

14



Waste

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14 Waste

14.1 Chapter purpose

This chapter identifies the type, quantity, characteristics, handling, storage, management and intended treatment and disposal of waste likely to be generated from the Project activities. This chapter also assesses the potential impacts and risks associated with waste generation, and mitigation measures to minimise waste management and disposal.

14.2 Methodology

The following tasks have been undertaken in order to complete the waste assessment for the Project:

- Review of the Commonwealth and State legislation, policy and guidelines relevant to waste management for the pre-construction, construction and operational phases of the Project
- Identification of sources of waste generated during Project activities based on design information available at the time of assessment, and similar projects
- Assessment of the potential impacts and risks associated with waste generation for the following activities:
 - WBE reclamation area bund wall and BUF construction
 - Dredging of the barge access channel
 - Dredging for the duplication of shipping channels
 - Placement of dredged material into the WB and WBE reclamation areas, including unloading and transfer of dredged material for placement
 - Removal and installation of new navigational aids
 - Reclamation area operational management
- Identification of management measures to minimise sources of waste, management (i.e. handling, storage, collection and treatment) and waste disposal.

14.3 Legislative and policy context

The management of waste is primarily the responsibility of State and Territory governments which manage and regulate waste in accordance with their policies and legislation. The Commonwealth Government is responsible for national legislation and policies for waste, including obligations under international agreements.

There is a range of Commonwealth and State legislation currently in place to address waste management in Australia. The sections below outline the legislation relevant to waste management for the Project.

14.3.1 Commonwealth legislation

14.3.1.1 National Waste Policy 2009

The *National Waste Policy 2009* sets Australia's waste management and resource recovery direction to 2020. The Policy covers wastes, including hazardous wastes and substances, in the municipal, commercial, industrial, construction and demolition waste streams as well as gaseous, liquid and solid wastes. The aims of the *National Waste Policy 2009* are to:

- Avoid the generation of waste and reduce the amount of waste (including hazardous waste) for disposal
- Manage waste as a resource
- Ensure that waste treatment, disposal, recovery and re-use is undertaken in a safe, scientific and environmentally sound manner
- Contribute to the reduction in greenhouse gas emissions, energy conservation and production, water efficiency and the productivity of the land.

14.3.2 State legislation

14.3.2.1 Environmental Protection Act 1994

The EP Act is the key piece of environmental legislation within Queensland. The EP Act creates a general duty for people, companies and government bodies to take all reasonable and practicable steps to avoid environmental harm within the context of ecologically sustainable development.

The EP Act provides a wide range of tools to achieve its objectives, including three EPPs gazetted under the EP Act. The *Environmental Protection (Waste Management) Policy 2000* was repealed in 2011 and replaced with the *Waste Reduction and Recycling Act 2011* (Qld) (WRR Act).

Another of the legislative tools enacted under the provisions of the EP Act is the EP Reg, which lists prescribed ERAs which require an environmental authority to be undertaken (i.e. a permit or licence to undertake the activity). The regulation also provides a regulatory framework for minor issues involving environmental nuisance as well as for implementing National Protection Measures for the National Pollutant Inventory and Used Packaging Material (McGrath 2011).

Tracking of regulated waste is managed under the EP Reg with regulated waste defined in Schedule 7 of the EP Reg. Wastes potentially produced during the Project activities that are classified as regulated waste include:

- Hydrocarbons and water mixtures or emulsions
- Sewage sludge and residues
- Waste from the use of inks, dyes, pigments, paints, lacquers or varnish.

14.3.2.2 Sustainable Ports Development Act 2015

The Ports Act provides a legislative framework to balance the development of the state's priority ports with the protection of the Great Barrier Reef. In doing this the Ports Act responds to the UNESCO World Heritage Committee recommendations, protecting the OUV of the GBRWHA from direct and indirect impacts of port development, such as the generation of waste.

