

DREDGE MATERIAL PLACEMENT ALTERNATIVES

When sediment is removed from the underwater infrastructure (shipping channels, berths and harbour) during maintenance dredging, it must be relocated to a suitable placement location. As outlined in the Port's Long Term Maintenance Dredging Management Plan, a range of alternatives have been considered and assessed by the Port. Options were evaluated against environmental, technical, operational and economic criteria, including:

- Ability to accommodate the required annual dredge volumes year after year;
- Environmental impacts and proximity to sensitive habitats;
- Navigation and operational requirements;
- Practicality and long-term sustainability; and
- Cost, energy use and greenhouse gas emissions.

SUMMARY OF ALTERNATIVES ASSESSED

OPTION	SUITABILITY	KEY CONSIDERATIONS
No maintenance dredging	Not suitable	Channels and berths would progressively infill, reducing navigational safety and limiting the Port's operation.
Land placement / reclamation	Limited suitability	Feasible, however large land area required for placement and dewatering; maintenance dredge material is generally soft, silty sediment and may require on land treatment for acid sulphate soil risks. Any new reclaim would extend into Cleveland Bay.
Beach nourishment	Not suitable	Suitable only for sand-sized material and only practical for small volumes each year making it not a suitable option.
Off-site disposal / landfill use	Not suitable	Material characteristics and salt content restrict reuse opportunities. Only practical for small volumes where there is a need for the material and sediment characteristics make it acceptable. Overall not a suitable option.
Existing offshore DMPA (Cleveland Bay)	Suitable	Existing established placement area with more than 30 years of operational use and environmental monitoring. Continues to be the most suitable option
New offshore greenfield placement area in GBR Marine Park	Limited suitability	Greater travel distance, increased costs, increased greenhouse gas emissions, longer dredging campaign, potential impacts to undisturbed seabed and benthic communities, Marine Park considerations, new impact assessment requirements, new receptor impact pathways, operational constraints and reduced certainty.
Nearshore placement area	Not suitable	Close to sensitive habitats and highly affected by coastal hydrodynamic processes. In shallow water placed sediments will be significantly exposed to re-suspension movement out of the placement area.
Far offshore (Deep-water placement)	Not suitable	Significant travel distance makes the option operationally impractical due to excessive travel distance, fuel consumption, greenhouse gas emissions and operational costs.

DETAILED ASSESSMENT OF THE POTENTIAL ALTERNATIVES CONSIDERED:

NO MAINTENANCE DREDGING

This is not considered a feasible option.

The natural movement of sediment within Cleveland Bay means that shipping channels and berths would continue to progressively infill over time. Without maintenance dredging, vessel access would become increasingly restricted to a point where ships cannot safely navigate, and the Port would ultimately be unable to operate safely and efficiently and becomes economically unviable.

BENEFICIAL REUSE - PLACEMENT ON LAND / RECLAMATION

This option has limited suitability for the volumes of maintenance dredging undertaken. This is not considered a feasible option for large maintenance dredging volumes.

Key Considerations include:

- Annual maintenance dredging generates approximately 450,000m³ of material.
- Significant land area would be required to contain and dewater this material.
- Reclamation would require the permanent conversion of marine areas within the Great Barrier Reef World Heritage Area into land. While reclamation may be appropriate where there is a demonstrated need for new port infrastructure or operational land, creating ongoing reclamation solely for placement of annual maintenance dredge material is not considered a practical long-term solution.
- Unlike quarry materials or engineered fill, maintenance dredge material is typically unconsolidated silts, clays and fine sands and is generally unsuitable for land development without significant processing and treatment.
- Material brought to land may require management and treatment for Acid Sulphate Soil risks.

Land placement and reclamation can be appropriate where there is a demonstrated need for new port infrastructure or operational land and suitable dredged material characteristics are available. The Port has historically brought dredge material to land for reclamation purposes to develop the lands the Port is on. While this has been an effective option in the past, in more recent times the Port has only placed limited volumes of maintenance dredge material on land where specific circumstances meant reuse was feasible, for example sandy material dredged from Ross River.

BENEFICIAL REUSE - BEACH RE-NOURISHMENT

This option may be feasible for small volumes of dredged material where the dredge material has appropriate characteristics, particularly sand sized sediments.

