

## MEMORANDUM

DATE: November 8, 2019 (revised November 12, 2019, with minor copy edits)

TO: Stakeholder & Tribal Advisory Group (STAG), MTCA Cleanup Rule Update

FROM: Clint Stanovsky, Cleanup Rulemaking Lead  
Toxics Cleanup Program (TCP), Policy and Technical Support Unit (PTSU)  
  
Eileen Webb, Environmental Remediation Coordinator, TCP/PTSU

CC: TCP Rule Team, TCP Management Team

RE: **Prototype – Site Hazard Assessment and Ranking Process (SHARP) Tool**

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This memorandum provides an overview of a new tool for assessing and ranking contaminated sites based on their threats to human health and the environment. Toxics Cleanup Program (TCP) staff are developing the Site Hazard Assessment and Ranking Process (SHARP) Tool to replace our current ranking procedure, the Washington Ranking Method (WARM), which remains unchanged since 1993.

This memo explains why we're proposing the new SHARP Tool, the concepts behind it, our design objectives and methods, and how we propose to use it. The accompanying MS Excel (2016) file provides a prototype of the SHARP Tool for your reference as you consider this memo. *[The SHARP tool was provided to STAG members on 11/8/2019, and is available upon request by emailing Clint Stanovsky, [clst461@ecy.wa.gov](mailto:clst461@ecy.wa.gov)]*

## Background

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The Model Toxics Control Act (MTCA) requires Ecology to “establish a hazard ranking system for hazardous waste sites” ([RCW 70.105D.030](#) (2)(b))<sup>1</sup>. In 1993, Ecology fulfilled this requirement in Section 330 of the Cleanup Rule. In 2001, following an extensive public advisory process, Ecology amended the rule to require the specific ranking procedures of the Washington Ranking Method Scoring Manual (Ecology publication number 90-14, April 1992). Since then the MTCA cleanup program has grown and changed significantly, but the 27-year-old ranking system has not grown with it, and it no longer serves the needs of the program or the public.

TCP is now updating the Cleanup Rule, [Chapter 173-340 WAC](#)<sup>2</sup>. We propose to remove the explicit reference to WARM and the WARM Scoring Manual from the rule. Instead, the updated rule will direct and provide performance requirements for Ecology to develop and maintain a

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<sup>1</sup> <https://app.leg.wa.gov/RCW/default.aspx?cite=70.105D.030>

<sup>2</sup> <https://apps.leg.wa.gov/WAC/default.aspx?cite=173-340>

hazard ranking system through agency-issued policy and procedures – not rule – with appropriate public review and comment.

Concurrent with our work to update the rule, TCP staff have developed the accompanying SHARP Tool prototype as an example of the ranking system that we would use to implement the draft rule changes. We have designed and tested the SHARP Tool using MS Excel 2016, and plan to continue reliability trials, pilot tests, and additional development until the updated Cleanup Rule becomes effective, as early as spring 2021.

Once the updated rule takes effect, we expect to proceed with MTCA site assessments and ranking using a final MS Excel version of the SHARP Tool. As resources permit, we expect to develop special-purpose software linked to Ecology's Integrated Site Information System (ISIS), our internal database of Washington sites that require (or required) cleanup under MTCA. ISIS includes more than 13,300 sites as of November 2019; information from ISIS is available to the public through [Ecology's website](#).<sup>3</sup>

## **SHARP Tool design objectives**

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TCP is developing the SHARP Tool with the following expectations and objectives:

- Unlike the WARM rankings, SHARP rankings will be absolute rather than relative. The ranking for each site will provide meaningful information about environmental risks at that site, independent of rankings at other sites.
- The SHARP tool will be designed for users who have a background in environmental science, toxicology, or engineering, and who have a working knowledge of MTCA regulations and practices.
- SHARP ranking will proceed using the best data available at the time of evaluation, and rankings will be easy to update when additional information is available or if site conditions change.
- SHARP will provide separate estimates of:
  - (a) the potential for exposure to hazardous substances at the site, and
  - (b) the likely severity of such an exposure for a human or environmental receptor.
- Rankings will also report a confidence level based on the user's confidence in the data available at the time of evaluation.
- SHARP evaluation and ranking should add less than an hour to the user's thorough review of available site information.