According to the Ports Act, the material generated from the capital dredging is not to be deposited or disposed of in a restricted area unless it is to be used in a beneficial way such as land reclamation, beach nourishment and/or the environmental restoration of wetlands or nesting islands. It prohibits the sea-based placement of capital dredged material within the GBRWHA.

In addition, the Ports Act requires the priority ports to develop master plans which include long term planning that provides strategic and coordinated approach to managing environmental values of the GBRWHA as well as efficiently using port and supply chain infrastructure.

14.3.2.3 Waste Reduction and Recycling Act 2011

The WRR Act outlines a range of measures to reduce waste generation and land disposal and encourage recycling. The WRR Act promotes the avoidance and reduction of generated waste, encouraging the principles of resource recovery and efficiency (EHP 2013b).

Key provisions of the WRR Act, and the associated *Waste Reduction and Recycling Regulation 2011* (Qld), include:

- A requirement for Queensland Government agencies and local governments to prepare waste management plans
- Introduction of product stewardship arrangements for any waste products that are identified as a growing problem for landfills in the future
- Stronger penalties related to littering and illegal dumping
- Management of used packaging materials
- Details about who is required to plan and report on waste management.

14.3.2.4 Transport Operations (Marine Pollution) Act 1995

The TOMPA protects Queensland's marine and coastal environment by minimising discharges of ship-sourced pollutants into coastal waters. It is an offence to discharge pollutants (either deliberately or negligently) and severe penalties apply.

Marine pollutants include:

- Oil (including diesel fuel, petrol and oil products) and oily residues or mixtures
- Chemicals and chemical residues
- Sewage
- Garbage (i.e. food wastes, paper products, rags, glass, metal, bottles, crockery, fishing gear, nets, bait boxes, lining, packing material, deck sweepings, paints, wood products, wire residues and all plastics).

The key objectives of the TOMPA include providing an approach to protecting Queensland's marine and coastal environment from ship-sourced pollutants such as oil, noxious liquid substances, sewage and garbage as well as:

- Complement international standards including the MARPOL, and the approach of the Commonwealth and the other States
- Establish regulations to prevent and control the discharge of ship-sourced pollutants
- Impose obligations on all ship owners and masters to exercise responsibility for the marine environment by ensuring the containment of all specified pollutants on-board and their appropriate disposal.

14.3.2.5 Queensland Waste Avoidance and Resource Productivity Strategy (2014-2024)

The *Queensland Waste Avoidance and Resource Productivity Strategy (2014-2024)* (EHP 2014) was developed to provide high-level direction for Queensland in avoiding unnecessary consumption and waste generation. Objectives of the Strategy include:

- **Driving cultural change:** All stakeholders recognise their role and are informed and empowered to participate in achieving their goals and objectives under the Strategy

- **Avoidance and minimisation:** Realise opportunities to maximise sustainable consumption and production
- **Reuse, recovery and recycling:** Optimise economic benefits from reuse, recovery and recycling
- **Management, treatment and disposal:** Reduce the impact of waste on human health and the environment through improved waste practices.

In addition, the Strategy identifies the highest priority wastes for action, which are wastes with high disposal impacts, social impacts or whose recovery would present resource savings or business opportunity (EHP 2014). Queensland's priority wastes include:

- Plastic waste (e.g. packaging, plastic bottles, plastic bags)
- Organic waste (e.g. green waste, food waste)
- High volume wastes with an existing resource value (e.g. concrete, treated timber, plasterboard)
- Regional impact waste (e.g. mining and industrial development, mattresses, orphan agricultural and veterinary chemicals)
- Complementary national product stewardship measures (e.g. fluorescent lights, used tyres, used oil).

