

# Former Camp Ipperwash Multi-Disciplinary Approach to the Completion of a Phase II Environmental Site Assessment

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# Former Camp Ipperwash

## Site Location

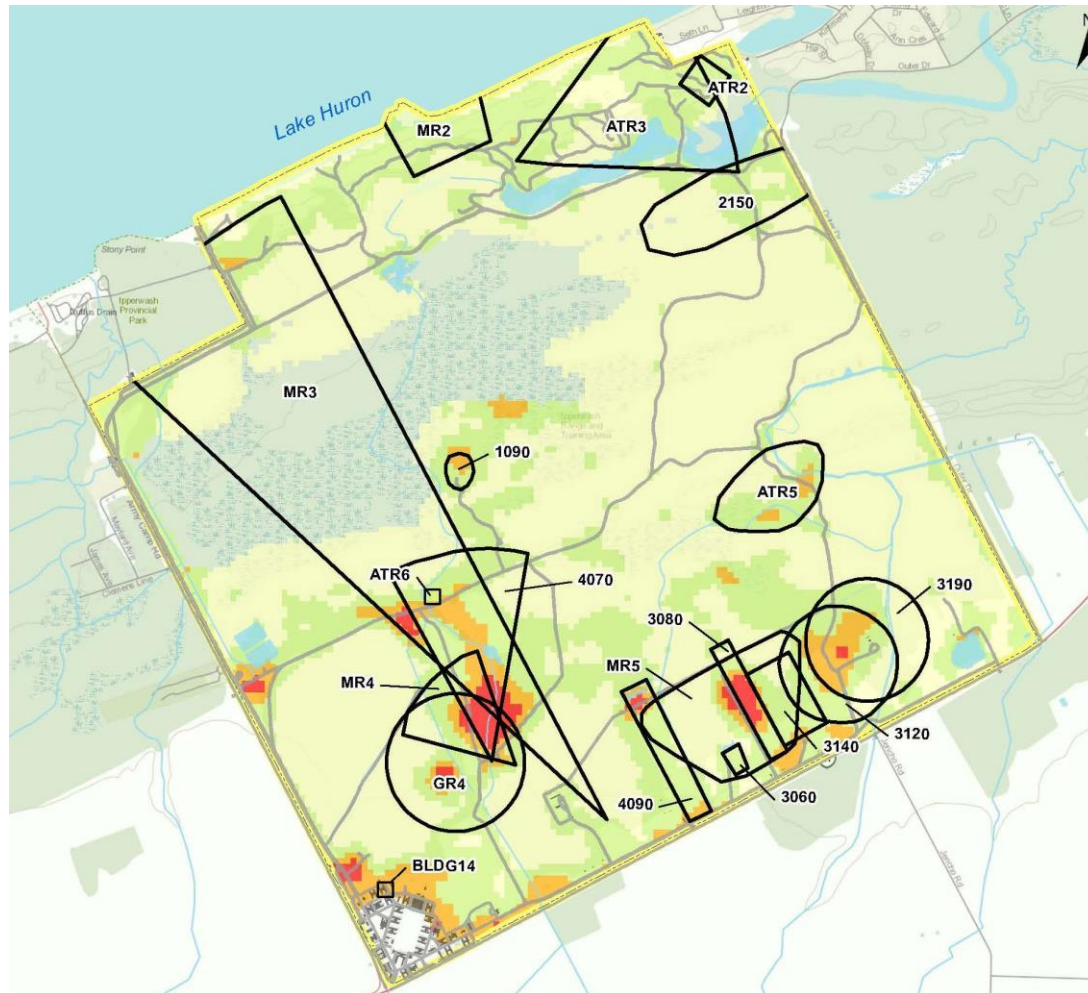




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# Former Camp Ipperwash

## Ranges







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# Former Camp Ipperwash

Built Up Area



# UXOs— An Emerging Contaminant

- UXOs are an emerging environmental contaminant.
- Use of explosives and weapons systems at training and testing ranges leave residual impacts including:
  - Metals
  - Explosive compounds
    - ✓ RDX (Trimethylenetrinitramine)
    - ✓ Nitroglycerine
    - ✓ TNT (Trinitrotoluene)
    - ✓ HMX (Cyclotetramethylene-Tetranitramine)
    - ✓ PETN (Pentaerythritol Tetranitrate)
    - ✓ Nitrocellulose
- Remediation of these impacts typically require a bioremedial approach, which by definition requires significant time and effort.

