

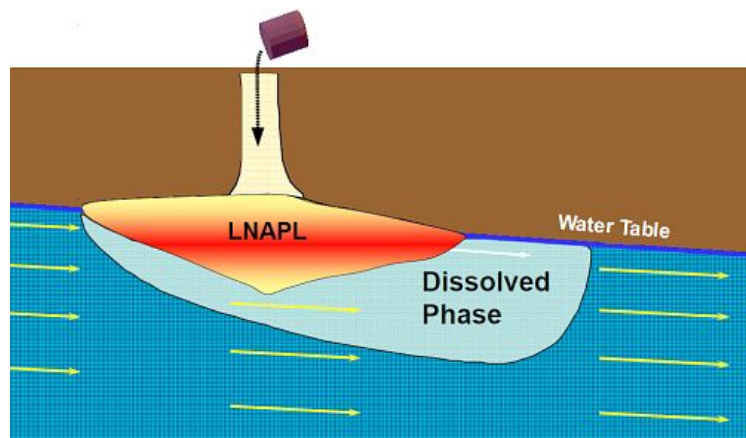


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FCSAP Guidance for the Management of Light Non-Aqueous Phase Liquid (LNAPL) Sites



**RPIC 2016 National Contaminated Sites
Workshop
Montreal, QC**

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Environment and Climate Change Canada
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Goals of the Guidance

- Meant to be practical and succinct
 - does not presume a specialist knowledge (e.g hydrogeology)
 - useful checklist
- Follows 10 step Decision Making Framework
- Complements FCSAP Monitored Natural Attenuation (MNA) guidance
- Assist custodians in understanding and managing LNAPL risks without being prescriptive



Scope of Guidance

- LCSM* addresses only LNAPL, more general CSM* required to address other contaminants
- Does not discuss non-technical risk management factors for LNAPL sites
- Deals only with legacy sites under FCSAP

*CSM – Conceptual Site Model

*LCSM – LNAPL Conceptual Site Model



Guiding Principles for the management of LNAPL sites under FCSAP

- Solutions driven by Canadian federal regulatory framework
- Solutions must respect Treasury Board and FCSAP goals and policies
- Solutions should be based in sound science



Highlights of LNAPL guidance

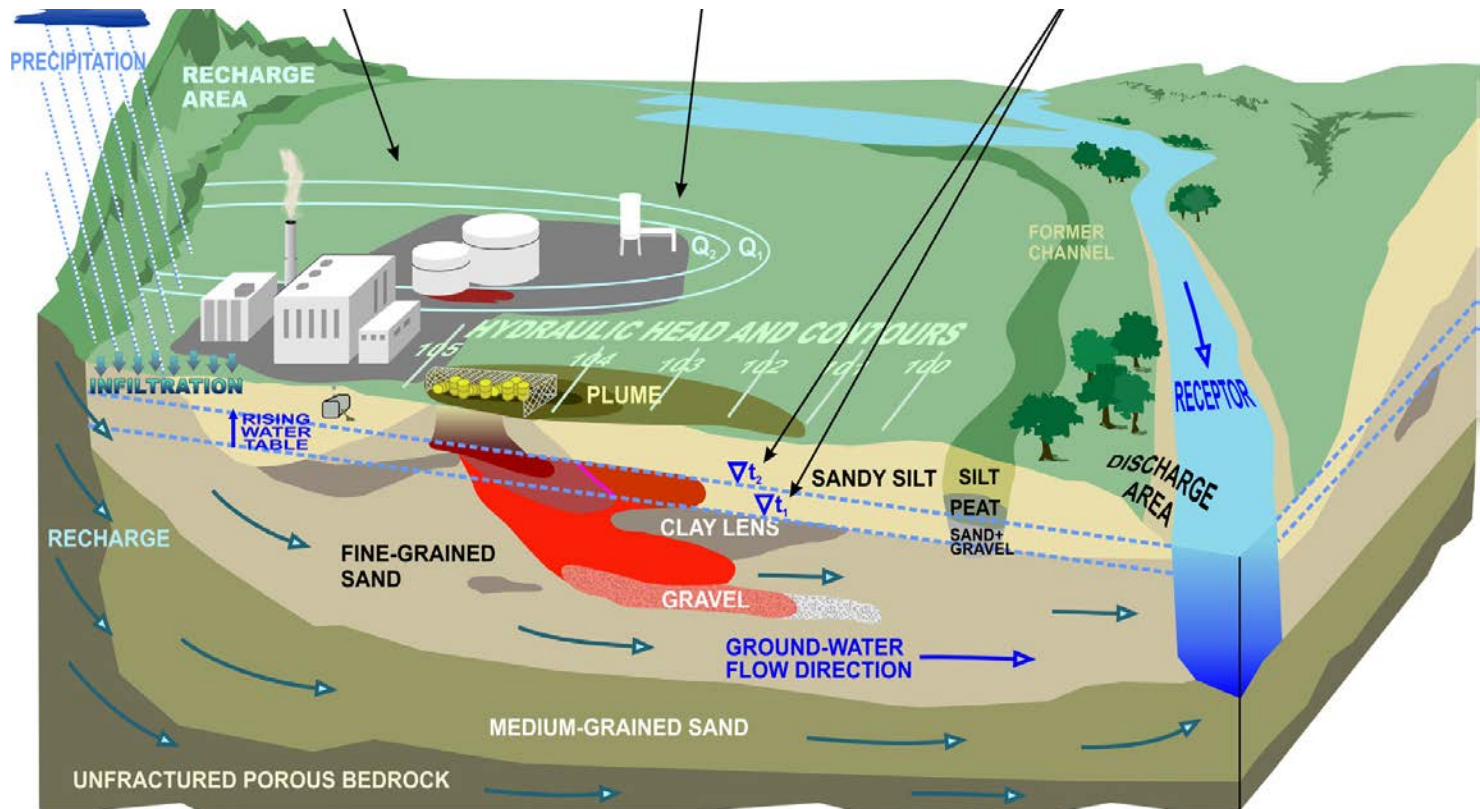
- Designed to be compatible with the 10-step process and the FCSAP Decision-Making Framework (DMF)
- Some discussion of risks associated with dissolved phase and vapour plumes; more thoroughly addressed in FCSAP's *Guide to Monitored Natural Attenuation in Groundwater and Soil for Federal Contaminated Sites*
- Promotes a similar approach to all sites regardless of the size and complexity of the site or where it is located in Canada
- Much of the focus on this guidance is in section 3 (Step 5); (re)Building the LCSM
- This guidance makes no assumption about where custodians may be in the 10 step process.
- Does not prescribe passive over active approaches



