

Table A1. Site selection criteria.

Parameter	Rationale
Biophysical	<ul style="list-style-type: none"> • Representative of both impacted and intact catchments; • Exhibits mangrove zonation representative of the harbour as a whole; and • Exhibits hydrodynamic and morphological attributes representative of the harbour e.g. a mixture of tidal creeks (low water attenuation), embayment's and open (oceanic facing) sites.
Logistical, Health and Safety	<ul style="list-style-type: none"> • Ease of access for installation / monitoring; • Sites of previous studies; and • HSE considerations.

Four main mangrove community types have been delineated within Darwin Harbour (Brocklehurst and Edmeades 1996), constituting 86.3% of the total mangrove estate. These assemblages are (Fig. A2):

- 1: *Sonneratia alba* dominated, seaward shoreline forest sites;
- 2: *Rhizophora stylosa* dominated tidal creeks and transitional forest;
- 3: *Ceriops tagall australis* dominated tidal flats; and
- 4: *Avicennia marina* dominated high tidal flat/ mixed hinterland margin forest.

The harbour exhibits a complex range of geomorphological and hydrodynamic characteristics including tidal creeks, embayment's, headlands and oceanic facing coastlines coupled with strong seasonal (wet season and dry season) trends in runoff input which influences sediment deposition and carbon burial rates. The harbour generally traps most fine sediments from runoff and redirects it into mud banks in embayment's and mangroves, with little escaping to the sea (Williams, et al. 2006). Spatially capturing this hydrodynamic and geomorphological representativeness in the project's sampling design is also an important consideration as well.

While different mangrove species induce sedimentation at differing rates due to plant morphology (differences in velocity and turbulence generated by stand density, pneumatophores etc.), the same species may also induce sedimentation at differing rates depending on their spatial orientation (e.g. *Sonneratia alba* fronting tidal creeks are likely to accrete proportionally more sediment than *S. alba* on oceanic facing sites). Similarly, differences in land-use within the catchments of feeder creeks to the harbour are also likely to affect sediment deposition rates (and elementary composition of sediment). The eastern extent of the harbour is relatively developed, while the western arms remain largely intact and dominated by native vegetation coverage. Developed catchments have a high proportion of impervious surfaces (roads, buildings and other infrastructure) which increases lag-time response runoff rates and subsequent sedimentation.