# The Project

- Retained by Defence Construction Canada (DCC), on behalf of the Department of National Defence (DND) to conduct a Phase II Environmental Site Assessment (ESA)
- Purpose was to delineate environmental impacts at various areas of known contamination on Site, and to investigate other potential areas of environmental concern (PAEC) including former training ranges on Site.
- Due to the historic use of the Site, and the biology associated with the Site, the team included:
  - Environmental Professionals;
  - UXO Professionals;
  - Archaeological Professionals; and
  - Biology Professionals.

# Services Provided

- In order to complete the project, Amec Foster Wheeler provided:
  - Completion of the Phase II ESA activities
    - ✓ Soil sampling, Groundwater sampling, Surface Water sampling, Sediment sampling, Risk Assessments, Fisheries Studies
  - Unexploded Ordinance (UXO) Services
    - ✓ Identification and Avoidance
  - Species at Risk Assessment (SAR)
    - ✓ Identification and avoidance of SAR
  - Cultural/Archaeological
    - ✓ Cultural/archaeological assessment of the areas subject to environmental investigation.

# Previous Results

- Previous work indicated the presence of the following contaminants:
  - Dioxins and Furans (Built Up Area)
  - Pesticides (Sediment Samples throughout Site)
  - PAHs (Built Up Area, Ranges)
  - VOCs (Built Up Area)
  - PHCs and BTEX (Built Up Area, Ranges)
  - Metals (Ranges)
  - Explosive Compounds (Ranges)