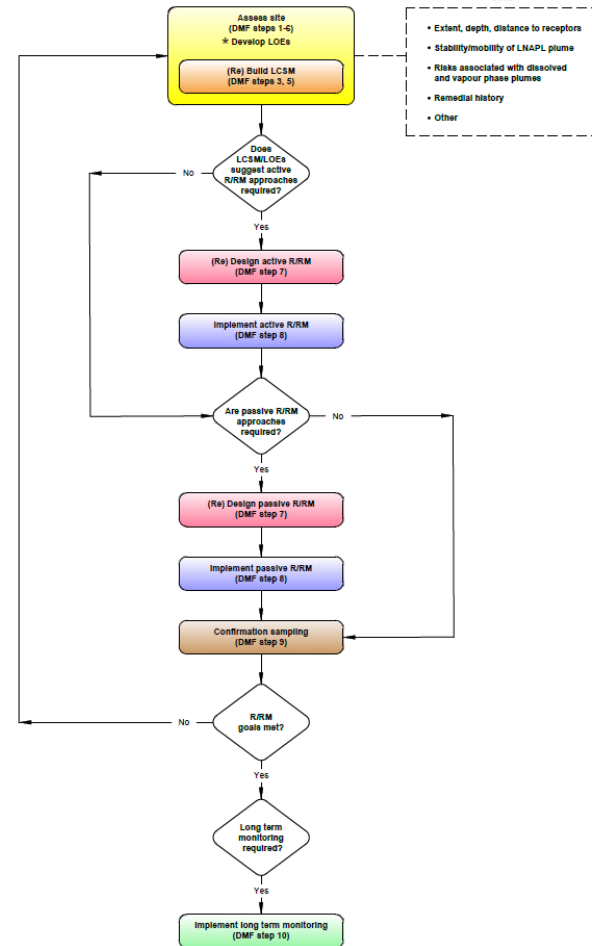
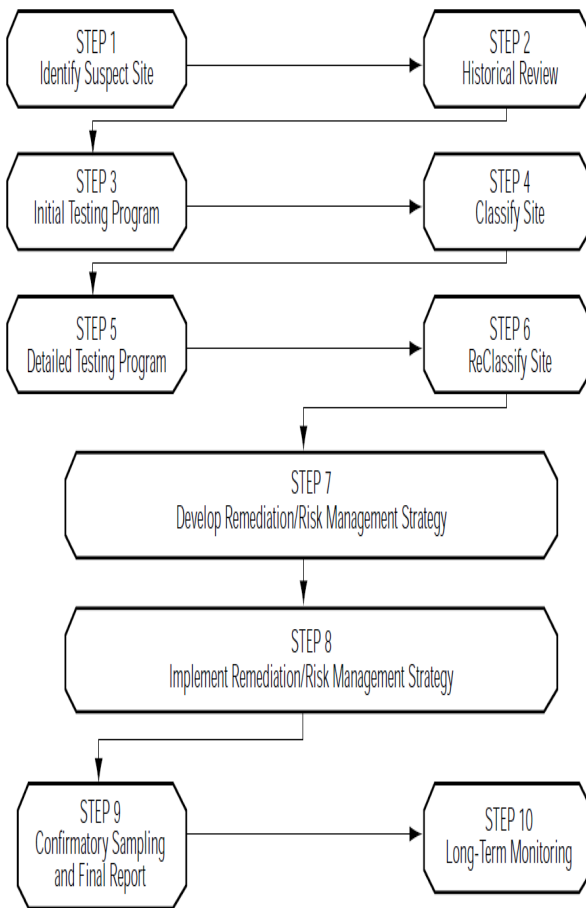
Checklist