14.4 Waste generation

14.4.1 Summary of waste generation

The generation of wastes during the Project is expected to be minimal on the basis that:

- Dredged material will be beneficially reused within the WB and WBE reclamation areas, with part of these areas becoming additional port land and berths in the future. Therefore, Project dredged material is not considered a waste.
- The bund wall material will be sourced from a commercial quarry and solid waste generated from the quarry will be managed under a separate waste management plan, and is therefore not considered part of this Project.
- Workforce numbers associated with the construction of the reclamation bund wall, the BUF and dredging and material placement will not generate large quantities of waste
- Waste bulk oils from dredgers, pushbusters and a tug will be stored on vessels and transferred to existing Port wharves via dredgers and/or work boats
- Waste relating to trucks, excavators and other equipment maintenance will not be generated or stored onsite during reclamation activities and dredged material placement. All truck and equipment maintenance will be undertaken offsite at either the quarry, GPC facilities or contractor facilities (where relevant).
- Following completion of reclamation construction and dredging activities, waste generation will be limited to green waste, including grass clippings, as part of operational management of the WB and WBE reclamation areas.

14.4.2 Dredging works

The expected workforce for dredging is expected to be 160 people for the TSHD and barge operations.

The waste expected to be produced by dredging vessels will include municipal, dunnage and quarantine waste, sewage/greywater as well as waste fuel, oils and lubricants (including oily bilge water).

14.4.3 Reclamation area

A construction compound and site office will be established for the construction of the reclamation area bund walls and dredged material unloading, placement and dewatering process.

Waste generated from the operation of the construction compound and site office will include:

- Municipal waste such as food waste, plastic wrappings, recyclables and other small, general waste items
- Office waste, including paper, cardboard, consumables and batteries
- Sewage and greywater from temporary ablution facilities and kitchen facilities
- Fuels and chemicals from temporary fuel storage facility within construction compound.

It is anticipated that construction of the reclamation bund walls and BUF will commence 36 and 12 months, respectively, prior to the dredging commencing.

The site office will be utilised by up to 20 construction staff during the establishment of the reclamation outer bund walls and BUF and up to 196 staff during the unloading, placement and dewatering of the dredged material. Post-dredging, only a small workforce will be required to finalise the reclamation surface (i.e. 2 to 3 years post-dredging to allow for settlement of fine materials). Waste generated from the operation of the site compound and construction office will be temporary and is not expected to be generated in significant quantities.

14.4.4 Demobilisation and decommissioning

Demobilisation and decommissioning works at the completion of each of the Project activities has the potential to generate typical general building material and municipal and office waste materials requiring standard landfill and recycling disposal. The volumes of waste expected in this phase would be of a minor volume and would be subject to standard waste management treatment under the respective contractor EMP.

Following the completion of the filling operations within the WBE reclamation area, GPC will undertake surface stabilisation works for the portion of the reclamation area that has achieved the final design surface level. These works are likely to include capping the final surface with material of an appropriate grade or vegetating with appropriate species.

Equipment, supporting infrastructure and site offices will be removed and the construction compounds removed and the area reinstated to similar surface level treatments as the surrounding reclamation areas.

Decommissioning of the navigational aids activities will involve removal of plant and equipment and all site based construction support infrastructure.

The eastern side of the barge dock wall within the BUF will form the wharf line for a future shipping berth for the WB port land when it is no longer required for unloading dredged material from Port dredging campaigns. The sheet piles east of the dock wall will require decommissioning. The fill between the eastern side of the barge dock wall and the eastern most sheet pile wall of the BUF will be removed and used to fill the barge dock area. The excess material will be used to reclaim within the WB reclamation area.

Demobilisation of the plant, equipment and supporting infrastructure used to construct and stabilise the WB and WBE reclamation areas and the BUF will generate general building material and municipal and office waste, which will require standard waste management treatment under the respective contractor EMP.

14.4.5 Summary of potential wastes from the Project

Details regarding potential wastes produced during Project activities, including source, estimated quantity and likely disposal options are provided in Table 14.1.