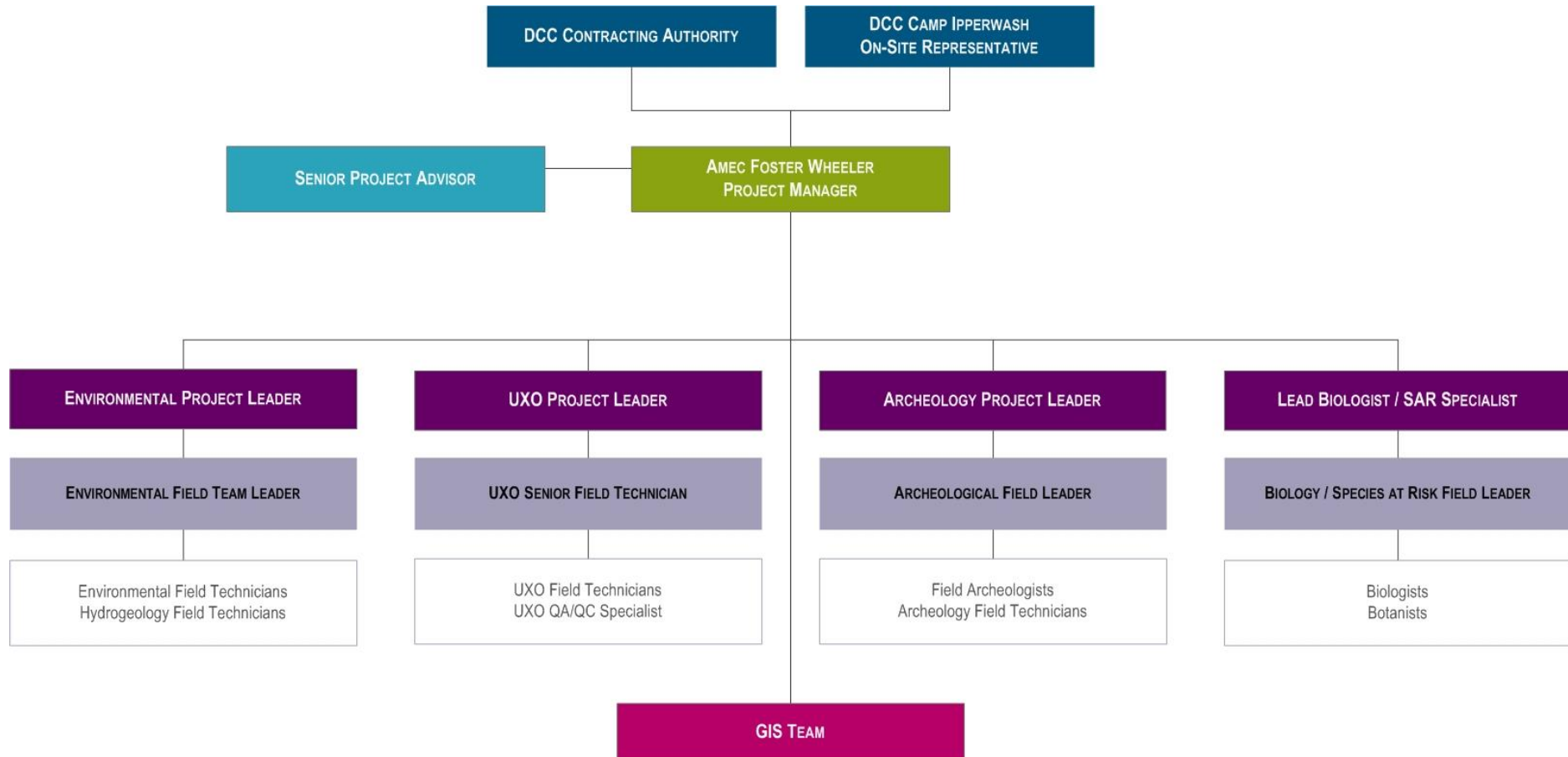




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# Project Team Structure

## Organization Chart

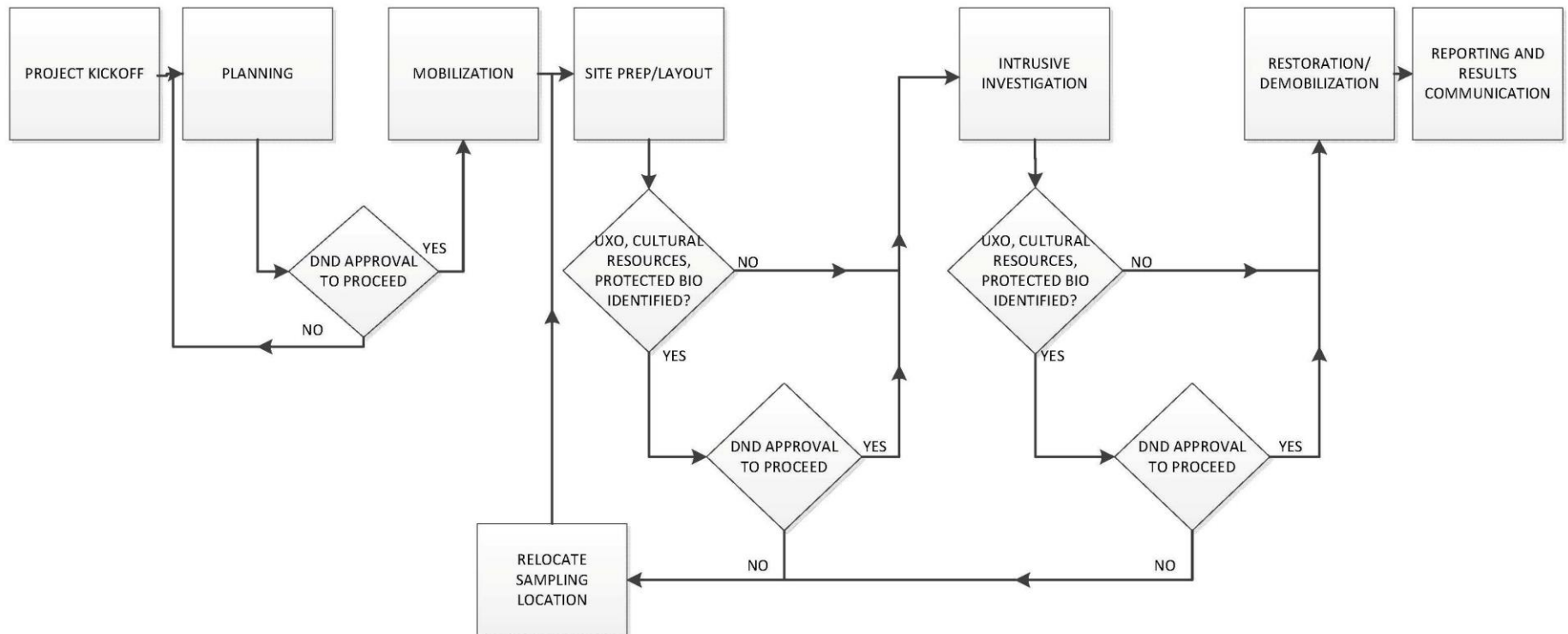




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# Project Processes

## Work Flow



# Project Processes

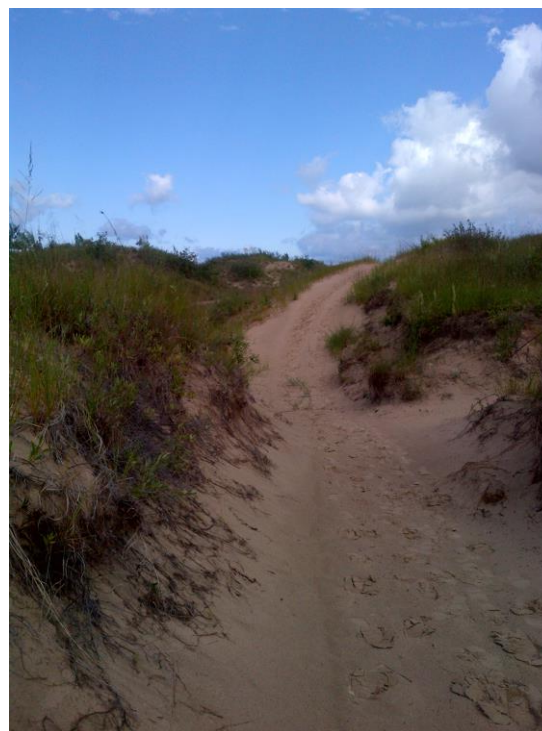
## Preparatory Steps

- Prior to the commencement of the field activities, the following activities were completed:
  - Job Fair at the Kettle and Stony Point First Nation. Bush cutters and UXO technicians were retained from the First Nation
  - Cultural Awareness Program (CAP) Training
  - Preparation and Approval of the Field Investigation Work Plan
    - ✓ Including planning of access routes to sampling locations

# Project Processes

## Order of Access

- Due to the sensitive nature of the Site as a result of the presence of UXO, SAR and cultural artifacts, all areas of the Site were generally accessed in the following order:
  - UXO
  - SAR
  - Cultural
  - Environmental





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# Project Processes

## Unexploded Ordinance

- First step – UXO Avoidance
- UXO team established that the path to the sample collection location was clear of potential UXOs.
- If potential UXOs were identified, the path was modified to avoid the potential UXOs.
- The project plan assumed a total surface clearance area of 4.5 km<sup>2</sup> (1.5 km long by 3 m wide).
- Actual surface clearance distance was over 12 km.





# Project Processes

## Species at Risk / Biological

- Second Step – SAR Identification and Avoidance
- SAR team conducted an inspection / survey of access routes to determine presence of SAR (both plant and animal)
- Upon identification of presence of SAR, mitigation measures were put in place to protect SAR.
- This may have been as simple as flagging the location of the SAR.
- Following SAR identification and avoidance, vegetation clearance in non-SAR areas was conducted in order to provide a clear route to sample locations. (Poison Ivy, etc.)



# Project Processes

## Cultural / Archaeological

- Third Step – Cultural Investigation
- Generally, cultural test pits were hand advanced every 5 meters along access routes, as well as at sampling locations.
- All cultural finds were documented and preserved.
- No cultural items were removed without prior approval of the First Nation.



# Project Processes

## Environmental

- Fourth step – Environmental Sampling
- Soil Sampling included:
  - Surface Soil – 95 samples
  - Test Pits – 16 sampled locations
  - Soil Boreholes – 107 boreholes