	A	B	C	D	E
1	TABLE 3.1				
2					
3	LNAPL SITE MANAGEMENT CHECKLIST				
4	FC SAP GUIDE TO LNAPL SITE MANAGEMENT				
5					
6	1	Site Goals and Regulatory Framework			
7	1.A	Are site goals well-defined?	<input type="radio"/> Yes		
8			<input type="radio"/> No	Engage stakeholders and establish goals	
9	1.B	Are regulatory requirements well understood?	<input type="radio"/> Yes		
10			<input type="radio"/> No	Determine appropriate requirements/criteria	
11	2	LNAPL Release History and Properties			
12	2.A	Is the source of the LNAPL release known? (indicate if high volume and/or pressure release)	<input type="radio"/> Yes		
13			<input type="radio"/> No		
14	2.B	Is there any possibility of an on-going release?	<input type="radio"/> Yes	Take immediate steps to halt release	
15			<input type="radio"/> No		
16	2.C	Is there an imminent threat posed by the release that warrants immediate mitigation or emergency response?	<input type="radio"/> Yes	Activate emergency response	
17			<input type="radio"/> No		
18	2.D	Is the LNAPL type or types known?	<input type="radio"/> Yes		
19			<input type="radio"/> No	See Table 3.2 for LCSM development options	
20	2.E	Is the date of the LNAPL release/approximate age of the LNAPL known?	<input type="radio"/> Yes		
21			<input type="radio"/> No	See Table 3.2 for LCSM development options	
22	2.F	Are the density/specific gravity and viscosity of the LNAPL known?	<input type="radio"/> Yes		
23			<input type="radio"/> No	See Table 3.2 for LCSM development options	
24	3	LNAPL Body			
25	3.A	Has the areal extent and vertical distribution of the LNAPL body been defined?	<input type="radio"/> Yes		
26			<input type="radio"/> No		
27	Indicate techniques used:				

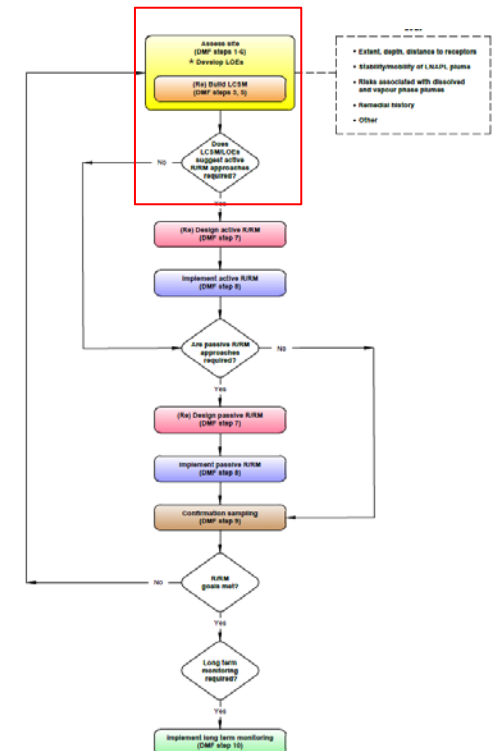
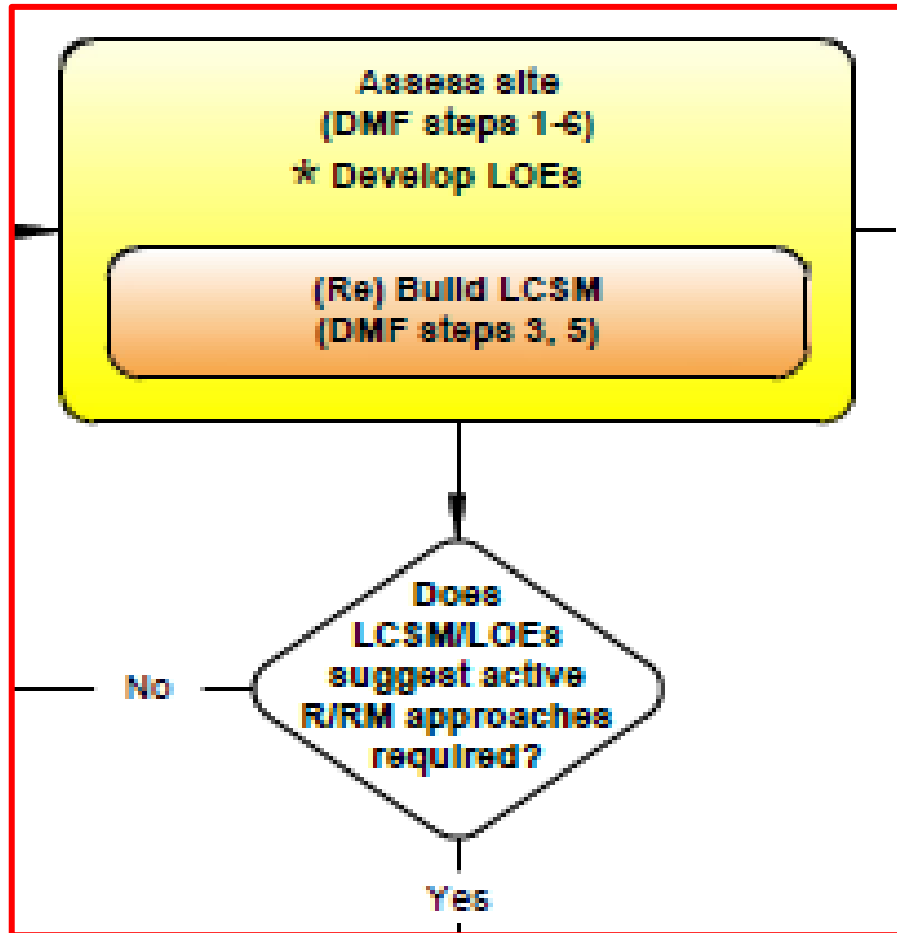
Case Study 2



