Detailed Assessment of the Fate of PFASs During Phytoremediation

- **Strategic Fit:** Phytoremediation for PFASs comprises a potential cost effective, passive approach to extract and sequester PFASs from soils, sediments and associated waters. However, soils and sediments are commonly impacted with polyfluoroalkyl substances which are precursors to the more commonly regulated perfluoroalkyl acids. Enhancing biological activity commonly increases the transformation rates of polyfluoroalkyl substances, potentially mobilizing PFAAs. This project aims to comprehensively examine phytoremediation mechanisms, considering precursors and the influence of soil amendments, to identify the dominant processes and develop a robust understanding of phytoremediation for PFASs that can guide application of this technology.
- **Program Goal:** The primary goals are to determine whether PFAA-precursors are transformed within the rhizosphere and plant tissues, and whether these processes lead to sequestration, degradation, or mobilization of PFASs.
- **Value Proposition:** The value involves risk management via generation of data to provide better informed decision making for a technology which has major costs benefits but inherent risks which have not been comprehensively assessed.
- **Brief Program Description and Expected Deliverables :** The work would involve controlled laboratory experiments involving specific plants grown in contaminated soils impacted with a range of PFASs originating from aqueous film forming foams (AFFFs), with and without addition of soil amendments such as sorbents (i.e., GAC) or biochar. Advanced non-target analytical techniques would be used to identify precursor compounds and transformation products, while a fluorine mass balance would be developed to track compound movement and transformation. The results would provide a comprehensive assessment of PFAS behavior during phytoremediation and help evaluate the effectiveness and potential risks of using plants to manage PFAS contaminated soils.
- **Deliverable(s)**: Interim and final reports, leading to academic publications describing the fate of PFASs (originating from AFFF) when applying phytoremediation. Generation of guidance documents for application of phytoremediation for PFASs.
- **Total estimated budget**: $400-700k (depending on the detailed scope, when liaising with a University who can deliver non-targeted PFASs analyses)