% for earthquakes of magnitude 8.0 or higher. Such a quake would be expected to produce very violent shaking that could last as long as four minutes.

In addition to the well-known risk of a a major earthquake on the Cascadia Subduction Zone, there may also be a risk associated with the Corvallis Fault, which has been mapped within two miles of Coffin Butte (passing through the new Calloway Creek subdivision just south of Adair Village, and continuing northeast at least as far as the intersection of Camp Adair Road and Independence Highway). Currently it is not known whether this fault is still active, but geologists have urged for this to be considered as a concern for any structures near the fault.

b) Climate

The general climate of Benton County has been described in previous county documents, such as the county's Prairie Species Habitat Conservation Plan
https://www.co.benton.or.us/parks/page/prairie-species-habitat-conservation-plan
Willamette Valley portions of the county, including Coffin Butte, are influenced by a maritime climate with wet mild winters and moderate dry summers. Precipitation is mainly rainfall, with some snow accumulation in the foothills and mountains.

Coffin Butte and Tampico Ridge, along with nearby areas of McDonald/Dunn Forest, are part of an area of relatively high annual rainfall compared to most other parts of eastern Benton County. Maps produced by the PRISM project at Oregon State University:
https://prism.oregonstate.edu/projects/gallery_view.php?state=OR
show that these ridges are in a zone with average annual precipitation of 50 to 65 inches per year. This is significantly wetter than downtown Corvallis, and more comparable to Coast Range areas such as Blodgett.

The relatively wet climate results in part from Coffin Butte being in a gap between the rain shadows cast by Chintimini (Marys Peak) to the south, and Bald Mountain (Monmouth Peak) to the north. By far most of this precipitation comes as rain in the cooler months from October through April, with ice storms (freezing rain) and snow possible during the winter months.

c) Surface water

Coffin Butte and the north end of Tampico Ridge are in the Soap Creek watershed, which is part of the larger Luckiamute River watershed that includes Kings Valley in NW Benton County, as well as much of Polk County as far north as Falls City.

Streams flowing off of the west side of these two ridges join Soap Creek directly in the vicinity of Coffin Butte Road and Wiles Road.

[a map of the local hydrologic features would be very useful here]

Water flowing eastward off of these ridges have been substantially modified by ditching in conjunction with the construction of Camp Adair during the early 1940s. The main flow passes through "Toketie Marsh" (a remedial wetland constructed by Valley Landfills Inc. to compensate for destruction of existing ponds higher up on Coffin Butte) and thence through a culvert into the former stream which was ditched to form the waterway now known as "the canal" on E.E. Wilson Wildlife Area.

This "canal" continues east through the feature known as the "Canal Pond," from which some water is pumped annually into a popular fishing pond. East of there the canal passes just north of the Pacific Recycling Center (PRC), where it receives surface runoff from the PRC area. East of the wildlife area

and the PRC, it continues as mainly as a ditched stream until it reaches Independence Hwy at Springhill Drive. There the stream turns north to join the lower part of Soap Creek, about a mile before Soap Creek flows into the Luckiamute River at Luckiamute State Natural Area. The Luckiamute River in turn reaches its confluence with the Willamette River about a mile beyond where Soap Creek flows in.

The south end of Tampico Ridge is part of a watershed divide between the Soap Creek watershed to the west, and the Calloway Creek / Bowers Slough drainage which joins Frazier Creek northeast of Corvallis, and flows into the Willamette River near Bowers Rock State Park.

d) Groundwater

Groundwater in the area is poorly understood, particularly in the bedrock underlying Coffin Butte and Tampico Ridge. Household and agricultural wells around these ridges mainly tap into fractured zones in the basalt, but there have been no investigations to determine the lateral extent of these zones, or how they might be connected to fractures in the bedrock closer to the landfill site.

Groundwater patterns in the unconsolidated sediments adjacent to the landfill (chiefly Willamette silts east of the topographic saddle, and recent alluvium west of the saddle) are much more well understood, based on a network of mostly shallow monitoring wells. These show that groundwater movement away from the current landfill site in these shallow sediments is mainly in the direction of the topographic gradient.

One household well in sediments west of the landfill, on the former Helms home site, received sufficient contamination from the landfill site that the well had to be decommissioned under DEQ supervision. Contaminants have also been found in excess of regulatory limits in monitoring wells on the east side of the landfill.

e) Vegetation

As summarized in the county's Prairie Species Habitat Conservation Plan:

https://www.co.benton.or.us/parks/page/prairie-species-habitat-conservation-plan

prior to settlement most of the Willamette Valley portions of Benton County were an open expanse of native upland and wet prairies, riparian areas, and oak savanna. Reconstructions of vegetation at the time of the earliest land surveys (1850s) show oak woodland and oak savanna as the main habitats on Coffin Butte and Tampico Ridge, with upland prairie and some wetlands in the surrounding areas of lower elevation.

Photos from the Ben Maxwell Archive (Salem City Library) from the early 1940s, just prior to the construction of Camp Adair, show a pastoral landscape with mainly open savanna habitats still maintained by grazing along the ridges, open pastures in the saddle area, and cropland in the surrounding lowland areas, with riparian vegetation along the creeks.

A remnant of this oak savanna habitat can still be seen on the portion of Coffin Butte accessible to the public via the Coffin Butte Trail (E.E. Wilson Wildlife Area). Native wildflowers including Menzie's larkspur, Tolmie's mariposa-lily ("cat's ear"), tough-leaved iris, fawn lily, spring-gold, coralroot and camas bloom in spring alongside of native prairie/savanna grasses including Roemer's fescue, California oatgrass and blue wildrye.

Private lands along Tampico Ridge also include stands of legacy oak woodlands which have recently been the focus of oak woodland restoration projects, including research on oak ecology, tree stress physiology, biodiversity, and climate change by a group from Western Oregon University in Monmouth:

https://www2.wou.edu/nora/woutv.video.viewer?pvideoid=1754

Other portions of Coffin Butte and Tampico Ridge closer to the landfill site have become more heavily forested with Douglas-fir and big-leaf maple as dominant species. In some cases the Douglas-firs grew in naturally following the cessation of fire and grazing, while in other areas these are monocultural plantations.

Adjacent public lands on the east side of Hwy 99W are managed by Oregon Department of Fish & Wildlife (ODFW). These lands include about 200 acres of native prairie restoration plus marshes and riparian corridors with native Oregon ash as a tree main species.

Lowlands on landfill-owned properties elsewhere around the landfill are a mix of cropland with recently constructed remedial wetlands to manage runoff, plus riparian growth along Soap Creek. One wetland area was planted with hybrid poplars as part of an unsuccessful plan to treat landfill leachate by phytoremediation.

Several areas are infested with invasive species, including yellow flag (iris) in the older remedial wetland ("Toketie Marsh"), reed canarygrass, bulbous canarygrass (Harding grass), meadow knapweed, Himalaya blackberry and teasel in disturbed or unmanaged areas around the edges of the active landfill and quarry sites. Bamboo has been spreading along Soap Creek from the vacated Helms home site now owned by VLI.

f) Wildlife and conservation

The entire area around the landfill has been identified by Benton County as areas of high priority for conservation actions to benefit key species in Benton County. The saddle area between Coffin Butte and Tampico Ridge is shown on county maps as part of a wildlife corridor connecting from the edge of the Coast Range (Dunn Forest) to the west to riparian habitats of E.E. Wilson Wildlife Area to the east, and beyond there all the way to the Willamette River at Luckiamute State Natural Area and Willamette Bluffs.

[add more text on Great Blue Heron rookeries]

From: Joel Geier
To: Sam Imperati; REDICK Daniel; NICHOLS Darren
Cc: Benton County Talks Trash
Subject: Re: Benton County Talks Trash" Workgroup: Welcome, 9-8-22 Agenda, Materials, and Homework
Date: Monday, September 5, 2022 6:59:28 AM
Attachments: image001.png

P.S. Sam, Daniel, and Darren,

Here's are a couple of links to help you in compiling more relevant information on "other permitting jurisdictions" ahead of this Thursday's meeting.

Yamhill County has an entire web page devoted to their landfill:
https://www.co.yamhill.or.us/content/riverbend-landfill

This is the landfill site most nearly analogous to what we have in Benton County, in terms of:
- Ownership has wound up in the hands of an out-of-state corporation
- Located in an area of substantial population density
- Located near a city with demographics and economy similar to Corvallis
- Rainy climate
- Potential impacts on rural residential use and farmland
- Widespread opposition from county residents

The Short Mountain Landfill in Lane County:
https://www.lanecounty.org/government/county_departments/public_works/waste_management/garbage___recycling/short_mountain_landfill

is similar to Coffin Butte in terms of geologic setting, wet climate and local demographics, but different from Coffin Butte in several key ways:

- County has maintained local control and operates it as a municipal landfill
- Waste limited to about 1/4 of the annual tonnage that Coffin Butte receives.
- Landfill conforms to its permitted operating hours (7 am to 5 pm) even for commercial customers.
- Generally non-controversial.
- Part of a system that provides Springfield/Eugene residents with somewhat lower garbage rates than Corvallis

Those differences could be useful for the group to consider. Certainly either of these examples are more relevant to our local situation than the ones that you've chosen from semi-arid eastern Oregon.

BTW, I notice that Lane County is generally offering much better service to rural residents than what we're getting in Benton County, including local recycling depots and transfer stations that are staffed during posted operating hours.

Joel

From: "clearwater"[redacted]
To: "Sam Imperati" <samimperati@icmresolutions.com>
Cc: "REDICK Daniel" <daniel.redick@Co.Benton.OR.US>, "Darren Nichols" <Darren.Nichols@co.Benton.OR.US>, "xanthippe augerot" <xanthippe.augerot@co.benton.or.us>, "nancy wyse" <nancy.wyse@co.benton.or.us>, "pat malone" <pat.malone@co.benton.or.us>
Sent: Friday, September 2, 2022 11:41:02 AM
Subject: Re: Benton County Talks Trash" Workgroup: Welcome, 9-8-22 Agenda, Materials, and Homework

Hi Sam,

Thanks for sending over the agenda and meeting materials.

I have a lot of comments on major topics that are missing from the "common understandings" document, which I'll try to send over the weekend. Very briefly, there is no site description, nor any history of the site or setting in the local North Benton community, other than its use as a dump and later as a landfill.

But while I'm working on those comments -- which will be lengthy -- I wanted to alert you to another major and important gap, which will likely require staff time to remedy before the first meeting.

The only examples of planning criteria of "other Oregon jurisdictions" come from two northeastern Oregon counties -- both very different from Benton County in terms of climate, geologic setting, population, local economy, and environmental attitudes. Gilliam County's entire population of 1,995 souls could practically fit into the City of Adair Village, once the Caldwell Creek subdivision is finished.