LNAPL Site Management Process

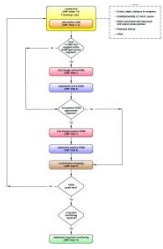


Section 2.0 DMF Steps 1-4 (Site assessment/categorization)



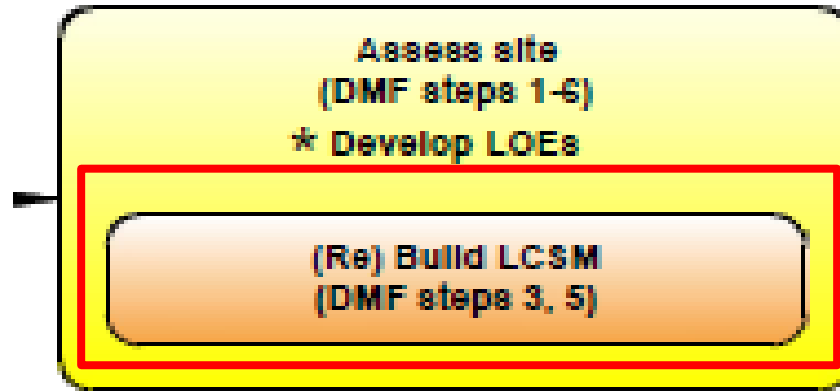
*LOE – Line of Evidence



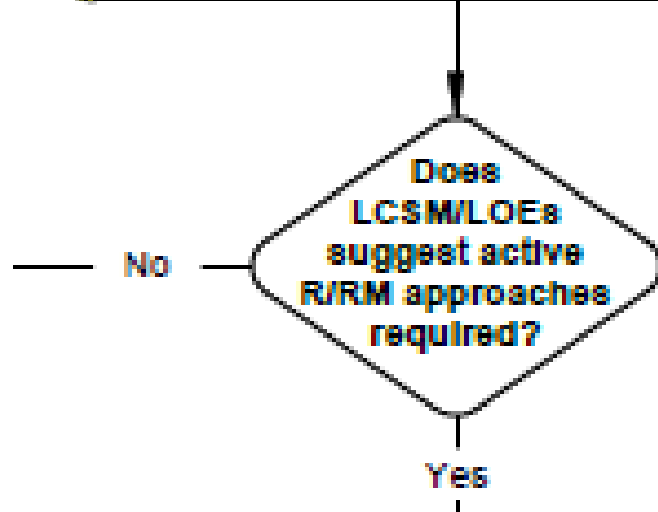


Section 3.0 DMF Step 3,5

((Re) Building the LCSM)



- Extent, depth, distance to receptors
- Stability/mobility of LNAPL plume
- Risks associated with dissolved and vapour phase plumes
- Remedial history
- Other