Key Considerations include:

- Most maintenance dredge material is unconsolidated silts, clays and fine sands that is not suitable for beach renourishment.
- Opportunities are limited because beach nourishment projects require a suitable location, compatible sediment characteristics and an identified demand for the material.

The Port has previously supported Townsville City Council's beach re-nourishment works using small volumes of dredged sands for beach renourishment at Rows Bay since the 2019 floods.

BENEFICIAL REUSE - OFF-SITE DISPOSAL / CAPPING AT LANDFILLS

This option has limited suitability and applicability. Council landfills cannot accommodate the volume of dredge material required for annual maintenance dredging. For this option to be viable, the dredge material needs to be placed on land and dewatered first; land space for dewatering large dredge volumes is a significant limitation. Land transport of dredge material offsite is logistically difficult and expensive.

Key Considerations include:

- Feasible for small volumes with suitable dredge material characteristics.
- High salt content of dredge material limits opportunities for land rehabilitation or capping.

- Significant land area would be required to dewater this material prior to movement off site.
- Maintenance dredge material brought to land likely to require management and treatment for Acid Sulphate Soil risks.

Based on the above considerations, off-site disposal and landfill-based reuse options are not considered practical for managing the large annual volumes generated through the Port's maintenance dredging program.

SEA PLACEMENT

Sea placement remains the most practical option for managing the large volumes of maintenance dredged material generated each year.

Key Considerations include:

- The Cleveland Bay DMPA has capacity to accommodate the annual volumes generated through the Port's maintenance dredging program;
- Sea placement ensures the retention of naturally occurring inshore sediments within the Great Barrier Reef lagoon system;
- Avoids the large land requirements associated with storing and dewatering dredged material;
- Avoids the significant management and treatment requirements that are likely to be associated with bringing marine sediments containing actual or potential Acid Sulfate Soils onto land; and
- Provides long-term operational and logistical suitability for annual maintenance dredging requirements.

ALTERNATIVE SEA PLACEMENT OPTIONS:

While sea placement of the maintenance dredge material is the most feasible option, the area where material is placed is carefully considered.

A number of alternative sea placement areas have been considered:

- Existing offshore placement area (current Cleveland Bay DMPA)
- New offshore placement (Greenfield site) area in GBR Marine Park
- Nearshore placement area
- Far Offshore (Deep-water) placement

EXISTING OFFSHORE PLACEMENT AREA (CLEVELAND BAY DMPA)

The existing Dredge Material Placement Area (DMPA) has been used since 1993 and was established following scientific review and assessment.

Key considerations include:

- An established placement area that has been in use since 1993, avoiding the need to develop and assess a new (greenfield) placement site;
- Located in deeper water (approximately 12–16 m depth) where sediments are less affected by wave-driven resuspension than sediments in much of Cleveland Bay;
- Located outside the Great Barrier Reef Marine Park within the Port Exclusion Area;
- Situated away from sensitive habitats such as seagrass meadows and coral communities and other key ecological receptors;
- Supported by more than 30 years of operational experience, environmental monitoring, scientific studies and hydrodynamic modelling;
- Continuity of environmental data and scientific understanding, resulting in a high level of confidence in environmental performance;
- Relatively short transit distances compared with alternative offshore locations, allowing dredging campaigns to be completed more efficiently;
- Lower fuel consumption and greenhouse gas emissions compared with more distant offshore placement options; and

- Reduced operational costs and shorter dredging campaign durations compared with alternative offshore placement locations.
- Established protocols and management for marine traffic and navigation.

Taken together, these factors mean the existing DMPA provides a demonstrated, well-understood and operationally practical placement location. As an established site, it avoids many of the environmental, regulatory and operational uncertainties associated with developing a new offshore (greenfield) placement area.

NEW OFFSHORE PLACEMENT AREA (GREENFIELD SITE) IN THE MARINE PARK

Alternative offshore locations, including areas north of Magnetic Island, have been considered.