Why aren't there any examples from western Oregon counties that would be more comparable to Benton County -- for example Lane County which hosts Short Mountain Landfill, or Yamhill County which hosts Riverbend Landfill?

I hope that by bringing this up now, you and/or county staff can find time to fix this problem before the first meeting of the group.

Thanks,
Joel

From: "Sam Imperati" <samimperati@icmresolutions.com>
To: Joel Geier [redacted]
Sent: Thursday, September 1, 2022 5:53:39 PM
Subject: FW: Benton County Talks Trash" Workgroup: Welcome, 9-8-22 Agenda, Materials, and Homework

---

From: Sam Imperati
Sent: Wednesday, August 31, 2022 10:42 PM
To: Duvall, Kathryn [redacted]
Cc: WYSE Nancy <nancy.wyse@Co.Benton.OR.US>; MALONE Patrick <Pat.Malone@Co.Benton.OR.US>; AUGEROT Xanthippe <Xanthippe.Augerot@Co.Benton.OR.US>; KERBY Joseph <Joseph.Kerby@Co.Benton.OR.US>; NICHOLS Darren <darren.nichols@Co.Benton.OR.US>; CRONEY Vance M <Vance.M.CRONEY@Co.Benton.OR.US> [redacted] WILLIAMS Inga <Inga.Williams@Co.Benton.OR.US>; REDICK Daniel <daniel.redick@Co.Benton.OR.US>; KWIATKOWSKI Maura <maura.kwiatkowski@Co.Benton.OR.US>; MAKEPEACE Amanda <amanda.makepeace@Co.Benton.OR.US>; MILO Erika <Erika.Milo@Co.Benton.OR.US>; GROGAN Cory <cory.grogan@Co.Benton.OR.US>; RAY Linda <Linda.Ray@Co.Benton.OR.US>; [redacted]
Subject: Benton County Talks Trash" Workgroup: Welcome, 9-8-22 Agenda, Materials, and Homework
Importance: High

Good Evening:

Welcome to the "Benton County Talks Trash" (BCTT) Workgroup! I am the process facilitator, and I am looking forward to meeting you next Thursday and working with you over the coming months. The project website is at https://www.co.benton.or.us/cd/page/solid-waste-process-work-group, and all relevant documents will be posted there as they become available.

Please forward this email to others and ask them to send an email to BentonCountyTalksTrash@Co.Benton.OR.US if they want to be added to our developing Interested Parties List. It will also include your alternates, members of SWAC, and members of the Planning Commission, etc., to keep folks in the loop. Please know I have and will continue to reach out to the Tribes.

I have attached the Agenda, which contains the meeting details and links to the meeting materials. As you will see, we have a lot topics to cover next Thursday. Please read the materials in advance so we can get right to work on this important project. I recommend you start by reviewing the Charter because it provides our charge, a draft workplan, a draft schedule, and other important process details like "Polling" for the development of Workgroup recommendations.

The materials also include the first draft of the eventual Workgroup Report, which is due to the Board of Commissioners on December 15, 2022. These processes work best when we start writing the Workgroup Report from the start, and revise it as we progress. It will be an iterative process. Restated, it will not be final until our last meeting.

Once you review our draft process workplan/schedule, you will see we have a lot to accomplish in the next 3.5 months. In order to be maximally successful, we will need to make progress between Workgroup meetings. I call this activity, "Homework," and it is for Polling and Ex-Officio members. The first "assignment" is found here: https://www.surveymonkey.com/r/3D3FXWZ. The majority of the survey asks process-related questions (meeting times, topic priority, schedule refinement, etc.) It should take about 30 minutes to complete.

The current Workplan has us starting by establishing common understandings from which to build your subsequent recommendations to the Board of Commissioners. The final survey question asks you to identify what topics/questions are missing from staff-drafted, Section IV. A., "Common Understandings." Finetuning that section is a critical first step, and that is why the final question could take an additional one to two hours.

Because there are always "growing pains" when launching a public policy process, I am simply asking you to do the best you can before the September 6, 200 3:00 PM deadline… especially in light of the upcoming weekend. We will summarize the survey responses received by the due date, and send them to you on September 7, 2022 for discussion at our first meeting. Recognizing the tight turnaround, there will be a subsequent, "last call" deadline of September 12th for you to supplement your "missing topics/questions" feedback on the last question. The first Workgroup opportunity to comment on the specific statements in "Common Understandings" section will start during meeting two on September 15, 2022.

Please email or call me with any questions, comments, suggestions, or concerns. I can be reached at (503) 244-1174 during the day and (503) 314-1156 after hours, even over the weekend.

Thank you for helping make Benton County even better!

Sam

From:	Joel Geier
To:	Sam Imperati; Benton County Talks Trash
Cc:	NICHOLS Darren
Subject:	Common Understandings document: Please consider starting afresh, and use the first work session for the group to produce an outline
Date:	Tuesday, September 6, 2022 1:30:14 PM

Hi again Sam,

Here's a "higher-level" comment for you, ahead of today's deadline for comments:

The biggest problem with the "Common Understandings" document is that someone started pasting in huge gobs of content before there was ever a serious discussion of the document's structure. The result is that you have a 99-page monstrosity that is woefully out of balance, right from the start.

In order to produce a credible document as a group, the group needs to have input on what pieces should be in it, and what should be the relative weight of each section in the document.

This will also be easier if we can work with the "Common Understandings" as a separate document. I realize that you see this part of your final deliverable, and you want to deliver a single report in the end. So it might fit with your plans. But it's a very unwieldy way for a group-produced document to start.

So let me suggest that we back up and start afresh from the top:

(1) Break out just the sections that are to be part of the "Common Understandings" chapter.

(2) Strip out all of the existing content and give us a clean outline -- just headings and bullet points for the major topics.

(3) At the first meeting, put this outline up on a whiteboard and open the floor to a discussion of:
(a) what topics are missing,
(b) which ones need to be given more weight,
(c) which topics may need multiple perspectives, etc.

(4) Then look back at the 99 pages of text and tables produced by staff, consider which parts fit where in the outline agreed upon by the group, and which sections will need someone to write new text.

(5) Consider replacing some of the excessively detailed sections with brief synopses that will be more amenable to group discussions regarding specific key points.

(6) Discard other details, or move them to an appendix or perhaps a supporting web page that could be referenced in the document.

For example, I could see "Rodents, swine, and other fauna of 19th century dump sites" as a popular web page that could bring more clicks to the county website -- some of those ancient articles looked like they might be fun to browse. But surely this level of detail doesn't need to be in this document, especially not at this early stage when the group has had no real chance to discuss the structure.

Joel

--
Joel Geier
Tampico Ridge north of Corvallis

From: REDICK Daniel
To: Benton County Talks Trash
Subject: Common Understandings Response - Homework
Date: Tuesday, September 6, 2022 3:00:45 PM
Attachments: image001.png

Hello,

These are my detailed responses to #11 in the survey:

1. Some sources in the history section should be added (ex: I.1.A. 11, 13, 14, 21, 39, 40, 58, 59)

11	Corvallis Gazette-Times PAGE 2 Corvallis, Oregon Thursday, February 14, 1924
13	Corvallis Gazette-Times PAGE 1 Corvallis, Oregon Tuesday, January 20, 1925
14	Corvallis Gazette-Times Page 1 Corvallis, Oregon Tuesday, April 07, 1925
21	Corvallis Gazette-Times PAGE 1 Corvallis, Oregon Monday, August 21, 1933
39	(Corvallis Gazette-Times (Corvallis, Oregon) 06 Jan 1948, Tue Page 1)
40	(Corvallis Gazette-Times (Corvallis, Oregon) 06 Jan 1948, Tue Page 1)
58	(Corvallis Gazette-Times (Corvallis,

	Oregon) 06 Oct 1951, Sat Page 2)
59	(Corvallis Gazette-Times (Corvallis, Oregon) 06 Oct 1951, Sat Page 2)

2. Explanation of why some jurisdictions are used as examples
   - The examples from jurisdictions included represent active regional MSW landfills in Oregon, which are owned and operated privately.

3. Appendix with past land use decisions
   - A document can be included as an appendix, compiling each of the land use decisions referenced in the document.

Thank you,

Daniel Redick *he/him*
Solid Waste & Water Quality Program Coordinator
Community Development
Phone: 541-766-6819
Email: daniel.redick@co.benton.or.us
www.co.benton.or.us

From: Sam Imperati
To: Benton County Talks Trash
Subject: FW: Benton County Talks Trash - Comments 9/6/22
Date: Wednesday, September 7, 2022 10:34:00 AM
Attachments: geosciences-09-00431-v2.pdf

-----Original Message-----
From: Edward Pitera [redacted]
Sent: Tuesday, September 6, 2022 3:45 PM
To: Sam Imperati <samimperati@icmresolutions.com>
Subject: Benton County Talks Trash - Comments 9/6/22

Sam:

I hope all is well.

I submitted the “extra credit” survey just before 3:00 today. There is a lot of information I asked for based on personal experience. Attached is an article which I feel offers a reasonable “visualization” of the concepts I was trying to get across. Is this the type of supporting information for Section I 1) you are looking for by 12 September?

Regards,
Ed Pitera

geosciences

MDPI

Review

Landfill Impacts on the Environment—Review

Magdalena Daria Vaverková [1,2]

[1] Department of Applied and Landscape Ecology, Faculty of AgriSciences, Zemědělská 1, Mendel University in Brno, 613 00 Brno, Czech Republic; magda.vaverkova@uake.cz

[2] Faculty of Civil and Environmental Engineering, Nowoursynowska 159, Warsaw University of Life Sciences—SGGW, 02 776 Warsaw, Poland

Received: 11 June 2019; Accepted: 29 September 2019; Published: 3 October 2019

Abstract: Waste management (WM) is a demanding undertaking in all countries, with important implications for human health, environmental preservation, sustainability and circular economy. The method of sanitary landfilling for final disposal of waste remains a generally accepted and used method but the available scientific evidence on the waste-related environmental and health effects is not conclusive. Comparative studies of various WM methods (landfilling, incineration, composting etc.) show that among the municipal solid waste (MSW) treatment and disposal technological options, sanitary landfilling or open dumping is popular in most countries because of the relative low cost and low-technical requirement. The European Union (EU) Directive on waste landfills has introduced specific goals for reducing the volume of disposed waste and very strict requirements for landfilling and landfill sites. Evaluation of the impact of landfills on the environment is a crucial topic in the literature and has received increased attention recently, given growing environmental concerns. The main goal of this survey was to conduct a comprehensive assessment of possible impacts of MSW landfills on the environment. The main conclusion of the overall assessment of the literature is that the disposal of MSW in landfills entails a number of environmental risks but with respect to the current situation and rich style of living adopted in industrially developed countries, the idea of WM systems functioning without landfilling—at least in the foreseeable future within one generation—seems to be somewhat unreal. The results also provided important information of landfills as a source of environmental risk. Results of this research may have an important impact on landfill management and the disposal of waste. From the literature review, it is evident that even if high levels of waste avoidance, reuse and recycling are achieved, some waste materials will always need to be forwarded for disposal.