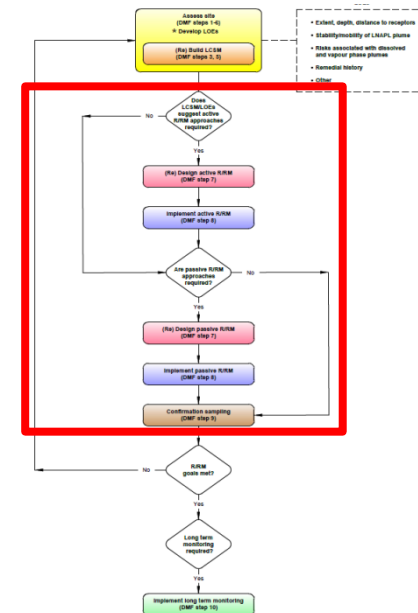


*R/RM – Remediation/Risk Management



Section 4.0 DMF Step 7

(Establishing Site Goals, Remedial/Risk Management Planning)



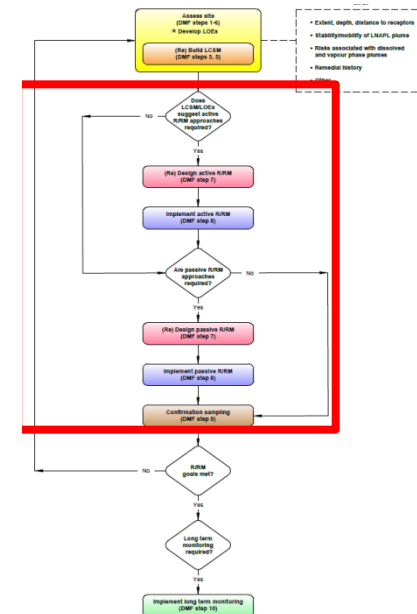
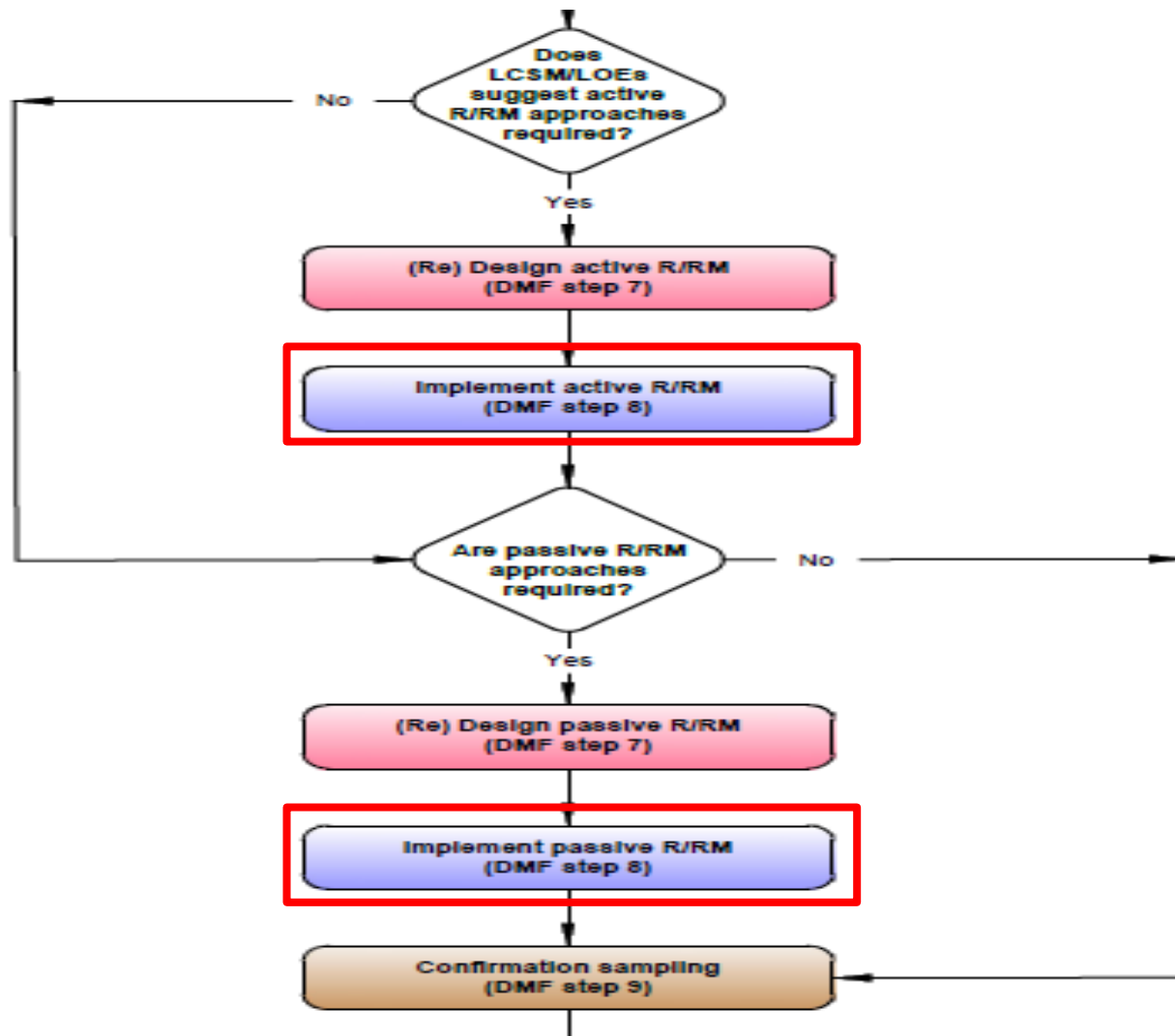
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Section 5.0 DMF Step 8