Table 14.1 Estimated wastes produced during Project activities

Waste type	Waste characteristics	Source	Project phase	Estimated quantity	Likely treatment/disposal
Hydrocarbons, fuels, oils and lubricants (including oily bilge)	Regulated waste	Construction compound, BUF and dredging works	Reclamation area construction Dredging Dredged material unloading and placement Navigational aids	10L/day (onsite) 4m ³ /week (TSHD and barges)	Recycling
Hazardous and potentially hazardous waste	Regulated waste	Construction compound, BUF and dredging works	Reclamation area construction Dredging Dredged material unloading and placement	Minimal	Landfill and recycling
Sewage/grey water	Regulated waste	Construction compound and dredging works	Reclamation area construction Dredging Dredged material unloading and placement	2,400L/day (onsite) 96m ³ /week (TSHD and barges)	Treated offsite at a sewage treatment plant
Municipal and office waste (food waste, plastics and paper)	General waste	Construction compound and dredging works	Reclamation area construction Dredging Dredged material unloading and placement	Approximately four wheelie bins (1m ³) per day (onsite) 15m ³ /week (TSHD and barges)	Landfill and recycling
General building material	Inert	Construction compound	Reclamation area and BUF construction	4m ³ /month	Landfill and recycling
Dredged material	Inert	Dredging channels	Dredging	Approximately 16.06Mm ³ in total (including bulking factor)	Construction of reclamation area
Dunnage and quarantine waste	Quarantined material	Dredging vessel	Dredging	Minimal	Sterilisation and disposal
Green waste (grass clippings and landscaping)	Inert	Reclamation area	Reclamation area operational management	Minimal	Re-used onsite for landscaping

14.5 Potential impacts

A range of waste types will be generated by the Project that have the potential to impact on the environment, unless treated or disposed appropriately.

The potential impacts of the waste generated by the Project are summarised in Table 14.2.

Table 14.2 Summary of potential impacts of waste from the Project activities

Waste type	Waste characteristics	Project phase	Potential impact
Hydrocarbons, fuels, oils and lubricants (including oily bilge)	Regulated	Reclamation area and BUF construction Dredging Dredged material unloading and placement Navigational aids	<ul style="list-style-type: none"> ■ Contamination of soil and sediment through leaching ■ Contamination of water ■ Toxicity to marine and/or intertidal flora and fauna ■ Odour
Hazardous and potentially hazardous waste	Regulated	Reclamation area construction Dredging Dredged material unloading and placement	<ul style="list-style-type: none"> ■ Public health risks ■ Contamination of soil and sediments through leaching ■ Toxicity to marine and/or intertidal flora and fauna ■ Contamination of water
Sewage/grey water	Regulated	Reclamation area construction Dredging Dredged material unloading and placement	<ul style="list-style-type: none"> ■ Contamination of soil and sediments through leaching ■ Odours ■ Public health risks ■ Contamination of water
Municipal and office waste (food waste, plastics and paper)	General	Reclamation area construction Dredging Dredged material unloading and placement	<ul style="list-style-type: none"> ■ Degradation of visual amenity ■ Injury to terrestrial or marine animals ■ Introduction or increase of feral or pest species
General building material	Inert	Reclamation area and BUF construction	<ul style="list-style-type: none"> ■ Degradation of visual amenity ■ Injury to terrestrial or marine animals ■ Potential to encourage pests and mosquito breeding
Dunnage and quarantine waste	Quarantined	Dredging	<ul style="list-style-type: none"> ■ Introduction of foreign pest species (terrestrial or marine) ■ Environmental, economic and community impacts
Green waste (grass clippings and landscaping)	Inert	Reclamation area operational management	<ul style="list-style-type: none"> ■ Potential to encourage pests and mosquito breeding ■ Potential fire hazard

14.6 Mitigation measures

It is intended that waste produced will be managed by GPC, and collected by a waste contractor and disposed of in accordance with the GPC EMS and applicable legislation and policies. Management of waste from dredging vessels will comply with the relevant waste management legislation and guidelines. It is intended that waste management services will be available upon vessel mooring for collection and removal of solid and liquid waste to a licenced facility.