Keywords: final disposal of waste; landfill; sustainability; environment impact

1. Introduction

The continually growing industrial production and trade in many countries worldwide in the last decennia has accompanied a rapid increase of the production of municipal and industrial waste [1–4]. In the second half of the 1990s, the annual volume of waste production ranged between (300–800) kg per capita in developed countries and less than 200 kg per capita in other countries [5,6]. The global waste will nearly double to 2.2 billion annual tones by 2025 and almost all the cities in the world are struggling to meet their waste reduction targets [7]. Landfills and/or open dumpsites were the common practice for municipal solid waste (MSW) disposal all over the world for example, in the U.S.A., 52.6% of MSW was discarded in landfills [8], in Brazil 59.1% [9], in The Kingdom of Saudi Arabia (KSA) 85% [10], in Malaysia 94.5% [11], in China 79% [12], in Venezuela: sanitary landfills 32%, controlled disposal 43% and non-controlled disposals or open dumps 24% [13], in Mexico: sanitary landfills 65%, in uncontrolled and open dumps 30% [14] and in Thailand 27% [15].

The method of landfilling for final disposal of MSW remains a generally accepted and used method thanks to its economic advantages [16–18]. Landfilling is defined as the disposal, compression and embankment fill of waste at appropriate sites Landfill for the moment is easy, adjustable with lower cost than the rest of disposal methods and stands alone as the only all waste material disposal method. Although the disposal of MSW in landfills has decreased, landfills are likely to remain an important part of integrated solid waste management systems all over the word. Comparative studies of various waste management (WM) methods (landfilling, incineration, composting etc.) show that among the MSW treatment and disposal technological options, sanitary landfilling or open dumping is popular in most countries because of the relative low cost and low-technical requirement [16–18].

The European Union (EU) Directive on waste landfills has introduced specific goals for reducing the volume of disposed waste and very strict requirements for landfilling and landfilling sites [19,20]. Regardless of this directive, the situation in Europe is not homogeneous. For example, Switzerland, Germany, the Netherlands, Sweden, Austria, Denmark and Belgium report landfilling below 5% of waste produced [21]. In new member countries, candidate countries and on islands, landfilling is still the prevailing technology of WM. For example, the representation of landfilled waste in Poland is 37%, 38% in Slovakia and 64% in Bulgaria, while in the Czech Republic (CR) it reaches 50% [22].

The hypothesis is that the landfills can be a source of environmental pollution and risk. The main aims of this review were to: (i) summarize the most recent scientific information on waste disposal options, (ii) present the direct and indirect impact of WM activities on the environment based on literature research.

The principal sources of emissions from landfill sites are as follows: the waste materials as they are brought onto site; emissions from transport; waste blown by the wind; dust generated from the landfill surface; landfill gas generated; leachate produced. The literature search was carried out online databases and included studies and reviews of impacts of WM methods in particular MSW landfills on the environment. In total, 116 references were selected for inclusion in this study; these satisfied the principal criterion for the study that the reported data must come from clearly defined sources and must be accurate. Results of this research may have an important impact on landfill management and the disposal of waste.

2. Waste Production in the European Union

The mass of waste produced in the world as well as in EU countries has been growing considerably for many decades. As mentioned above, the most practical solution for WM in a majority of EU countries remains landfilling due to technical, economic and legal reasons (Table 1) [21,23,24].

Table 1. Municipal solid waste generated in 1995 and 2016 (Kg/capita) adopted from [25] and share of landfill disposal (%) adopted from [26].

Country	1995	2016	2017	Waste Treatment—Landfill, 2016 (Share of Landfill Disposal)
Austria	480	552	570	3%
Belgium	446	414	409	1%
Bulgaria	531	404	416	64%
Cyprus	595	592	637	81%
Czech Republic	312	339	344	50%
Denmark	521	777	781	1%
Estonia	370	327	390	12%
Finland	437	504	510	3%
France	476	510	513	22%
Germany	623	625	633	1%

Table 1. *Cont.*

Country	1995	2016	2017	Waste Treatment—Landfill, 2016 (Share of Landfill Disposal)
Greece	331	498	-	82%
Hungary	377	380	385	51%
Ireland *	430	615	-	22%
Italy	468	436	489	28%
Latvia	184	367	438	72%
Lithuania	542	422	455	31%
Luxemburg	587	614	607	17%
Malta	387	584	604	92%
Netherlands	509	518	513	1%
Poland	284	307	315	37%
Portugal *	351	483	487	49%
Romania	254	228	272	80%
Slovakia	294	344	378	66%
Slovenia **	469	434	471	24%
Spain	365	443	462	57%
Sweden	386	442	452	1%
United Kingdom *	501	476	-	28%

* Data from 2014; ** Data from 2015.

Disposal in landfills are considered an effective method for WM [27]; however, there are many reasons why landfilling appears as the least rational method of WM. Waste can be landfilled only for limited time and the period of landfill reclamation may last up to hundreds of years [28]. Biogas and leachates can seriously impact the environment [21,28–30]. In addition, MSW is disposed on landfills without any sorting in numerous countries. Moreover, for the majority of landfills worldwide, unfavorable odor and air pollution bring about serious sanitary problems and are the main causes for the "not in my backyard (NIMBY)" syndrome for the nearby communities [31]. WM has recorded significant development and its regulation imposed by legislation (e.g., setting of goals for recycling and permitted amount of landfilled biologically degradable waste) curbs the rate of landfill extension now. Evaluation of the impact of landfills on the environment (Figure 1) is a crucial topic in the literature and has received increased attention recently, given growing environmental concerns.

Figure 1. Potential impact of landfills on the environment.

3. Landfill as a Potential Source of Pollution

The need for the collection and sanitary disposal of MSW was not recognized until recently. Fifty years ago, throughout the world, most MSW was disposed of in open dumps or tips. In 1959, the American Society of Civil Engineers (ASCE) defined "sanitary landfilling" as a controlled operation in which MSW is deposited in defined layers, each layer being compacted and covered with soil before depositing the next layer [32].

The fundamental difference between a dump and a landfill is that in a dump there is no attempt to separate the waste from the underlying soil or rock strata and where the hole extends to below the groundwater level, waste is dumped directly into the groundwater [32]. In contrast, a sanitary landfill is an engineered structure consisting of bottom liners, leachate collection and removal systems, and final covers (Figure 2). Landfills are designed both to store and to treat wastes. Much of the potential risk from MSW landfill results from the migration of contaminated leachate and landfill gas therefore the environmental impacts of the many landfills existing throughout the world cannot be ignored. Major emissions (leachates and biogas) are considerably affected by biological processes occurring in them. If the MSW is disposed on the landfill with no pre-treatment, emissions develop during the landfill operation period, which are produced even after the landfill will have been closed [33–35]. According to Białowiec (2011) these emissions produce on average circa 150 (range of 70–300) m^3 of biogas per 103 kg of municipal waste (related to dry matter weight) and about 5 m^3. $ha^{-1}.d^{-1}$ of severely contaminated leachates, depending on waste composition, climatic conditions etc. [28]. The values approximately correspond to heavily compacted landfills in central Europe with annual total precipitation amounts ranging from (550−750) mm. The produced biogas has to be collected and incinerated or it can be used as a source of energy. The produced leachates have to be collected and treated [28].

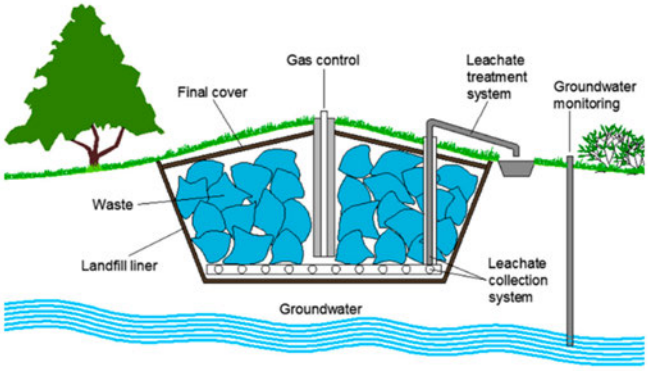


Figure 2. Sanitary landfill.

3.1. Landfill Gas

One of the products of biological processes occurring in MSW landfills is biogas or landfill gas (LFG) [35]. Biogas is a product of the decomposition of biologically decomposable organic matter [36]. The rate of biogas production and its composition change during the landfill lifetime. Landfill gas production (Figure 3) is based on the composite model of bacterial waste decomposition and on the model of long-term behavior of landfill gas from old waste repositories [37].

LFG obtained from the MSW develops during anaerobic decomposition of organic matter. MSW contains about (150–250) kg of organic carbon per ton of waste, microorganisms in which transform it into landfill gas during anaerobic processes. The generated LFG with (40–60%) methane has an average heating value of 17,765 kJ/N m^3. With the energy conversion efficiency being 34%, the produced electric energy is approximately 2.5 kW h/N m^3 [38]. Considering the presence of methane and carbon dioxide within the LFG, the total amount of greenhouse gases (GHE) in the landfill life can be estimated at about 1.37 E+09 kg of equivalent carbon dioxide [39].

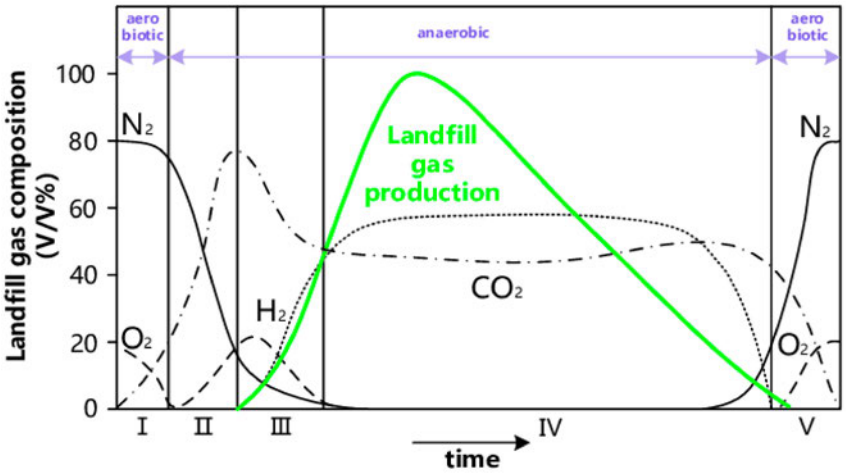


Figure 3. Composition of each stage of landfill degradation [34].

Main factors affecting the amount of LFG are as follows: waste composition, moisture content, temperature, landfill age etc. LFG generation starts one to two years after waste disposal into the landfill and continues for (15–25) years [40–42]. Moreover, according to Directive 31/1999/CE: "LFG shall be collected from all landfills receiving biodegradable waste and the LFG must be treated and used. If the collected LFG cannot be used to produce energy, it must be incinerated".