(Remedial and/or Risk Management Plan implementation)

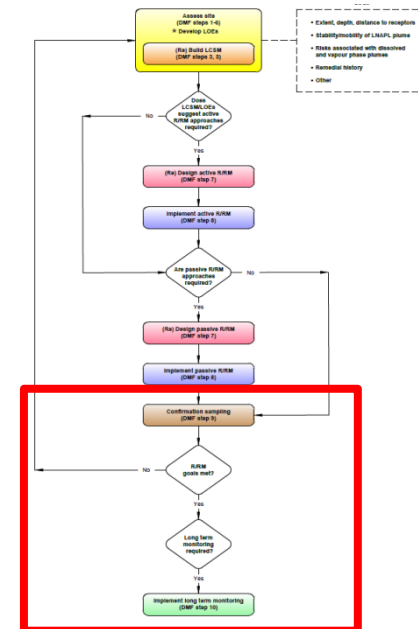
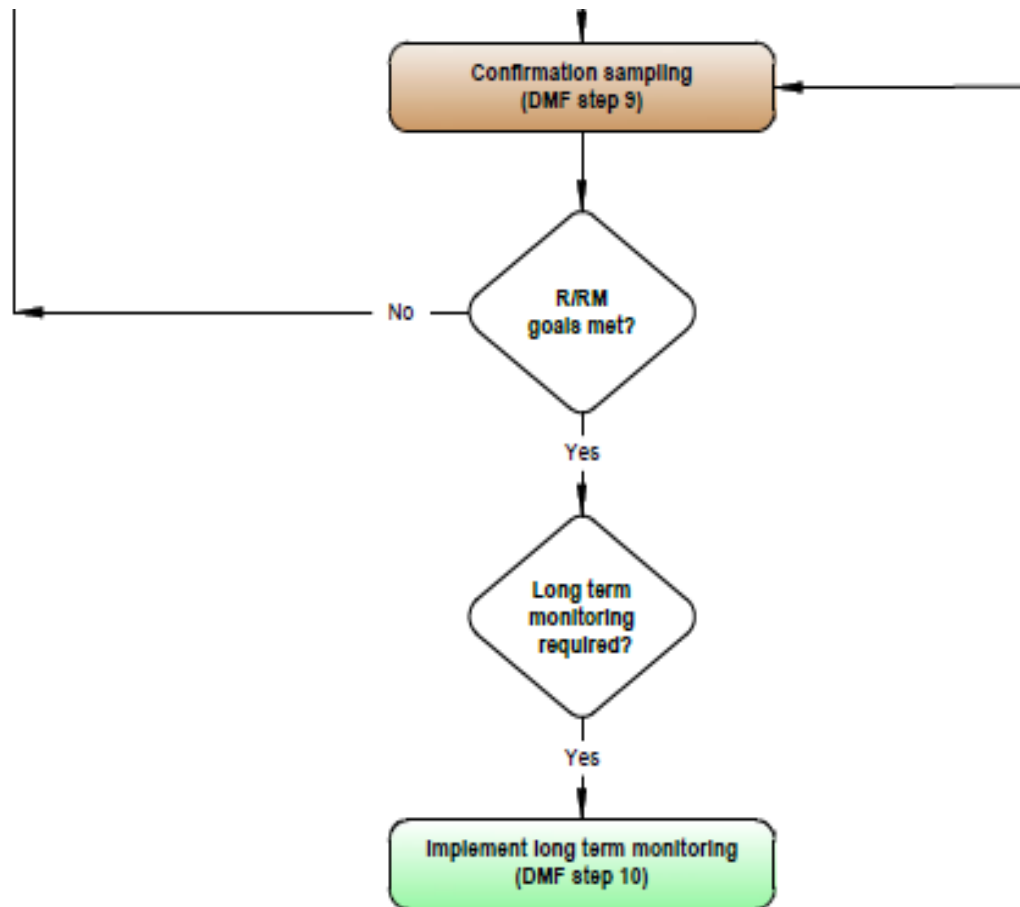