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<sup>3</sup> <https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Cleanup-sites/Locate-contaminated-sites>

## Components of SHARP site rankings

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SHARP rankings provide separate estimates of:

- **Exposure-potential** – the likelihood that human or environmental receptors are, or could be, exposed to hazardous substances at or from the site;
- **Severity** – the likely effects of the potential exposure on receptors; and
- **Confidence** – the extent to which the exposure and severity estimates are based on credible, site-specific information.

SHARP generates these estimates for each of six possible **exposure routes** at the site:

1. Accessible soil
2. Deeper soil
3. Groundwater
4. Surface water
5. Vapor intrusion
6. Sediment

### Exposure Potential

The SHARP Tool ranks exposure-potential on an ordinal scale from A through D, where “A” represents the most urgent need for remedial action, and “D” the least. This estimate is based on answers to a short series of questions about the possibility of exposure to hazardous substances through each of the site’s exposure routes.

For each exposure route, the possible outcomes are:

- A Known Active* – Action is needed to break an active exposure route.
- B Possible Active* – Action may be needed to break a possible active exposure route.
- C Potential Future* – Action may be needed to break a potential future exposure route.
- D Unlikely* – No further action is likely needed to break an exposure route.

### Severity

The SHARP Tool ranks severity on an ordinal scale from 1 through 4, where “1” represents a threat of greatest concern, and “4” the least. The severity estimate of a potential exposure is based on answers to specific questions for each exposure route that has an exposure-potential score of A, B or C. The SHARP Tool does not generate severity rankings for routes with exposure-potential scores of D–“Unlikely,” since no further action is likely needed to break that exposure route.

The possible rankings are:

- 1 *Greatest concern*
- 2 *Moderate concern*
- 3 *Lesser concern*
- 4 *Least concern*

To generate severity rankings, the SHARP Tool awards points for the answer to each question and sums the points for each exposure route. The number of severity questions varies by exposure route, and some questions are weighted twice as heavily as others, based on our knowledge of the MTCA cleanup standards and other applicable or relevant and appropriate requirements (ARARs). This means that the six exposure routes can have different maximum point scores.

To allow comparison of scores for different routes, the SHARP Tool assigns a threshold point score for “1” (Greatest Concern) to each route based on the total possible points for that route. Lower severity scores (2, 3, and 4) are based on a linear allocation of points below the “1” threshold. Severity thresholds for “greatest concern” are set for each route by knowledgeable TCP staff, and are adjusted to provide a useful distribution of route scores over a variety of sites.

## Confidence

For each ranking question, the SHARP Tool requires the user to choose the best answer from a small set of confidence options:

*High* – supported by sufficient, credible, site-specific information.

*Medium* – supported by site-specific data, but of limited quality or quantity. Additional data may be needed to support site cleanup decisions.

*Low* – based on reported or suspected facility operations and processes, apparent site conditions, and types and quantities of contamination typically generated at similar facilities. Additional data are required to support site cleanup decisions.

For each exposure route, overall confidence scores are based on the user’s confidence when responding to questions addressing:

*Route Exposure Confidence.* Confidence levels are selected for each exposure question. The overall confidence level is the lowest confidence level reported for all exposure screening questions within each exposure route.

*Route Severity Confidence.* Overall confidence levels for each route are based on the confidence levels reported by the user for each severity question, weighted by the points awarded to that question. Thus, the confidence score for each route reflects the user’s

level of confidence in their answers as well as the contribution of each answer to the route severity score.

A comment field for each question allows users to note the basis of their confidence choice, and to document site-specific information sources for each question.

## Vulnerable Populations and Other Severity Factors

In addition to exposure and severity scores for each exposure route, the SHARP Tool recognizes other factors that can affect the overall severity of potential exposures at some sites. For sites impacted by the factors in the following list, the SHARP Tool generates a “flag” that is stored and reported as part of the SHARP ranking. Severity flags in the SHARP Tool currently include:

### *Vulnerable populations.*

Public health research on environmental justice in the management of contaminated sites in the United States indicates that certain disadvantaged populations are more susceptible to harm from exposures to hazardous substances than the overall population.<sup>4</sup> The U.S. Environmental Protection Agency (EPA) uses U.S. Census Bureau data to report on standard measures of population vulnerability at the census block-group level through its EJ Screen website (<https://www.epa.gov/ejscreen>).