3.2. Landfill Leachates

Rain has a major influence in the formation of leachates. Precipitation percolates through the deposited waste and binds to dissolved and non-dissolved waste constituents by means of several physical and chemical reactions. Groundwater tributaries, surface runoff and biological decomposition also participate in the formation of leachates. Liquid fractions in the waste combined with soil cover moisture content take part in the formation of leachates as well.

Moisture can be eliminated from the landfill by the consumption of water in LFG formation by means of water vapor evaporated in LFG or by means of leachate removed through drainage system.

Thus, the discharge of leachates is closely related to rainfalls, surface runoff and infiltration of groundwater soaking up the landfill. The method of landfilling (water-proof covers, requirements for insulation layers such as clay (mineral cohesive soil), geotextiles (GCL) and/or plastic materials) is crucial for checking the amount of water reaching the upper layers of the landfill, and hence, for mitigation of pollution risk. The production of leachates is also greatly affected by climatic conditions since they influence the input of precipitation into the landfill and losses due to evaporation. Moreover, the production of leachates depends on the character of disposed waste, namely on water content and on the degree of compaction of upper landfill layers [43].

Technology applied as routine on landfills established in Europe in the 20th century was technology of leachate treatment based on the "dilute and disperse" system. Landfills were usually not properly sealed and the leachates produced were leaking into the wider surroundings where they mixed with groundwater in which they were dispersed. Such facilities for dilution and dispersion are no more built nowadays; however, the existing ones have left old environmental burdens all over Europe in the form of landfills, which may represent a risk of contamination, particularly in areas with high groundwater table [44–46].

3.2.1. Composition of Leachates

Many studies have proven that landfill leachate is a significant source of pollutants as a consequence of the leaching of hazardous substances [21,43,47,48]. Leachates contain four main components: nutrients (namely nitrogen), volatile organic compounds, heavy metals (HM) and toxic organic

compounds [48–50]. Nitrogen in the form of NH_3 was identified as one of priority substances to be eliminated for the mitigation of leachate toxicity [51–53].

There are many factors affecting the quality of leachates, e.g., landfill age, seasonal weather fluctuations, total precipitation amount, waste type and its composition [54]. Composition of leachates significantly changes especially in dependence on landfill age. There are three types of leachates defined according to landfill age (Table 2). Concentration of organic compounds (COD) in leachates decreases with the increasing age of the landfill, while the concentration of NH_3 increases.

Table 2. Classification of landfill leachates ([9,55,56] adapted by Vaverková).

Parameter	Low-Age Landfill	Mid-Age Landfill	Old Landfill
Landfill age (years)	<1	1–5	>5
pH	<6.5	6.5–7.5	>7.5
COD (g O_2.dm^{-3})	>15	3.0–15	<3.0
BOD_5/COD	0.5–1	0.1–0.5	<0.1
TOC/COD	<0.3	0.3–0.5	>0.5
NH_3-N (mg.dm^{-3})	<400	400	>400
Heavy metals (mg.dm^{-3})	>2.0	<2.0	<2.0

Concentration of organic compounds (COD), Biochemical oxygen demand (BOD), Total organic carbon (TOC).

3.2.2. Toxicity of Landfill Leachates

Leachates represent complex mixtures of substances including dissolved organic matter, inorganic macro-components, HM and a wide range of xenobiotic organic compounds. A great amount of these substances occurring in landfill leachates is hazardous and toxic to human health and the environment. Moreover, chemicals can bioaccumulate in organisms and be passed along the food chain, eventually reaching humans [48].

The assessment of risks from landfill leachates is traditionally based on the evaluation of individual chemical substances by means of chemical analysis. Although the approach is important, it features some limitations. First, some chemical contaminants may occur in the leachates that are below the detection limits of chemical analysis and their detection can be difficult due to the limitations of analytical techniques. For the regime of continual chemical sampling, changes caused by regular refluxes may be necessary; however, this system is rather costly and labor force intensive.

Furthermore, these chemical techniques do not allow prediction of the effects of pollutants on recipients (ecosystems). Eco-toxicological studies of the responses of model biological organisms exposed to the effects of toxic substances can provide important information complementing the standard chemical analyses [46]. Unlike the chemical analysis, the biological test of toxicity can include biological effects of all present compounds as well as their biological availability [46,47]. The chemical analysis by itself provides only limited information about the environmental fate of complex refluxes of leachates [46]. Thus, eco-toxicological tests can provide the necessary link between the traditional chemical analysis and comprehensive field studies with using biological organisms in controlled (defined) environmental conditions [57,58].

Cameron [59] published one of the first studies on the toxicity of leachates. In this study, they highlighted shortcomings of traditional chemical testing and used a recently developed test with the salmoniform fish of rainbow trout (*Oncorhynchus mykiss*), setting up standard methodology for the evaluation of biological toxicity of leachates. The authors identified main constituents of leachate toxicity (non-ionized ammonia, tannins and copper) on the model fish species. NH_3 can have negative toxic effect on the environment. It was demonstrated that NH_3 is highly toxic for aquatic organisms both acutely and chronically. This statement was confirmed in previous studies demonstrating that NH_3 is a primary cause to the toxicity of leachates from MSW landfills [59,60]. In addition,

NH_3 is released from leachates by means of volatilization (Henry's constant is 32.2 $Pa.m^{-3}.mol^{-1}$ at 20/25 °C) and increased concentrations of NH_3 in the atmosphere may have adverse impacts on vegetation [59–61]. Comparative toxicological studies also revealed mutagenic properties of these leachates. Helma et al. [62] demonstrated that the genotoxic potential of leachates MSW landfills is higher than that of wastewater from the manufacture of cellulose, industrial wastewater, contaminated surface and ground waters or even of drinking water and bathing water samples.

The above-described properties of leachates from landfills clearly point out the necessity of introducing high-quality strategy in the management of landfill leachates (collection, re-circulation and final treatment prior to discharge into the environment) as a final strategy for the management of pollutants [63].

3.2.3. Landfill Leachate Treatment Technologies

There is considerable scientific literature on the collection, storage and suitable treatment of landfill leachates. A range of technologies are available for the treatment of landfill leachate, aimed at achieving the standards established by legislation. Typically, the leachate treatment can be carried out through: (1) biological processes (activated sludge, aerobic and anaerobic stabilization lagoons and biological filters); (2) physical-chemical processes (flotation, coagulation/flocculation, adsorption, chemical precipitation, air stripping, pH adjustment, chemical oxidation, ion exchange, electrochemical treatment); (3) membrane filtration (microfiltration, ultrafiltration, nanofiltration and reverse osmosis), (4) advanced oxidative treatments (ozonization) and (4) natural systems (wetlands) [9,63–66].

3.3. Landfill Fires—A Source of Pollution

Landfill fires are unexpectedly common [67,68]; however, the environmental aspects of landfill fires have been given little attention within the research community. In 2004–2010, there were 840 fire events recorded in U.S., which resulted in the subsequent loss of material and machinery as well as of human health damages [69]. More than 60 landfill fires were recently recorded in Poland and the authorities announced that many of them are likely to have had been set up on purpose in order to devour illegal waste imported from other countries. These incidents show that landfill fires are controllable only with difficulties and have a great impact on the environment. Published reports on the impact of landfill fires on the environment due to the emission of toxic substances are few (Table 3).

Table 3. The impact of a landfill fire on environment. MSW: municipal solid waste.

Type of Landfill	Landfill Location	Year	Environment	References
MSW, industrial and construction waste	Western Norway	2003	Landfill leachates	[70]
MSW	Tagarades, Greece	2006	Landfill surrounding area/soil and vegetation samples	[71,72]
Landfill's shredded tire drainage layer	Iowa City, United States	2012	Air	[73,74]
MSW	Niger Delta, Southern Nigeria	2013	Air	[75]
MSW	Iqaluit, Northern Canada	2014	Air	[76]
MSW, electronic waste and bulky waste	Araraquara city, Brazil	2015	Soil, dust, leachate and well water	[77]
Tire landfill	Seseña, Toledo, Spain	2016	Air/soil	[78,79]
MSW	Talagante, Chile	2016	Air	[69]

Landfill fires can significantly harm the environment due to emissions of toxins into the atmosphere, soil and water. Risk factors depend on the type of burning waste, on the geographical location of the landfill and on the type of fire [69]. In general, these fires occur at low temperatures and under anoxic conditions. Hydrocarbons, chlorinated materials and pesticides produce a variety of toxic

gases in such conditions, which may contain dioxins/furans [79], polynuclear aromatic hydrocarbons, respirable particulates (PM) [80] and HM [81] as well as other harmful compounds [78]. Smoke produced during the landfill fire may contain hazardous toxic gases such as CO, H_2S, CH_4 etc. and carcinogenic substances such as dioxins.

Emitted bad odors and smoke bother the neighborhood and may put into danger even human health, especially among vulnerable populations such as the elderly, children, pregnant women and/or people with pre-existing chronic respiratory conditions [81–86].

4. The Future of Landfills

In the hierarchy of WM, Europe increasingly moves from landfilling towards recycling and reuse [87,88]. The directive in force since 1999 comprises requirements for the reduction of waste amounts disposed in landfills. Since 2016, member countries are not allowed to landfill more than 35% of biodegradable MSW landfilled in 1995. Some countries managed to achieve these goals four years later. The main objective of the WM strategy is to prevent waste formation. If prevention is not possible, then the waste should be reused or recycled. If even this is impossible, the waste should be used to generate energy thereof (thermo-valorization). Waste should be disposed in landfills only if no other possibilities of its management exist.

Regardless of what preventive measures, reuse or recycling can be realized by the society, landfills will always play a role in the WM system. Furthermore, globally, and even in EU countries, landfill rates are still high; meanwhile, waste prevention and recycling rates are too low [89–94]. Many authors agreed that waste reducing, reusing and recycling (3R) behaviors have been a widely accepted WM strategy [89–94]. However, sufficient capacity for recycling and reuse of all types of waste will not be economically acceptable under all conditions. In the pursuit of greater prevention, investment into recycling and reuse of wastes that to disappear in the future would be economically disadvantageous. Moreover, the amount of waste fluctuates throughout the year. Sometimes, the amount of waste determined for recycling, reuse or incineration exceeds the capacity. Not all types of waste can be recycled or incinerated. For some of them, landfill is the only choice and in case that the recycling facility or incinerator are out of operation due to maintenance, repair or breakdown, the waste should not remain in residential areas. This shows that some types of waste have to be disposed in landfills even when recycling and reuse are in place [95]. In the sound system of WM, these landfills serve as 'security networks'. Landfills should be established by using sustainable methods so that they do not represent an environmental burden for future generations.