  - Sediment – 15 samples





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# Project Processes

## Environmental

- Water Sampling included:
  - Surface Water – 25 surface water samples
  - Ground Water Monitoring Wells – 41 wells installed







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# Project Processes

## Environmental

- Total Number of Samples Collected as part of work program:
  - Soil samples – 1000
  - Water samples - 300 (Aggregate of all water samples)
  - Sediment samples - 15





# Field Team



# Health and Safety

- The project followed a strict Health and Safety protocol.
- Throughout the project, there were no injuries with the exception of bee stings.



# Results

- Generally, previously identified contaminants were confirmed to be present at the Site and were delineated.
- However, the presence of some of the contaminants could not be confirmed.
  - May indicate that some contaminants are limited in extent.
  - Additional assessment may be required in these areas.
- Some of the contaminants identified may be naturally occurring or from off-Site sources, particularly some of the metal impacts identified.

# Results

- In terms of explosive compounds, RDX was identified in groundwater, Nitroglycerine was identified at the rocket range firing line.
- It should be noted, that the location of many of the firing lines could not be identified due to changes in landscape. Explosive compound impacts may still be present. The location of the firing lines require confirmation.
- Due to presence of metal fragmentation in target zones, and requirement to avoid UXOs, there is the potential for UXOs as well as explosive and metal impacts to be present in these areas.



# Managing a Multi-Disciplinary Team

- As shown, projects of this nature may require the use of a multi-disciplinary team.
- Each discipline may approach the project from a different reference point, based upon their experience, their stream and areas of practice.
- Key challenge are backgrounds of the teams.
  - Teams are comprised of engineers, hydrogeologists, scientists and archaeologists.
- It is critical that as the Project Manager, effective leadership and management of each of the teams.
  - Clearly define expectations within the overall project goals.



# Thank you to the Project Team

- Chris Elliot;
- David Raymond;
- Andrew Calder;
- Kevin Hill;
- Shaun Austin;
- Megan Hazell;
- All of the field technicians, scientists and UXO personnel;
- Daniel Brassard our DCC client contact; and
- Pam Cushing, the DND Ipperwash Project Manager.

## QUESTIONS