Ecology and the Department of Health have built on EPA’s methods to develop internal state-level map layers (Figure 1) using the Census Bureau’s American Community Survey five-year estimates, which are published annually to report demographics at the census block-group level. TCP has used EPA’s EJ Screen to accomplish demographic analysis in the current SHARP Tool prototype, but we plan to use state-hosted map tools in future versions to ensure access to the most up-to-date demographic data and for consistency within the state.

In the SHARP Tool, Ecology identifies and flags for a “vulnerable population” any site located in a census block-group that exceeds the 80<sup>th</sup> percentile in Washington for one or more of the following indicators:

- People of color
- Low-income
- Less than high school education
- Age less than 5 years
- Age greater than 64 years

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<sup>4</sup> Washington State Department of Health’s website:  
<https://www.doh.wa.gov/DataandStatisticalReports/HealthDataVisualization/SocialDeterminantsofHealthDashboards>

We also identify and flag for a “vulnerable population” any site in a block-group that contains more than 1,000 people or five percent of the block-group population who identify as speaking English “Less Than Very Well” for the following indicator:

- Lack of English Proficiency

The “Flagged Factors” sheet in the SHARP Tool prototype includes fields for demographic results and instructions for accessing EJ Screen. Ultimately, this field will be completed automatically using resources provided by EPA or the Washington Department of Health, without requiring the user to access EJScreen. We’re still developing final procedures for this factor.

#### *Multiple Contaminant Types.*

The SHARP Tool provides a flag for sites with multiple contaminant types as an indicator of cleanup complexity and of potential synergistic effects from multiple, differing types of contaminants. The contextual help for this question on the Flagged Factors sheet lists common contaminant groups that are used to answer this question. We are still working to further define this list.

#### *Additional Severity Factors.*

The SHARP Tool allows users to report and document special additional factors that could affect the severity of exposures at a site arising from contaminant toxicity, special receptors, or a magnitude of impact that may not be sufficiently addressed in other worksheets of the SHARP Tool. These special factors could affect how we prioritize a cleanup, or support creation of a special focus on specific cleanup actions.

TCP may develop other “additional severity factors” in future versions of the SHARP Tool. One possibility is a flag for area-wide soil arsenic or lead, which can compound or obscure the effects of other contaminants when ranking a site.

## **SHARP Tool Development**

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The SHARP Tool prototype provided for STAG review represents several significant advances in design but does not yet fully reflect the results of our latest internal trials. We intend to continue developing the SHARP Tool in anticipation of –and later as part of – TCP policies and procedures implementing proposed updates to Sections 310, 320 and 330 of the Cleanup Rule. Further testing will likely focus on strategic groups of sites to help us prepare to implement the SHARP process after the anticipated rule updates go into effect.

Ecology expects eventually to develop a final SHARP Tool as a special-purpose application for Ecology use, linked to the Integrated Site Information System (ISIS) database. However, we anticipate that a future Excel-based version of the SHARP Tool will be sufficiently reliable and

efficient to allow TCP to begin ranking sites immediately and continue until Ecology develops optimal software.

## Reliability

To develop and test the SHARP Tool TCP is conducting trials in which several users independently rank the same site using the same data sets. Statistical comparison of the resulting rankings is allowing us to estimate the inter-rater reliability (reproducibility) of ranking results, and to track changes in reliability from one version of the tool to the next. These trials have helped us identify sources of variability in exposure, severity, and confidence scores that are not simply related to differences of judgment among users.