Insulation of landfills by means of impermeable membranes becomes a European standard. The insulation stops all processes in the landfill. These membranes have a lifetime of up to 50 years and can even sustain up to 500 years. However, they inevitably fail at a certain time moment, and if they are disrupted, the emission generating processes will start again. Hence, the potential emissions are postponed for future generations (Figure 1). In many countries, after-care landfill management is governed by legislation and it must be ensured in general for at least 30–60 years after landfill closure. Some countries require the after-care as long as the relevant authority of state administration considers necessary. After-case is apparently required for a time-period longer than one generation. A safe solution would be more sustainable. It follows that a society that strives for long-term sustainable development needs long-term sustainable landfills.

There are no internationally recognized definitions of sustainable landfilling (Figure 4). When it comes to landfills, discussions about sustainability frequently use terms such as stability, completion, end technologies and threat to the environment [96,97]. Scharff et al. [98] presented the following selection of definitions:

The Solid Waste Association of North America (SWANA) sub-committee for stability: landfill is "functionally stable" as long as the waste matter does not represent threat to human health and the environment after its closure. This condition must be assessed with respect to the quality and amount of leachates, gas production and composition, cover, slope gradient, slope and design of insulation,

site geology and hydrogeology, climate, potential recipients, exposure of ecosystems and humans to landfill impacts, and with respect to other factors considered as relevant for specific localities.

Anglo-Welsh agency for environment protection: completion is defined as a condition when the landfill is physically, chemically and biologically stabilized to such extent that its undisturbed contents are likely not presenting any risk of environment pollution to landfill surroundings. After the landfill closure, neither active pollution controls are required within after-care (e.g., leachate and gas management) nor any monitoring systems.

Technical University Hamburg (TUH): the stage of after-care can be terminated in the moment when the potential of the development of emissions is so low that actual emissions do not harm the environment.

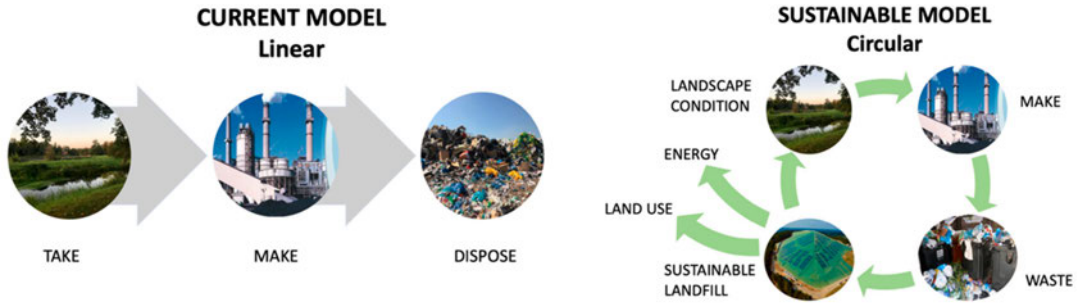


Figure 4. Current and future model of landfilling.

Although various definitions have slightly different reading, it appears that there is a general agreement that sustainable landfill or landfill in which after-care termination is considered safe is such a landfill that will reach a condition within a limited time-period when its undisturbed content will no more represent any threat to human health or the environment. This is the moment (often referred to as completion) in which the after-care of landfill can be terminated. It is important to realize that this condition is in basic agreement with the intention of EU waste legislation. Annex II to the Landfill Directive requires neither insulation nor after-care in landfills of inert waste and defines inert waste in a similar way as not representing and threat to human health or the environment [98]. A question remains to be asked whether inert waste actually does not represent a risk for human health and the environment because research in this field is scarce.

Advantages of Waste Landfilling

The most frequent threats following out from the operation of landfills have been described above. Now, the time has come to take into account arguments advocating advantages of limited disposal of waste in landfills. Especially in the long-term time horizon, landfilling can transform the troublesome share of waste flow into the short-term gas generation and provide long-term carbon supply. Moreover, the after-care of landfills can also promote renovation of brownfields, which may finally lead to new opportunities for betterment of landscape condition and of the environment.

Options of WM are not interchangeable. Diverse strategies available for solid WM are generally considered as the hierarchy of opportunities for sustainability with the reduction of waste amount at the source being the best option and landfilling the worst. However, alternative removal of waste is currently subject of criticism by both environmentalists and landfill operators and suppliers.

Although the possibility of 'zero waste' is discussed frequently [92,99], according to Song [100] transforming currently over-consuming activities into zero waste is still challenging.

Efficient introduction of recycling into practice at a reasonable price is difficult since it would require effective separation of individual waste fractions both at the source and after collection. Separation of organic matter from waste, either biologically degradable or combustible is considered a significant source of various pathogens. Composting, as the most valuable method for recycling of biologically degradable waste, inevitably also generates bioaerosols impairs the health of workers

and inhabitants near large composting facilities [101–103]. Incineration is the main alternative of landfilling but brings a number of related problems. It represents a very costly technology needed for the solution of all possible risks, namely emissions into the air [104–106]. It is also a subject of criticism in relation to possible hazardous emissions [107], non-removal of pathogenic substances, non-provision of HM immobilization and also in relation to yet other shortcomings of WM economy. In addition, the perception of risks by the public considerably exceeds actual risks. Ash material from municipal waste incinerators can be disposed in landfills after or without pre-treatment but the risk of inhaling ash from the source in landfills has been assessed as insignificant.

Landfilling brings the lowest own costs. Its secondary impacts (hygienic, social and environmental—calculated on an economic basis) are traditionally referred to as significant. However, their expression in numbers is questionable and any considerations again do not take into account the new available technologies [28].

It should be emphasized that the current enormous volumes of dumped waste in landfills could be regarded as potential resource reservoirs for metals, high quality recycled aggregates and waste-derived fuels by landfill mining. 150,000–500,000 old and still active landfills exist throughout EU representing an estimated total volume of 30–50 Gm^3 of waste. Landfills should be seen as 'urban stocks' and be considered as resource reservoirs for future recovery, 'a bank account' for coming generations [108].

5. Landfill Mining

Landfill mining (LFM) has become very current topic. LFM has been proposed as an innovative strategy to mitigate environmental risks associated with landfills, to recover secondary raw materials and energy from the deposited waste and to enable high-valued land uses at the site [109]. Landfills are mined to obtain materials for use as raw materials (e.g., metals) or as energy resources (e.g., plastics) [110]. Moreover, the concept of LFM is designed to close the material loops towards a circular economy (CE), recovering landfill waste [111]. However, according to the latest literature, there are many problems associated with LFM. According to Hölzle [111], LFM operations required on average 103 MJ diesel (≙2.4 kg) and 1.9 MJ electricity per ton excavated waste, producing 12 kg of CO_2 equivalent. Transportation proved to be the sub-process with the largest energy consumption by far, producing 58% of total emissions, followed by processing (27%). Laner at al., [109] has pointed out that our understanding about the climate impact of LFM is limited to a few case-specific assessments [112–114]. While some of them conclude that LFM would lead to reduced climate impacts compared to business-as-usual [112,114], others have found that such projects would instead result in net contributions to global warming (GW) [113,115]. Laner at al. [116] pointed out that the economy of LFM is very important. Several case study assessments on the economy of LFM exist, a broader understanding of the driving factors is still lacking. It has been suggested [116] that 80% of the generated LFM scenarios show negative results. Therefore, the development of a treatment plant that enables maximum resource recovery and environmentally and economically reliable remains one of the technological challenges for further development of LFM. For LFM to reach its full potential, strategic policy decisions and tailored support systems, including combined incentives for material recycling, energy utilization and nature restoration are required.

6. Conclusions

On the basis of the above discussion, it can be concluded that in many countries, landfilling remains a dominant method of municipal Waste Management. Landfills continue to be one of the main methods of waste disposal despite their relatively high potential to pollute the environment. Therefore, regular landfill monitoring is required to identify and define landfill hazards for the environment. This literature research shows the necessity of identifying knowledge gaps and establishing bases for developing a more holistic framework of landfill risk analysis.

Thus far, however, with respect to the current situation and rich style of living adopted in industrially developed countries, the idea of waste management systems functioning without landfilling—at least in the foreseeable future within one generation—seems to be somewhat utopian.

From the literature review, it is evident that even if high levels of waste avoidance, reuse and recycling are achieved, some waste materials will always need to be forwarded for disposal. Therefore, the concept of sustainable landfill should be implemented. A truly sustainable landfill is one in which the waste materials are safely assimilated into the surrounding environment.

The framework of this study that obtain from a comprehensive literature review can be used as a systematic approach for evaluation of landfill impacts on the environment for all stakeholders involved in the landfill industry.

Funding: This research received no external funding.

Conflicts of Interest: The author declares no conflict of interest.

Abbreviations

(ASCE)	American Society of Civil Engineers
(BOD)	Biochemical oxygen demand
(CE)	Circular economy
(COD)	Concentration of organic compounds
(CR)	Czech Republic
(EU)	European Union
(GCL)	Geotextiles
(GW)	Global warming
(GHE)	Greenhouse gases
(HM)	Heavy metals
(LFG)	Landfill gas
(LFM)	Landfill mining
(MSW)	Municipal solid waste
(NIMBY)	Not in my backyard
(ASCE)	Society of Civil Engineers
(SWANA)	Solid Waste Association of North America
(TUH)	Technical University Hamburg
(KSA)	The Kingdom of Saudi Arabia
(TOC)	Total organic carbon
(WM)	Waste management

References

1. Vaverková, M.D.; Adamcová, D. Long-Term Temperature Monitoring of a Municipal Solid Waste Landfill. *Pol. J. Environ. Stud.* **2015**, *24*, 1373–1378. [CrossRef]
2. Adamović, V.M.; Antanasijević, D.Z.; Ćosović, A.R.; Ristić, M.Đ.; Pocajt, V.V. An artificial neural network approach for the estimation of the primary production of energy from municipal solid waste and its application to the Balkan countries. *Waste Manag.* **2018**, *78*, 955–968. [CrossRef]
3. Alobaid, F.; Al-Maliki, W.A.K.; Lanz, T.; Haaf, M.; Brachthäuser, A.; Epple, B.; Zorbach, I. Dynamic simulation of a municipal solid waste incinerator. *Energy* **2018**, *149*, 230–249. [CrossRef]
4. Chen, Y.C.H. Evaluating greenhouse gas emissions and energy recovery from municipal and industrial solid waste using waste-to-energy technology. *J. Clean. Prod.* **2018**, *192*, 262–269. [CrossRef]
5. Eurostat. *Waste Database Municipal Waste*; Eurostat: Brussel, Belgium, 2016.
6. Ercolano, S.; Gaeta, G.L.L.; Ghinoi, S.; Silvestri, F. Kuznets curve in municipal solid waste production: An empirical analysis based on municipal-level panel data from the Lombardy region (Italy). *Ecol. Indic.* **2018**, *93*, 397–403. [CrossRef]
7. Chan, J.K.H. The ethics of working with wicked urban waste problems: The case of Singapore's Semakau Landfill. Landsc. *Urban Plan.* **2016**, *154*, 123–131. [CrossRef]