Key considerations include:

- Locations assessed were generally located in deeper water than the existing DMPA, which may reduce wave-driven sediment resuspension due to less interaction with the shallow coastal processes that influence sediment movement within Cleveland Bay.
- While deeper water may reduce wave-driven resuspension, offshore locations are often more strongly influenced by regional currents, creating different sediment transport pathways and environmental considerations.
- Greater distance from Cleveland Bay coastal receptors than the existing DMPA.
- Establishing a new greenfield location introduces dredged material placement activities into previously undisturbed areas of the Marine Park, likely to have some effect on seabed habitats and benthic communities at that location and creating new environmental impact pathways requiring assessment and management
- Placement would relocate naturally occurring inshore sediments into areas where those sediments may not otherwise accumulate under natural conditions.
- There is less environmental and operational understanding of these locations compared with the existing DMPA, which has been monitored and studied for more than 30 years.
- New environmental approvals, impact assessments and monitoring programs would be required.
- Increased travel distances would increase fuel consumption, greenhouse gas emissions and dredging campaign duration.
- Some locations are near major shipping routes within the Great Barrier Reef shipping passages.

While an offshore location may provide some advantages associated with deeper water placement, they would introduce dredged material placement activities into previously undisturbed areas of the Great Barrier Reef Marine Park, create new environmental impact pathways and increase operational cost, complexity and uncertainty. For these reasons, alternative offshore greenfield locations are considered less suitable than the existing offshore placement area.

NEARSHORE PLACEMENT AREA

As noted in the Long-Term Maintenance Dredging Management Plan, nearshore placement areas were historically used by the Port but are no longer considered a viable long-term option.

Key considerations include:

- Limited available water depth means that nearshore areas are shallower and experience greater influence of waves, weather and coastal sediment transport processes.
- Nearshore locations have higher levels of sediment re-suspension and mobilisation of sediment compared with the existing deep water Cleveland Bay DMPA.
- Proximity to, and potential placement on or near seagrass habitats and other sensitive ecological receptors.
- Nearshore placement areas would require dredge vessels to operate more frequently within shallow coastal waters that support important habitats for protected species, including dugongs, and turtles, increasing the potential for vessel-fauna interactions.

- Closer proximity to the Port means that resuspension of sediments have the potential to migrate into and contribute to sediment accumulation in the Port's underwater infrastructure and navigation channels increasing maintenance dredging volumes.
- Potential impacts on marine traffic and navigation.

For these reasons, nearshore placement areas are not considered a practical or sustainable long-term solution for managing the Port's maintenance dredging requirements.

FAR OFFSHORE (DEEP-WATER) PLACEMENT

Far offshore (deep-water) placement would require dredged material to be transported substantially further offshore than both the existing DMPA and potential alternative offshore placement areas.

Key considerations include:

- Placement in deeper waters may reduce wave-driven sediment resuspension compared with shallower coastal environments.
- Placement would introduce naturally occurring inshore sediments into offshore environments where those sediments may not naturally accumulate.
- Placement would occur at a new (greenfield) location with no existing operational history, requiring new environmental assessments, approvals and monitoring programs.
- Placement activities could affect previously undisturbed seabed habitats and benthic communities.
- Environmental responses and sediment transport pathways would be less certain than at the existing DMPA, which has more than 30 years of monitoring and operational experience.
- Significantly greater transit distances would increase fuel consumption, greenhouse gas emissions and dredging campaign duration.
- Increased vessel operating distances would result in greater vessel activity across offshore marine environments and increased potential for interactions with marine fauna.
- The substantially greater travel distance would significantly increase operational costs and reduce dredging efficiency, resulting in longer dredge campaigns each year.

While deep-water placement may provide some advantages associated with deeper water environments, it would relocate inshore sediments to a substantially different offshore setting, create new environmental impact pathways and require significantly greater vessel travel and resulting increases in fuel consumption, greenhouse gas emissions and dredging campaign duration. For these reasons, deep-water placement is not considered a practical or preferred alternative to the existing DMPA.

SUMMARY

A range of alternative dredge material placement options have been considered through a number of studies and reviews undertaken over time, including independent assessments completed as part of the GBRMPA Improved Dredge Material Management for the Great Barrier Reef Region initiative. All reviews have identified that the existing offshore Dredge Material Placement Area remains the most practical and sustainable option for managing the Port's annual maintenance dredging requirements. The existing DMPA provides the best balance between environmental outcomes, operational efficiency and long-term viability.