Strategies to improve the inter-rater reliability of the SHARP Tool as a ranking instrument include:

- Uniform, simple menus of responses for each question
- Contextual links to help topics specific to each question
- Navigation guides and links within the workbook
- Internal checks for completeness and logical consistency, with error messages for responses that have incomplete or incompatible answers

### *User Input Menus*

For each question, the user selects from a drop-down menu of options. In most cases, the available responses for exposure and severity questions are:

- YES – Confirmed
- YES – Suspected
- NO – Unlikely

Available drop-down menu responses for confidence levels for each answer are:

- High – Sufficient information
- Medium – Limited information
- Low – Insufficient information

### *Contextual Help*

To answer each screening question, the SHARP Tool provides internal and external hyperlinks to helpful information. Currently, each question has a hyperlink to relevant worksheets within the workbook to guide users. From within each help worksheet, the user can jump back to the question they were answering.

A wide variety of TCP subject-matter experts have contributed to the help worksheets found in the SHARP Tool. We will continue to develop and improve concise guidance for each question.

## Reporting SHARP Ranking Results

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### Ranking Summary

After a site ranking is complete, the SHARP Tool generates a summary sheet that reports the exposure, severity, and confidence scores of each exposure route, as well as flag indicators of other severity factors (Figure 2). The summary also highlights the three exposure routes with the highest exposure-potential and severity. This summary is a stand-alone component that the user can print for meeting discussions, or to support manual data entry, while necessary.

The ranking summary indicates whether the scores reflect an initial ranking or a re-ranking. It also provides a field for the user to enter a narrative summary, including such information the site's physical description, operating and regulatory history, chemicals of concern, facility operation details, and remedial action milestones. When appropriate, this narrative can include the rationale for re-ranking.

### Report Card

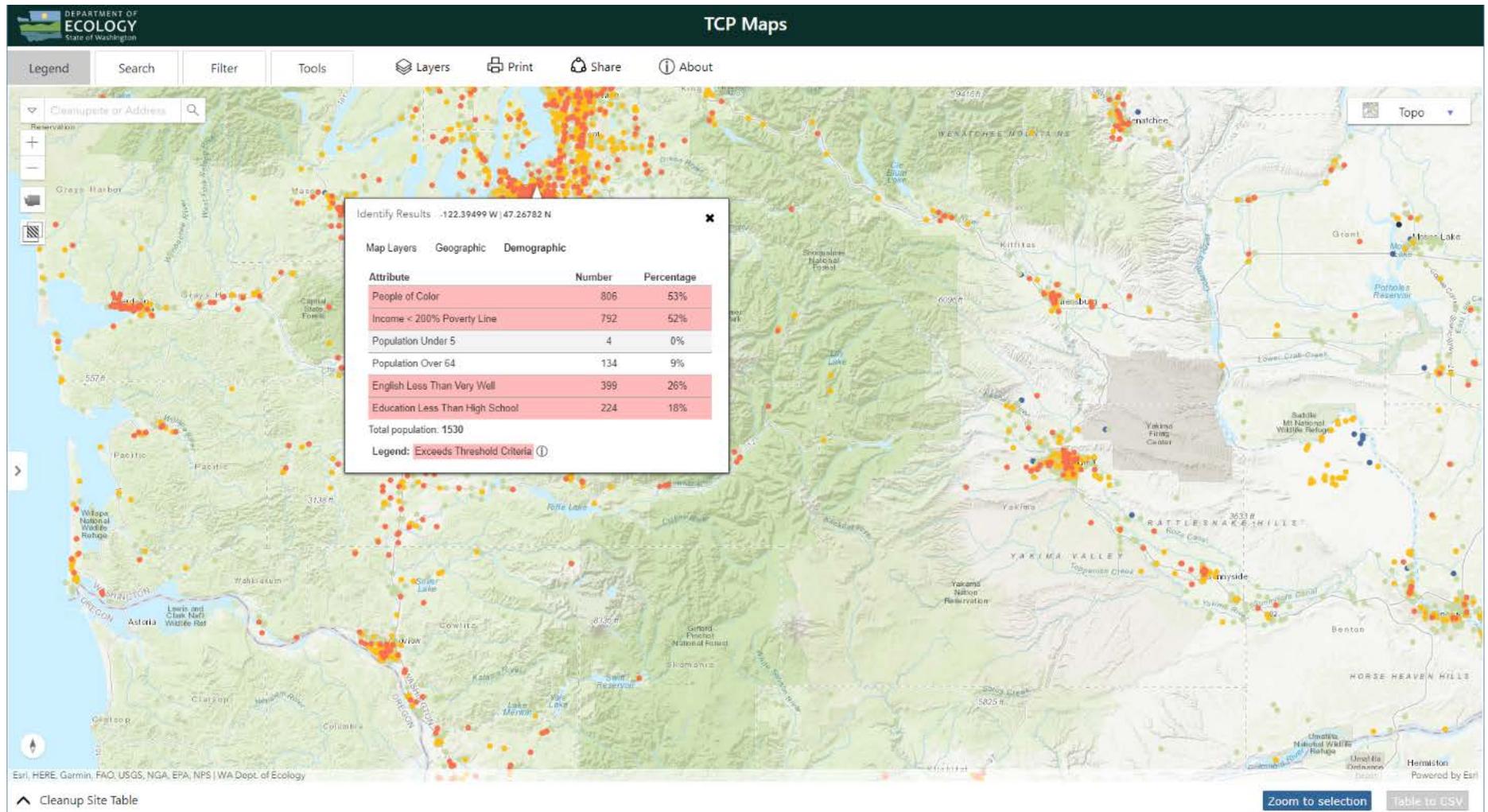
The SHARP Tool automatically generates an illustrated "report card" that visually summarizes the site scores and highlights any flagged severity factors (Figure 3). The report card assists users in interpreting the ranking scores. Like the summary sheet, the report card is a stand-alone component suitable for printing and use in meetings, to support understanding by a non-technical audience.