8. Sun, W.; Wang, X.; DeCarolis, J.F.; Barlaz, M.A. Evaluation of optimal model parameters for prediction of methane generation from selected U.S. landfills. *Waste Manag.* **2019**, *91*, 120–127. [CrossRef] [PubMed]
9. Costa, A.M.; de Souza Marotta Alfaia, R.G.; Campos, J.C. Landfill leachate treatment in Brazil—An overview. *J. Environ. Manag.* **2019**, *232*, 110–116. [CrossRef]
10. Ouda, O.K.M.; Raza, S.A.; Nizami, A.S.; Rehan, M.; Al-Waked, R.; Korres, N.E. Waste to energy potential: A case study of Saudi Arabia. *Renew. Sustain. Energy Rev.* **2016**, *61*, 328–340. [CrossRef]
11. Tan, S.T.; Lee, C.T.; Hashim, H.; Ho, W.S.; Lim, J.S. Optimal process network for municipal solid waste management in Iskandar Malaysia. *J. Clean. Prod.* **2014**, *71*, 48–58. [CrossRef]
12. Havukainen, J.; Zhan, M.; Dong, J.; Liikanen, M.; Deviatkin, I.; Li, X.; Horttanainen, M. Environmental impact assessment of municipal solid waste management incorporating mechanical treatment of waste and incineration in Hangzhou, China. *J. Clean. Prod.* **2017**, *141*, 453–461. [CrossRef]
13. Balda, M.C.; Furubayashi, T.; Nakata, T. Integration of WTE technologies into the electrical system for low-carbon growth in Venezuela. *Renew. Energy* **2016**, *86*, 1247–1255. [CrossRef]
14. Güereca, L.P.; Torres, N.; Juárez-López, C.R. The co-processing of municipal waste in a cement kiln in Mexico. A life-cycle assessment approach. *J. Clean. Prod.* **2015**, *107*, 741–748. [CrossRef]
15. Wichai-utcha, N.; Chavalparit, O. 3Rs Policy and plastic waste management in Thailand. *J. Mater. Cycles Waste Manag.* **2019**, *21*, 10–22. [CrossRef]
16. Gonzalez-Valencia, R.; Magana-Rodriguez, F.; Cristóbal, J.; Thalasso, F. Hotspot detection and spatial distribution of methane emissions from landfills by a surface probe method. *Waste Manag* **2016**, *55*, 299–305. [CrossRef] [PubMed]
17. Jovanov, D.; Vujić, B.; Vujić, G. Optimization of the monitoring of landfill gas and leachate in closed methanogenic landfills. *J. Environ. Manag.* **2018**, *216*, 32–40. [CrossRef] [PubMed]
18. Feng, S.J.; Chen, Z.W.; Chen, H.X.; Zheng, Q.T.; Liu, R. Slope stability of landfills considering leachate recirculation using vertical wells. *Eng. Geol.* **2018**, *241*, 76–85. [CrossRef]
19. European Parliament. Decision No 1386/2013/EU of the European parliament and of the Council of 20 November 2013 on a general union environment action Programme to 2020 'living well, within the limits of our planet'. *Off. J. Eur. Union* **2013**, *354*, 171–200.
20. Peri, G.; Ferrante, P.; La Gennusa, M.; Pianello, C.; Rizzo, G. Greening MSW management systems by saving footprint: The contribution of the waste transportation. *J. Environ. Manag.* **2019**, *219*, 74–83. [CrossRef] [PubMed]
21. Brennan, R.B.; Healy, M.G.; Morrison, L.; Hynes, S.; Norton, D.C.; Clifford, E. Management of landfill leachate: The legacy of European Union Directives. *Waste Manag.* **2016**, *55*, 355–363. [CrossRef]
22. EPA. *Biodegradable Waste Diversion from Landfill*; EPA: Washington, DC, USA, 2015.
23. Karak, T.; Bhagat, R.M.; Bhattacharyya, P. Municipal solid waste generation, composition, and management: The world scenario. *Crit. Rev. Environ. Sci. Technol.* **2012**, *42*, 1509–1630. [CrossRef]
24. Vaverková, M.D.; Elbl, J.; Radziemska, M.; Kintl, A.; Baláková, L.; Adamcová, D.; Bartoň, S.; Hladký, J.; Kynický, J.; Brtnický, M. Environmental risk assessment and consequences of municipal waste disposal. *Chemosphere* **2018**, *208*, 569–578. [CrossRef] [PubMed]
25. Castillo-Giménez, J.; Montañés, A.; Picazo-Tadeo, A.J. Performance and convergence in municipal waste treatment in the European Union. *Waste Menag.* **2019**, *85*, 222–231. [CrossRef] [PubMed]
26. European Parliament. *EU WM: Infographic with Facts and Figures*; European Parliament: Strasbourg, France, 2018.
27. Chakravarty, P.; Kumar, M. Floral Species in Pollution Remediation and Augmentation of Micrometeorological Conditions and Microclimate an Integrated Approach. In *Phytomanagement Polluted Sites*; Elsevier: Amsterdam, The Netherlands, 2019. [CrossRef]
28. Białowiec, A. Some Aspects of Environmental Impact of Waste Dumps. In *Contemporary Problems of Management and Environmental Protection*; University of Warmia and Mazury in Olsztyn: Olsztyn, Poland, 2011.
29. Koda, E.; Miszkowska, A.; Sieczka, A. Levels of organic pollution indicators in groundwater at the old landfill and WM site. *Appl. Sci.* **2017**, *7*, 638. [CrossRef]
30. Koda, E.; Pachuta, K.; Osinski, P. Potential of plant applications in the initial stage of the landfill reclamation process. *Pol. J. Environ. Stud.* **2013**, *22*, 1731–1739.

31. Weng, Y.C.; Fujiwara, T.; Houng, H.J.; Sun, C.H.; Li, W.Y.; Kuo, Y.W. Management of landfill reclamation with regard to biodiversity preservation, global warming mitigation and landfill mining: Experiences from the Asia–Pacific region. *J. Clean. Prod.* **2015**, *104*, 364–373. [CrossRef]
32. Vallero, D.A.; Blight, G. The Municipal Landfill. In *Waste*, 2nd ed.; Academic Press: Cambridge, MA, USA, 2019. [CrossRef]
33. Laner, D.; Crest, M.; Scharff, H.; Morris, J.W.F.; Barlaz, M.A. A review of approaches for the long-term management of municipal solid waste landfills. *Waste Manag.* **2012**, *32*, 498–512. [CrossRef]
34. Ziyang, L.; Luochun, W.; Nanwen, Y.; Youcai, Z. Martial recycling from renewable landfill and associated risks: A review. *Chemosphere* **2015**, *131*, 91–103. [CrossRef]
35. Shen, S.; Chen, Y.; Zhan, L.; Xie, H.; Bouazza, A.; He, F.; Zuo, X. Methane hotspot localization and visualization at a large-scale Xi'an landfill in China: Effective tool for landfill gas management. *J. Environ. Manag.* **2018**, *225*, 232–241. [CrossRef]
36. Rada, E.C.; Ragazzi, M.; Stefani, P.; Schiavon, M.; Torretta, V. Modelling the Potential Biogas Productivity Range from a MSW Landfill for Its Sustainable Exploitation. *Sustainability* **2015**, *7*, 482–495. [CrossRef]
37. Zhao, C.; Zhang, Y.; Xie, D. The Multi-energy High precision Data Processor Based on AD7606. *IOP Conf. Ser. Earth Environ. Sci.* **2017**, *94*, 012138. [CrossRef]
38. Zappini, G.; Cocca, P.; Rossi, D. Performance analysis of energy recovery in an Italian municipal solid waste landfill. *Energy* **2010**, *35*, 5063–5069. [CrossRef]
39. Lombardi, L.; Carnevale, E.; Corti, A. Greenhouse effect reduction and energy recovery from waste landfill. *Energy* **2006**, *31*, 3208–3219. [CrossRef]
40. Tchobanoglous, G.; Kreith, F. *Handbook of Solid WM*; McGraw-Hill: New York, NY, USA, 2002.
41. Scheutz, C.; Kjeldsen, P. Guidelines for landfill gas emission monitoring using the tracer gas dispersion method. *Waste Manag.* **2019**, *85*, 351–360. [CrossRef] [PubMed]
42. Thomasen, T.B.; Scheutz, C.; Kjeldsen, P. Treatment of landfill gas with low methane content by biocover systems. *Waste Manag.* **2019**, *84*, 29–37. [CrossRef] [PubMed]
43. Da Costa, F.M.; Daflon, S.D.A.; Bila, D.M.; da Fonseca, F.V.; Campos, J.C. Evaluation of the biodegradability and toxicity of landfill leachates after pretreatment using advanced oxidative processes. *Waste Manag.* **2018**, *76*, 606–613. [CrossRef] [PubMed]
44. Regadío, M.; Ruiz, A.I.; de Soto, I.S.; Rastrero, M.R.; Sánchez, N.; Gismera, M.J.; Sevilla, M.T.; da Silva, P.; Procopio, J.R.; Cuevas, J. Pollution profiles and physicochemical parameters in old uncontrolled landfills. *Waste Manag.* **2012**, *32*, 482–497. [CrossRef] [PubMed]
45. O'Shea, F.T.; Cundy, A.B.; Spencer, K.L. The contaminant legacy from historic coastal landfills and their potential as sources of diffuse pollution. *Mar. Pollut. Bull.* **2018**, *128*, 446–455. [CrossRef] [PubMed]
46. Rezapour, S.; Samadi, A.; Kalavrouziotis, I.K.; Ghaemian, N. Impact of the uncontrolled leakage of leachate from a municipal solid waste landfill on soil in a cultivated-calcareous environment. *Waste Manag.* **2018**, *82*, 51–61. [CrossRef]
47. Melnyk, A.; Kuklinska, K.; Wolska, L. Chemical pollution and toxicity of water samples from stream receiving leachate from controlled municipal solid waste (MSW) landfill. *Environ. Res.* **2014**, *135*, 253–261. [CrossRef] [PubMed]
48. Budi, S.; Suliasih, B.A.; Othman, M.S.; Heng, L.Z.; Surif, S. Toxicity identification evaluation of landfill leachate using fish, prawn and seed plant. *Waste Manag.* **2016**, *55*, 231–237. [CrossRef] [PubMed]
49. Moody, C.M.; Townsend, T.G. A comparison of landfill leachates based on waste composition. *Waste Manag.* **2017**, *63*, 267–274. [CrossRef] [PubMed]
50. Arunbabu, V.; Indu, K.S.; Ramasamy, E.V. Leachate pollution index as an effective tool in determining the phytotoxicity of municipal solid waste leachate. *Waste Manag.* **2017**, *68*, 329–336. [CrossRef]
51. Paskuliakova, A.; McGowan, T.; Tonry, S.; Touzet, N. Microalgal bioremediation of nitrogenous compounds in landfill leachate—The importance of micronutrient balance in the treatment of leachates of variable composition. *Algal Res.* **2018**, *32*, 162–171. [CrossRef]
52. Singh, S.K.; Tang, W.Z. Statistical analysis of optimum Fenton oxidation conditions for landfill leachate treatment. *Waste Manag.* **2013**, *33*, 81–88. [CrossRef]
53. Xiong, J.; Zheng, Y.; Yang, X.; Dai, X.; Zhou, T.; He, J.; Luo, X. Recovery of NH3-N from mature leachate via negative pressure steam-stripping pretreatment and its benefits on MBR systems: A pilot scale study. *J. Clean. Prod.* **2018**, *203*, 918–925. [CrossRef]