14.6.1 Dredging works

It is intended that waste produced by dredging and other vessels will be managed via contractual arrangements with GPC, and will meet requirements of the GPC EMS as well as the relevant waste management legislation and guidelines. It is intended that waste management services will be available upon vessel mooring (or bunkering) for the collection and removal of solid and liquid waste to a licenced facility.

Any waste fuel, oils and lubricants (including oily bilge water) will be collected and managed by Nationwide Oil Pty Ltd as per DTMR's Port Procedures (DTMR 2018).

14.6.2 Inert waste

The bund wall material will be sourced from a commercial quarry and solid waste generated from the quarry will be managed under a separate waste management plan, and is therefore not considered part of this Project.

Green waste generated during construction and operational management of the WB and WBE reclamation areas (i.e. vegetation cleared for construction and operational management, including grass clippings and other green waste) will be used for landscaping and site stabilisation within the WB and WBE reclamation areas.

14.6.3 Municipal waste

Minimal quantities of solid general waste will be generated by the construction compound and site office established for the construction of the reclamation area bund walls, the BUF and for the dredging unloading, placement and dewatering operations. The solid waste generated from the site office will primarily be food waste, plastic wrappings and other small waste items. It is intended that waste produced will be managed by GPC and collected by a waste contractor and disposed of in accordance with the applicable legislation and policies.

All waste areas will be kept tidy and all municipal waste is to be placed in the appropriate receptacle. Sealed bins will be used to prevent wind, animals and rain from spreading litter.

Solid waste will be temporarily stored onsite, in accordance with the relevant legislation and guidelines, and regularly collected by a licenced waste disposal contractor and, where recycling is not feasible, transferred to a licenced waste facility within the GRC area (e.g. Benaraby Landfill).

14.6.4 Regulated waste

Waste water generated by the dredger activities will be stored on the dredger, transferred to Auckland Point Wharf area for collection and then transported to GRC sewage treatment plant. Dredgers with on-board tertiary waste water treatment facilities will treat generated waste water within these facilities.

All sewage and greywater, generated as a result of the operation of the reclamation area construction compound and site office, will be temporarily stored onsite in accordance with the relevant waste management legislation and guidelines, and removed and transported to the GRC sewage treatment plant.

In the event of an oil or fuel spill into marine and/or terrestrial environments, vessels will adhere to the requirements of the spill-clean procedure included in the DTMR *Guide for the prevention of ship-sourced pollution and for the safe transfer of bunkers in Queensland waters, 2016*. An Environmental Incident Report and Corrective Action Report will be completed within 24 hours of the incident occurring as per the requirements set out in the Project EMP.

14.6.5 Quarantine waste

All vessels arriving at the Port of Gladstone are required to follow the DTMR's *Port Procedures and Information for Shipping, Port of Gladstone, 2017*, which details quarantine requirements.

Upon arrival within the Port of Gladstone, all wastes, including quarantine waste, from the dredging vessels will be assembled for collection and disposal. Quarantine waste will be kept in sealed plastic bags on board until collection by a licenced contractor (DTMR 2018). Quarantined waste will be sterilised prior to disposal at a licenced facility.

14.6.6 Summary

Where feasible the waste management hierarchy, as per the *Waste Reduction and Recycling Act 2011* will be implemented during the Project.

- AVOID unnecessary resource consumption
- REDUCE waste generation and disposal
- RE-USE waste resources without further manufacturing
- RECYCLE waste resources to make the same or different products
- RECOVER waste resources, including the recovery of energy
- TREAT waste before disposal, including reducing the hazardous nature of waste
- DISPOSE of waste only if there is no viable alternative.