### Future links to ISIS and Ecology Web pages

In the future, the SHARP Tool will link automatically to ISIS. With further development effort, Ecology expects then to make the SHARP Ranking Summary and Report Card available on demand to the public through Ecology's website, potentially linked to ["What's in my neighborhood"](#)<sup>5</sup> or as automatically-generated site pages.

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<sup>5</sup> <https://apps.ecology.wa.gov/neighborhood/>



**Figure 1:** This is a screenshot of the internal map layer that Ecology has developed to streamline demographic analysis and make that information easily available to Ecology staff. This layer follows the EPA’s methodology for identifying vulnerable communities and uses the same base data as EJScreen and the Washington Tracking Network.<sup>6</sup> This map layer is still in development and subject to change.

<sup>6</sup> <https://www.doh.wa.gov/DataandStatisticalReports/HealthDataVisualization/SocialDeterminantsMeasureExplorer>



## RANKING SUMMARY

check if initial ranking  
 check of re-ranking

date June 4, 2019  
 by Jane Smith

**\*\* Type Site Identifying Information Below \*\***

<b>Site Name</b>	<b>Washington Industries, LLC</b>
Address	100 Main Street
City	Wenatchee
CSID	1234567
FSID	98765432
VCP	None
LUST	None

Exposure Route Priorities	Exposure	Severity	Flag Factors
Primary Exposure ▶ <i>Sediment</i>	A	4	(x, y)
Secondary Exposure ▶ <i>Soil - Readily Accessible</i>	C	2	
Tertiary Exposure ▶ <i>Soil - Deeper</i>	C	2	