54. Koda, E.; Zakowicz, S. Physical and hydraulic properties of the MSW for water balance of the landfill. In Proceedings of the 3rd International Congress on Environmental Geotechnics, Lisbon, Portugal, 7–11 September 1998; pp. 217–222.
55. Yao, P. Perspectives on technology for landfill leachate treatment. *Arab. J. Chem.* **2017**, *10*, S2567–S2574. [CrossRef]
56. Wang, B.; Shen, Y. Performance of an anaerobic baffled reactor (ABR) as a hydrolysis-acidogenesis unit in treating landfill leachate mixed with municipal sewage. *Water Sci. Technol.* **2000**, *42*, 115–121. [CrossRef]
57. Vaverková, M.D.; Zloch, J.; Adamcová, D.; Radziemska, M.; Vyhnánek, T.; Trojan, V.; Winkler, J.; Đorđević, B.; Elbl, J.; Brtnický, M. Landfill Leachate Effects on Germination and Seedling Growth of Hemp Cultivars (*Cannabis sativa* L.). *Waste Biomass Valorization* **2019**. [CrossRef]
58. Vaverková, M.D.; Adamcová, D. Can vegetation indicate municipal solid waste landfill impact on the environment? *Pol. J. Environ. Stud.* **2014**, *23*, 501–509.
59. Cameron, R.D.; Koch, F.A. Toxicity of landfill leachates. *Water Pollut. Control* **1980**, *52*, 760–769.
60. US EPA. *Ambient Water Quality Criteria for Ammonia (Saltwater) 440/5-88-004*; US Environmental Protection Agency, Criteria and Standards Division: Washington, DC, USA, 1989.
61. US EPA. *Ambient Water Quality Criteria for Ammonia 440/5-85-001*; US Environmental Protection Agency, Criteria and Standards Division: Washington, DC, USA, 1984.
62. Helma, A.; Mersch-Sundermann, V.; Houk, V.S.; Glasbrenner, U.; Klein, C.; Wenquing, L.; Kassie, F.; Schulte-Hermann, R.; Knasmuller, S. Comparative evaluation of four acterial assays for the detection of genotoxic effects in the dissolved water phases of aqueous matrices. *Environ. Sci. Technol.* **1996**, *30*, 897–907. [CrossRef]
63. Duggan, J. The potential for landfill leachate treatment using willows in the UK—A critical review. *Resour. Conserv. Recycl.* **2005**, *45*, 97–113. [CrossRef]
64. Renou, S.; Givaudan, J.G.; Poulain, S.; Dirassouyan, F.; Moulin, P. Landfill leachate treatment: Review and opportunity. *J. Hazard. Mater.* **2008**, *150*, 468–493. [CrossRef]
65. Raghab, S.M.; El Meguid, A.M.A.; Hegazi, H.A. Treatment of leachate from municipal solid waste landfill. *HBCR J.* **2013**, *9*, 187–192. [CrossRef]
66. Kamaruddin, M.A.; Yusoff, M.S.; Rui, L.M.; Isa, A.M.; Zawawi, M.H.; Alrozi, R. An overview of municipal solid WM and landfill leachate treatment: Malaysia and Asian perspectives. *Environ. Sci. Pollut. Res.* **2017**, *24*, 26988. [CrossRef]
67. Powell, J.T.; Pons, J.C.; Chertow, M. Waste informatics: Establishing characteristics of contemporary U.S. landfill quantities and practices. *Environ. Sci. Technol.* **2016**, *50*, 10877–10884. [CrossRef]
68. Chavan, D.; Lakshmikanthan, P.; Mondal, P.; Kumar, S.; Kumar, R. Determination of ignition temperature of municipal solid waste for understanding surface and sub-surface landfill fire. *Waste Manage.* **2019**, *97*, 123–130. [CrossRef]
69. Raúl, G.E.; Morales, S.; Toro, R.; Luis, A.; Morales, M.A.; Leiva, G. Landfill fire and airborne aerosols in a large city: Lessons learned and future needs Air Qual. *Atmos. Health* **2018**, *11*, 111–121.
70. Øygard, J.K.; Måge, A.; Gjengedal, E.; Svane, T. Effect of an uncontrolled fire and the subsequent fire fight on the chemical composition of landfill leachate. *Waste Manag.* **2005**, *25*, 712–718. [CrossRef]
71. Vassiliadou, I.; Papadopoulos, A.; Costopoulou, D.; Vasiliadou, S.; Christoforou, S.; Leondiadis, L. Dioxin contamination after an accidental fire in the municipal landfill of Tagarades, Thessaloniki, Greece. *Chemosphere* **2009**, *74*, 879–884. [CrossRef] [PubMed]
72. Chrysikou, L.; Gemenetzis, P.; Kouras, A.; Manoli, E.; Terzi, E.; Samara, C. Distribution of persistent organic pollutants, polycyclic aromatic hydrocarbons and trace elements in soil and vegetation following a large scale landfill fire in northern Greece. *Environ. Int.* **2008**, *34*, 210–225. [CrossRef] [PubMed]
73. Downard, J.; Singh, A.; Bullard, R.; Jayarathne, T.; Rathnayake, C.M.; Simmons, D.L.; Wels, B.R.; Spak, S.N.; Peters, T.; Beardsley, D.; et al. Uncontrolled combustion of shredded tires in a landfill—Part 1: Characterization of gaseous and particulate emissions. *Atmos. Environ.* **2015**, *104*, 195–204. [CrossRef] [PubMed]
74. Singh, A.; Spak, S.N.; Stone, E.A.; Downard, J.; Bullard, R.L.; Pooley, M.; Kostle, P.A.; Mainprize, M.W.; Wichman, M.D.; Peters, T.M.; et al. Uncontrolled combustion of shredded tires in a landfill—Part 2: Population exposure, public health response, and an air quality index for urban fires. *Atmos. Environ.* **2015**, *104*, 273–283. [CrossRef] [PubMed]

75. Rim-Rukeh, A. An Assessment of the Contribution of Municipal Solid Waste Dump Sites Fire to Atmospheric Pollution. *Open J. Air Pollut.* **2014**, *3*, 53–60. [CrossRef]
76. Weichenthal, S.; Van Rijswijk, D.; Kulka, R.; You, H.; Van Ryswyk, K.; Willey, J.; Dugandzic, R.; Sutcliffe, R.; Moulton, J.; Baike, M.; et al. The impact of a landfill fire on ambient air quality in the north: A case study in Iqaluit, Canada. *Environ. Res.* **2015**, *142*, 46–50. [CrossRef] [PubMed]
77. Cristale, J.; Belé, T.G.A.; Lacorte, S.; Rodrigues de Marchi, M.R.R. Occurrence of flame retardants in landfills: A case study in Brazil. *Environ. Res.* **2019**, *168*, 420–427. [CrossRef]
78. Nadal, M.; Rovira, J.; Díaz-Ferrero, J.; Schuhmacher, M.; Domingo, J.L. Human exposure to environmental pollutants after a tire landfill fire in Spain: Health risks. *Environ. Int.* **2016**, *97*, 37–44. [CrossRef]
79. Escobar-Arnanz, J.; Mekni, S.; Blanco, G.; Eljarrat, E.; Barceló, D.; Ramos, L. Characterization of organic aromatic compounds in soils affected by an uncontrolled tire landfill fire through the use of comprehensive two-dimensional gas chromatography–time-of-flight mass spectrometry. *J. Chromatogr. A* **2018**, *1536*, 163–175. [CrossRef]
80. Purser, D.A.; Maynard, R.L.; Wakefield, J.C. *Toxicology, Survival and Health Hazards of Combustion Products*; The Royal Society of Chemistry: London, UK, 2015. [CrossRef]
81. Rovira, J.; Dominguez-Morueco, N.; Nadal, M.; Schuhmacher, M.; Domingo, J.L. Temporal trend in the levels of polycyclic aromatic hydrocarbons emitted in a big tire landfill fire in Spain: Risk assessment for human health. *J. Environ. Sci. Heal. A.* **2018**, *53*, 222–229. [CrossRef]
82. Kumar, S.; Aggarwal, S.G.; Gupta, P.K.; Kawamura, K. Investigation of the tracers for plastic-enriched waste burning aerosols. *Atmos. Environ.* **2015**, *108*, 49–58. [CrossRef]
83. Sahariah, B.; Goswami, L.; Farooqui, I.U.; Raul, P.; Bhattacharyya, P.; Bhattacharya, S.S. Solubility, hydrogeochemical impact, and health assessment of toxic metals in municipal wastes of two differently populated cities. *J. Geochem. Explor.* **2015**, *157*, 100–109. [CrossRef]
84. Rao, M.N.; Sultana, R.; Kota, S.H. Municipal solid waste. In *Solid and Hazardous WM*; Elsevier: Amsterdam, The Netherlands, 2017; pp. 3–120.
85. Krzyzanowski, M.; Cohen, A. Update of WHO air quality guidelines. *Air Qual. Atmos. Health* **2008**, *1*, 7–13. [CrossRef]
86. Giusti, L. A review of WM practices and their impact on human health. *Waste Manag.* **2009**, *29*, 2227–2239. [CrossRef] [PubMed]
87. Dhabbah, A.M. Ways of analysis of fire effluents and assessment of toxic hazards. *J. Anal. Sci. Methods Instrum.* **2015**, *5*, 1–12. [CrossRef]
88. Stoeva, K.; Alriksson, S. Influence of recycling programmes on waste separation behavior. *Waste Manag.* **2017**, *68*, 732–741. [CrossRef] [PubMed]
89. Hipel, J.; Ma, K.W.; Hanson, M.L.; Cai, X.; Liu, Y. An analysis of influencing factors on municipal solid waste source-separated collection behavior in Guilin, China by using the theory of planned behavior. *Sustain. Cities Soc.* **2018**, *37*, 36–343. [CrossRef]
90. Pandey, R.U.; Surjan, A.; Kapshe, M. Exploring linkages between sustainable consumption and prevailing green practices in reuse and recycling of household waste: Case of Bhopal city in India. *J. Clean. Prod.* **2018**, *173*, 49–59. [CrossRef]
91. Matsuda, T.; Hirai, Y.; Asari, M.; Yano, J.; Miura, T.; Ii, R.; Sakai, S. Monitoring environmental burden reduction from household waste prevention. *Waste Manag.* **2018**, *71*, 2–9. [CrossRef]
92. Pietzsch, N.; Ribeiro, J.D.L.; Medeiros, J.F. Benefits, challenges and critical factors of success for zero waste: A systematic literature review. *Waste Manag.* **2017**, *67*, 324–353. [CrossRef]
93. Samadder, S.R.; Prabhakar, R.; Khan, D.; Kishan, D.; Chauhan, M.S. Analysis of the contaminants released from municipal solid waste landfill site: A case study. *Sci. Total Environ.* **2017**, *580*, 593–601. [CrossRef] [PubMed]
94. Zaman, A.U. A comprehensive study of the environmental and economic benefits of resource recovery from global WM systems. *J. Clean. Prod.* **2016**, *124*, 41–50. [CrossRef]
95. Westlake, K. Sustainable Landfill—Possibility or Pipe-Dream? *Waste Manag. Res.* **1997**, *15*, 453–461. [CrossRef]
96. Townsend, T.G.; Powell, J.; Jain, P.; Xu, Q.; Tolaymat, T.; Reinhart, D. Planning for Sustainable Landfilling Practices. Sustainable Practices for Landfill Design and Operation. In *Sustainable Practices for Landfill Design and Operation*; Springer: New York, NY, USA, 2015; pp. 35–51. [CrossRef]