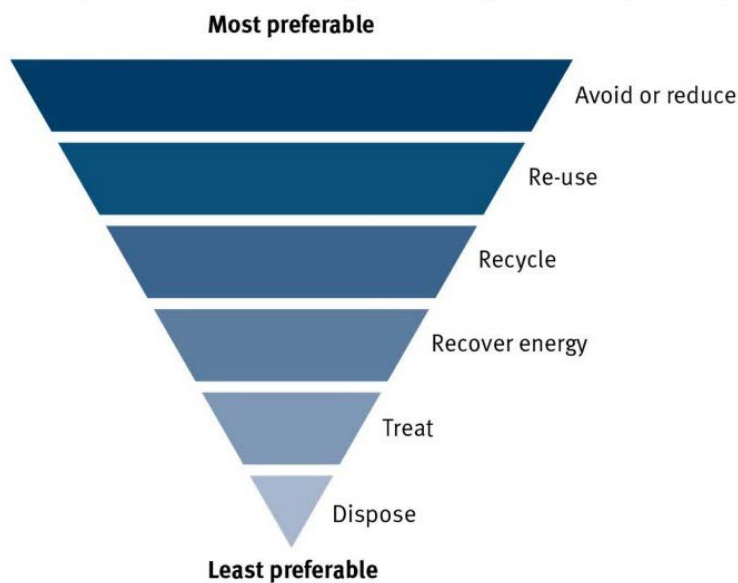


Figure 14.1 The waste and resource management hierarchy

Source: EHP (2013a)

A summary of mitigation measures to reduce the impacts of waste generation during the Project is provided in Table 14.3.

Table 14.3 Mitigation measures for waste management of the Project activities

Waste type	Waste characteristics	Mitigation measures
Hydrocarbons, oils and other lubricants (including oily bilge)	Regulated	<ul style="list-style-type: none"> ■ Removal of solid and liquid waste to a licenced facility ■ Waste bulk oils will be stored on dredgers and directly transferred to existing Port wharves or via work boats ■ No truck and vehicle maintenance permitted at the reclamation area. All maintenance to occur offsite at either the quarry, GPC or contractor facilities ■ Powered Mobile Equipment (PME) will be suitable and rated for the task and kept in good working order ■ A PME preventative maintenance regime will be implemented ■ Temporary storage of hydrocarbons will occur in bunded areas that are appropriately sized for the application and capacity maintained (i.e. kept free of rain water) ■ Wash bilges with biodegradable degreasers or detergents and dispose of cleaning residue ashore ■ Use absorbents to mop up excess oil or fuel ■ Undertake checks and preventative maintenance of plant and equipment to minimise leaks and spills ■ Spill response procedures implemented and staff are suitably trained ■ Spill equipment (including hydrocarbon absorbent booms) is available and staff are familiar with its use ■ Regular maintenance of work areas, storage areas, transfer equipment and spill equipment ■ Call emergency services to assist with hazardous material spills. ■ Appropriate handling of absorbent material (including absorbent booms) where these have been used to clean up spills
Hazardous and potentially hazardous waste	Regulated	<ul style="list-style-type: none"> ■ Maintain inventory and safety data sheets for hazardous substances ■ Tracking records to be kept when regulated waste is removed from the dredger or a GPC wharf facility. All regulated waste transported by licenced contractors and disposed at a licenced place. ■ Bring only the minimum quantity of substance required ■ Store full and empty drums and/or containers in bunded areas ■ Collect empty drums for re-use or recycling ■ Waste not disposed of by burning ■ Hazardous substances handled and stored in a manner that prevents environmental harm ■ Any spills to be cleaned up as soon as practicable ■ Call emergency services to assist with hazardous material spills ■ Complaints or incidents to be reported to GPC.
Sewage/grey water	Regulated	<ul style="list-style-type: none"> ■ Waste water from dredger and ablution facilities to be collected then transported to GRC sewage treatment plant ■ With the help of a licenced contractor determine the number of ablution facilities required at the site offices for the duration of the Project ■ Dredgers with tertiary treatment facilities will treat generated waste water on board.