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Section 6.0 DMF Step 9, 10 (Confirmatory, Long Term Monitoring)



Other Considerations/Precautions for Custodians

- Must be aware of regulatory requirements (Fisheries Act, Migratory Birds Convention Act, etc)
- Must consider source control requirements of FCSAP Eligible Cost Document
- Authority for groundwater use/protection may rest with other non-federal jurisdictions – should consult where appropriate



Summary of selected NAPL Guidance in Canada and elsewhere

- BC MOE NAPL Protocols
- CRA technical guidance (2010) prepared for Environment and Climate Change Canada
- ITRC – guidance docs, training courses
 - [Evaluating Natural Source Zone Depletion at Sites with LNAPL \(LNAPL-1\)](#),
 - [Evaluating LNAPL Remedial Technologies for Achieving Project Goals \(LNAPL-2\)](#)
- ASTM
 - E2531 – LCSMs,
 - E2856 - Transmissivity
- API LNAPL guide, models
- CRC CARE (Australia)
 - Selecting and assessing strategies for remediating LNAPL in soils and aquifers
 - Technical impracticability of further remediation for LNAPL-impacted soils and aquifers

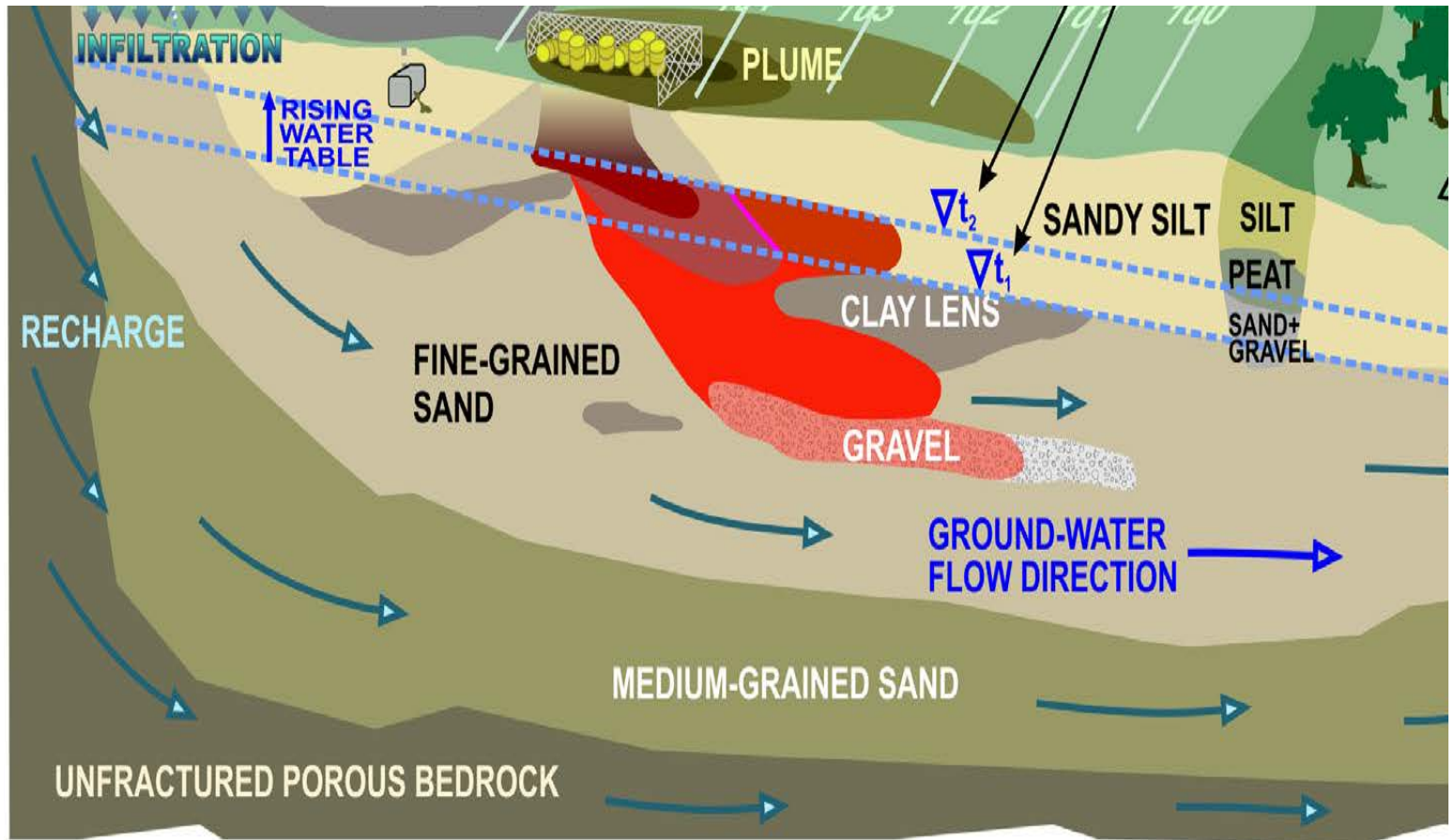


Comparison to approaches from Other Jurisdictions

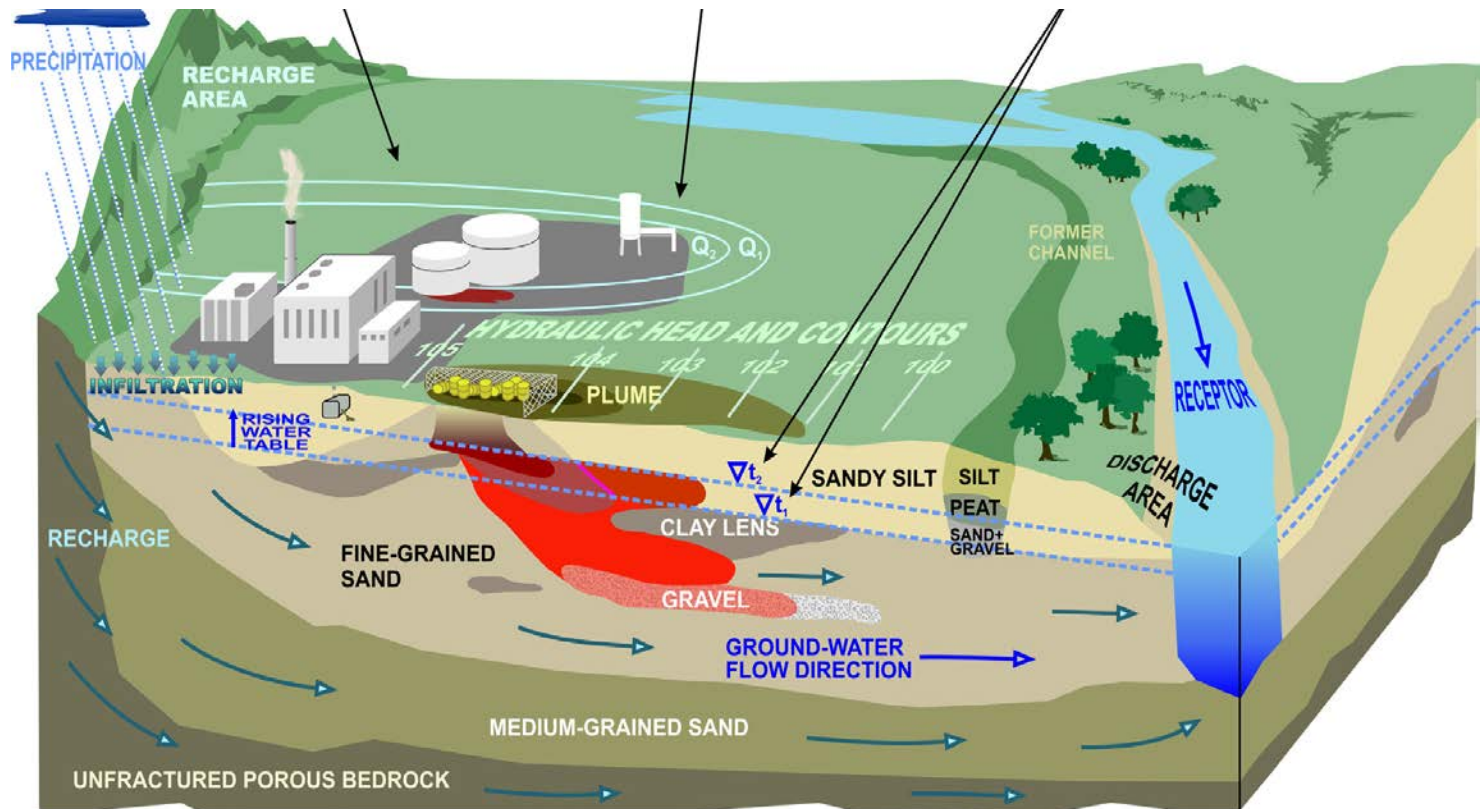
- Similarities
 - LNAPL Science
 - Approach to characterizing sites, evaluating risks
- Differences
 - Regulatory regime: Fisheries Act drivers vs Maximum Extent Practicable approaches
 - Transmissivity – useful (as indicator of mobility) but must recognize limitations (does not recognize risk associated with preferential pathways).



Case Study 1



Case Study 2



Conclusions

- FCSAP LNAPL guidance, in combination with FCSAP MNA guidance, can assist with consistent approaches and advice on all FCSAP LNAPL sites



Questions?