97. Meegoda, J.N.; Soliman, A.; Hettiaratchi, P.A.; Agbakpe, M. Resource Mining for a Bioreactor Landfill. *Curr. Environ. Eng.* **2019**, *6*, 17–34. [CrossRef]
98. Scharff, H.; Kok, B.; Krom, A.H. The role of sustainable landfill in future WM systems. In Proceedings of the Eleventh International WM and Landfill Symposium, Cagliari, Italy, 1–5 October 2007.
99. Huber-Humer, M.; Lechner, P. Sustainable landfilling or sustainable society without landfilling? *Waste Manag.* **2011**, *31*, 1427–1428. [CrossRef] [PubMed]
100. Song, O.; Li, J.; Zeng, X. Minimizing the increasing solid waste through zero waste strategy. *J. Clean. Prod.* **2015**, *104*, 199–210. [CrossRef]
101. Taha, M.P.M.; Drew, G.H.; Longhurst, P.J.; Smith, R.; Pollard, S.J.T. Bioaerosol releases from compost facilities: Evaluating passive and active source terms at a green waste facility for improved risk assessments. *Atmos. Environ.* **2006**, *40*, 159–1169. [CrossRef]
102. Pearson, C.; Littlewood, E.; Douglas, P.; Robertson, S.; Gant, T.W.; Hansell, A.L. Exposures and health outcomes in relation to bioaerosol emissions from composting facilities: A systematic review of occupational and community studies. *J. Toxicol. Environ. Health Part B* **2015**, *18*, 43–69. [CrossRef]
103. Robertson, S.; Douglas, P.; Jarvis, D.; Marczylo, E. Bioaerosol exposure from composting facilities and health outcomes in workers and in the community: A systematic review update. *Int. J. Hyg. Environ. Health* **2019**, *222*, 364–386. [CrossRef]
104. Ounoughene, G.; Chivas-Joly, C.; Longuet, C.; Le Bihan, O.; Lopez-Cuesta, J.M.; Coq, L.L. Evaluation of nanosilica emission in polydimethylsiloxane composite during incineration. *J. Hazard. Mater.* **2019**, *371*, 415–422. [CrossRef]
105. Feng, Y.; Jiang, X.; Chen, D. The emission of fluorine gas during incineration of fluoroborate residue. *J. Hazard. Mater.* **2016**, *308*, 91–96. [CrossRef] [PubMed]
106. Jones, A.M.; Harrison, R.M. Emission of ultrafine particles from the incineration of municipal solid waste: A review. *Atmos. Environ.* **2016**, *140*, 519–528. [CrossRef]
107. Hsu, W.T.; Liu, M.C.; Hung, P.C.; Chang, S.H.; Chang, M.B. PAH emissions from coal combustion and waste incineration. *J. Hazard. Mater.* **2016**, *3018*, 32–40. [CrossRef] [PubMed]
108. Burlakovs, J.; Kriipsalu, M.; Klavins, M.; Bhatnagar, A.; Vincevica-Gaile, Y.; Stenis, J.; Jani, Z.; Mykhaylenko, V.; Denafas, G.; Turkadze, T.; et al. Paradigms on landfill mining: From dump site scavenging to ecosystem services revitalization. *Resour. Conserv. Recycl.* **2017**, *123*, 73–84. [CrossRef]
109. Laner, D.; Cencic, O.; Svensson, N.; Krook, J. Quantitative Analysis of Critical Factors for the Climate Impact of Landfill Mining. *Environ. Sci. Technol.* **2016**, *50*, 6882–6891. [CrossRef] [PubMed]
110. Mönkäre, T.; Palmroth, M.R.T.; Sormunen, K.; Rintala, J. Scaling up the treatment of the fine fraction from landfill mining: Mass balance and cost structure. *Waste Manag.* **2019**, *15*, 464–471. [CrossRef]
111. Hölzle, I. Contaminant patterns in soils from landfill mining. *Waste Manag.* **2019**, *83*, 151–160. [CrossRef] [PubMed]
112. Danthurebandara, M.; Van Passel, S.; Van Acker, K. Environmental and economic assessment of 'open waste dump' mining in Sri Lanka. *Resour. Conserv. Recycl.* **2015**, *102*, 67–79. [CrossRef]
113. Danthurebandara, M.; Van Passel, S.; Vanderreydt, I.; Van Acker, K. Assessment of environmental and economic feasibility of Enhanced Landfill Mining. *Waste Manag.* **2015**, *45*, 434–447. [CrossRef]
114. Frändegård, P.; Krook, J.; Svensson, N.E.; Eklund, M. Resource and Climate Implications of Landfill Mining. *J. Ind. Ecol.* **2013**, *17*, 742–755. [CrossRef]
115. Winterstetter, A.; Laner, D.; Rechberger, H.; Fellner, J. Framework for the evaluation of anthropogenic resources: A landfill mining case study—Resource or reserve? *Resour. Conserv. Recycl.* **2015**, *96*, 19–30. [CrossRef]
116. Laner, D.; Esguerra, J.L.; Krook, J.; Horttanainen, M.; Kriipsalu, M.; Rosendal, R.M.; Stanisavljević, N. Systematic assessment of critical factors for the economic performance of landfill mining in Europe: What drives the economy of landfill mining? *Waste Manag.* **2019**, *15*, 674–686. [CrossRef] [PubMed]

BCTT Public Comments
Received as of 9/7/22 at 11am

From: BECKY MERJA
To: NICHOLS Darren; Sam Imperati; REDICK Daniel; Benton County Talks Trash
Cc: AUGEROT Xanthippe; WYSE Nancy; MALONE Patrick
Subject: Benton County Talks Trash work Group
Date: Thursday, September 1, 2022 10:17:10 PM

Darren, Sam, Xan, Pat, Nancy, Daniel, Trash Talk BC,

Regarding Benton County Talks Trash, if public input is supposed to be an integral part of this process, then I have concerns about the meeting format. Taking public comment at the END of a 4 hour meeting is not conducive to the community hanging around to comment. There might be more participation from the public if comments were taken at the beginning AND the end of each session with that opportunity verbalized by the facilitator at the beginning, middle and end of each meeting.

I also have concerns about the meeting schedule, I thought the original focus of this group was supposed to be on the “future of solid waste”, and to guide a sustainable materials plan for Benton County. It appears that that is the smallest part of the meeting agenda. Does this work group know that the focus has changed? Why is a good portion of meeting time going to be spent touring the landfill? This group is supposed to be concentrating on the future, not the present or past.
Thank you for the opportunity to comment
Respectfully,
Becky Merja

Sent from Mail for Windows

From:	Mark Yeager
To:	Sam Imperati; REDICK Daniel; NICHOLS Darren; WYSE Nancy; AUGEROT Xanthippe; MALONE Patrick; Benton County Talks Trash; Mark Yeager
Subject:	BC Talks Trash Survey Monkey and Public Involvement
Date:	Tuesday, September 6, 2022 7:59:23 AM

Dear Mr Imperati, Mr Reddick, Mr Nichols, and Commissioners,

Considering the extreme amount of interest in this process and this topic among the public, the large number of community folks who applied to be on the workgroup (and were not selected), and the vital nature of the effort the work group is planning to undertake, I would request that the survey that is currently being circulated only to working group appointees be opened up to the general public as well (these are being undertaken via a "Survey Monkey").

The County has indicated that it is interested in getting the public engaged in planning the future of materials management, but the way this Talks Trash process is being rolled out sends the opposite message. First, by having the Survey Monkey only available to the Workgroup members excludes public input into development of workgroup priorities; second, scheduling the public input opportunity at the END of the planned meetings and forcing the public to wait 5 and a half hours to voice their ideas is disrespectful; and finally, the planned, rushed schedule for the process and meetings (8 extremely long meetings in 4 months) clearly says that you are just going through the motions with the appearance of wanting community members help in deciding the future of materials management for Benton County.

- Open the Survey Monkey to the public. Weigh the responses from the public, non members however the facilitator chooses, but I think it is imperative, and it has been emphasized in all formative County discussions regarding the workgroup, that meaningful public involvement is critical to developing a supported, long-term materials management plan for Benton County.
- Schedule public input at both the start and end of the meetings. It sends a clear message that you respect and value the public's input and involvement.

Thank you,

Mark Yeager

From: Rollie Baxter
To: Benton County Talks Trash
Subject: trash agenda
Date: Wednesday, September 7, 2022 10:27:36 AM

The agenda suggested that citizens with questions send questions to this address.

My question is: Why was the Lane County landfill south of Eugene/Springfield not evaluated as a (comparable) landfill example?

In the "jurisdictions hosting landfills", Item 8 on page 61 of the "draft common understandings" you provide extensive info on the Gilliam County landfill. Why not a similar comparison of common understandings with the Lane County landfill?

I understand that the Gilliam County fill is apparently owned and operated privately. Perhaps the Lane County fill may be owned and operated by a government agency. However, there may still be some relevant info that would be useful to know. Even if a direct comparison is not appropriate, the reasons for differentiating because of ownership may be important to understanding the big picture. Any reasons for excluding the Lane County landfill from a comparison should be known.

Rolland Baxter