Waste type	Waste characteristics	Mitigation measures
Municipal and office waste (food waste, plastics and paper)	General	<ul style="list-style-type: none"> ■ Provide facilities for the appropriate separation and storage of waste. Adequate storage capacity to be maintained and no waste to remain at the completion of works ■ Ensure that waste is removed and disposed of by a licenced contractor on a regular basis to a licenced waste facility ■ Educate staff to recycle waste ■ All waste areas will be kept tidy and all municipal waste is to be placed in the appropriate receptacle ■ Use sealed bins to prevent wind, animals and rain from spreading litter ■ Waste is not to be disposed of in the marine environment or incinerated in vessels at sea ■ Ensure that bins/bags used on the dredgers to store waste are secure ■ Retrieve litter that does enter the water.
General building material	Inert	<ul style="list-style-type: none"> ■ Store waste separately to avoid contamination with other waste ■ Where possible reuse excess materials on site alternatively remove to recycling facility.
Dunnage and quarantine waste	Quarantine	<ul style="list-style-type: none"> ■ Not to be disposed of in the marine environment or incinerated in vessels at sea ■ Waste to be kept in sealed plastic bags on board until collection by a licensed contractor ■ Waste to be sterilised prior to disposal ■ Record the movement and quantities of regulated and quarantine wastes.
Green waste (grass clippings and landscaping)	Inert	<ul style="list-style-type: none"> ■ Chipped and used onsite for landscaping.

14.7 Risk assessment

14.7.1 Methodology

To assess and appropriately manage the potential waste risks to environmental values as a result of Project activities, a risk assessment process has been implemented (herein referred to as 'risk assessment'). The risk assessment methodology adopted is based on principles outlined in the:

- AS/NZS ISO 31000:2009 Risk management – Principles and guidelines
- HB 203:2012 Handbook: Managing environment-related risk.

The risk assessment identifies and assesses the potential waste impact risks to environmental values/receptors for both the establishment of the reclamation area, dredging activities, installing navigational aids and operational management of the reclamation area.

The purpose of this risk assessment is to identify potential impacts to environmental values/receptors, prioritise environmental management actions and mitigation measures, and to inform the Project decision making process.

The risk management framework incorporates the Australian/New Zealand Standard for Risk Management (AS/NZS 4360:2004) and contains quantitative scales to define the **likelihood** of the potential impact occurrence and the **consequence** of the potential impact should it occur.

An overview of the interaction between Project activities (drivers/stressors), sensitive values/receptors and the risk impact assessment process is provided in Figure 14.2.