**Summary Scores by Exposure & Severity**

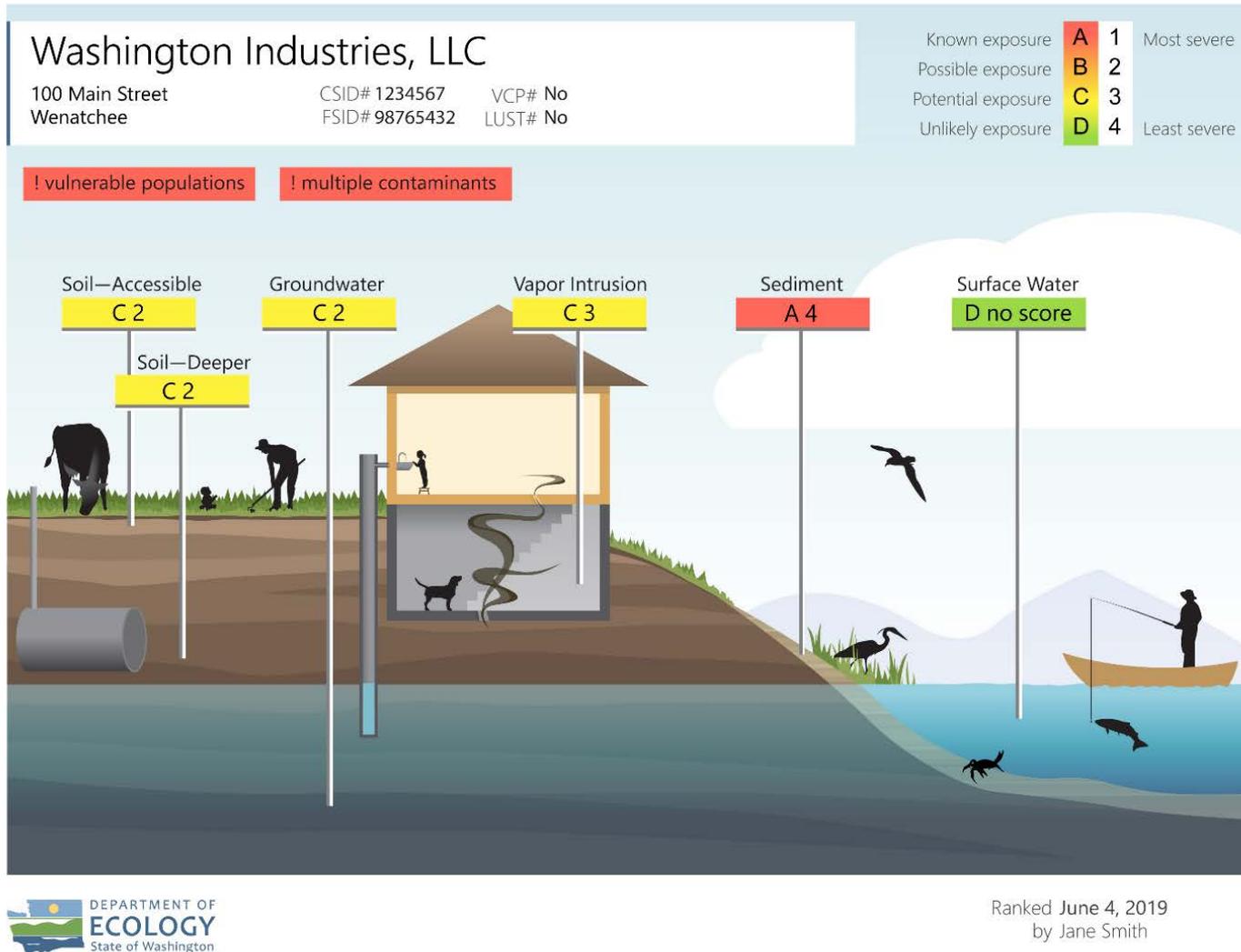
Exposure Route	Exposure Score	Exposure Confidence Level	Severity Score	Severity Confidence Level
Soil - Readily Accessible	C	Medium	2	High
Soil - Deeper	C	Medium	2	High
Vapor Intrusion	C	Medium	3	High
Groundwater	C	High	2	High
Surface Water	D	High	No Score	High
Sediment	A	High	4	High
Flag Factors	(x) vulnerable populations, (y) multiple contaminants			

**Site Summary** (describe the Site and significant issues).

The site is under Agreed Order No. DE 24680B entered into by Washington Industries, LLC, and Ecology with an effective date 2019-07-07.

The Agreed Order is a continuation of previous and ongoing significant oil spill response activities and removal actions conducted under the Administrative Order on Consent for Removal Activities issued by the EPA on 2019-04-04 (EPA Docket No. WCA-19-3456-7890).

**Figure 2:** Example of the SHARP Tool Ranking Summary for an individual site.



**Figure 3:** Example of the SHARP Tool Report Card summarizing site exposure and severity rankings, and highlighting flagged severity factors.