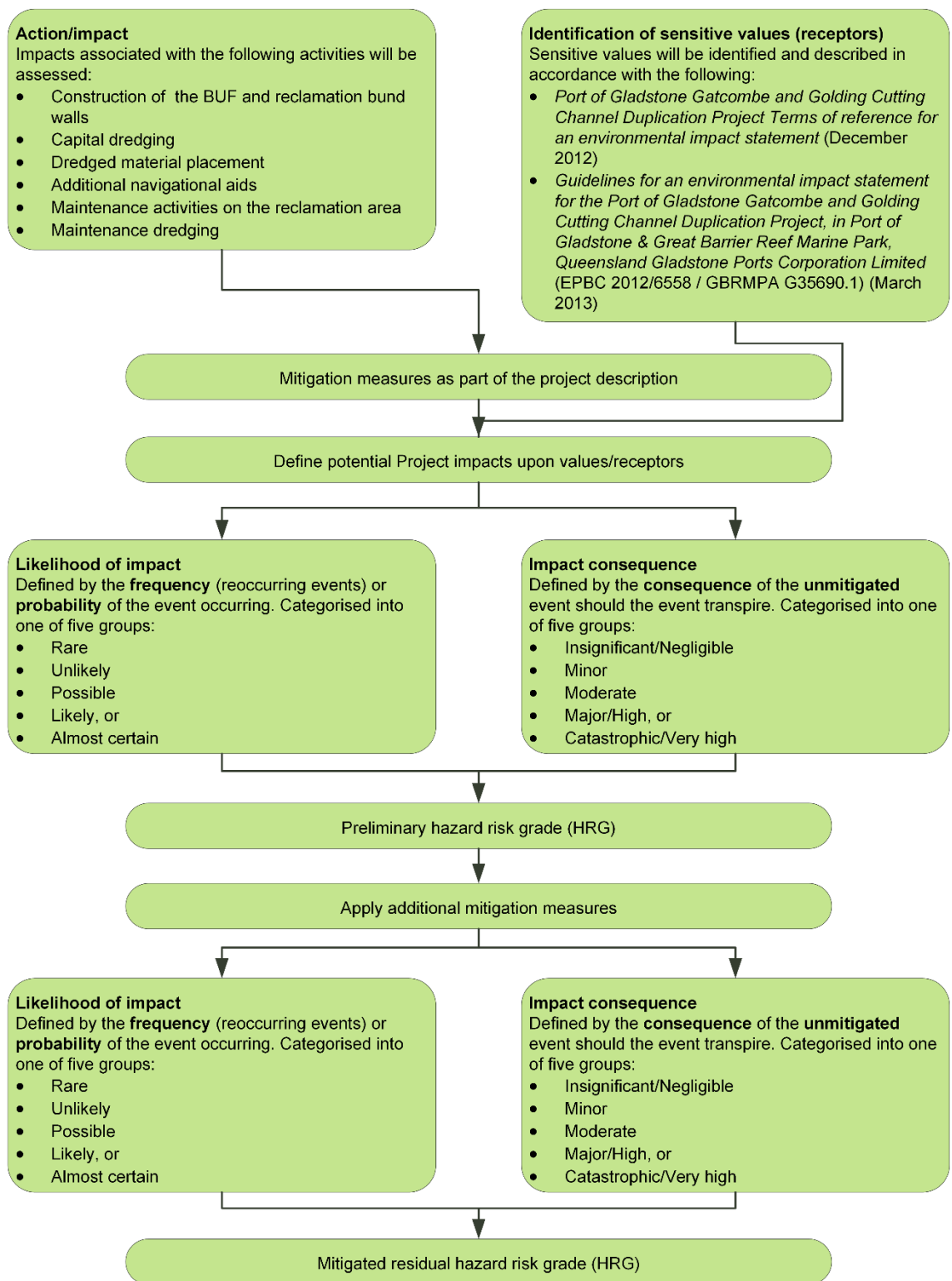


Figure 14.2 Risk assessment framework

Criteria used to rank the **likelihood** and **consequence** of potential impacts are provided in Table 14.4 and Table 14.5, respectively.

Table 14.4 Environmental (ecosystem), public perception and financial consequence category definitions (adapted from GBRMPA 2009)

Description	Definition/quantification ¹		
	Environmental*	Public perception	Financial
Negligible (Insignificant)	No impact or, if impact is present, then not to an extent that would draw concern from a reasonable person No impact on the overall condition of the ecosystem	No media attention	Financial losses up to \$500,000
Low (Minor)	Impact is present but not to the extent that it would impair the overall condition of the ecosystem, sensitive population or community in the long term	Individual complaints	Financial loss from \$500,001 to \$5 million
Moderate	Impact is present at either a local or wider level Recovery periods of 5 to 10 years likely	Negative regional media attention and region group campaign	Financial loss from \$6 million to \$50 million
High (Major)	Impact is significant at either a local or wider level or to a sensitive population or community Recovery periods of 11 to 20 years are likely	Negative national media attention and national campaign	Financial loss from \$51 million to \$100 million
Very high (Catastrophic)	Impact is clearly affecting the nature of the ecosystem over a wide area or impact is catastrophic and possibly irreversible over a small area or to a sensitive population or community Recovery periods of greater than 21 years likely or condition of an affected part of the ecosystem irretrievably compromised	Negative and extensive national media attention and national campaigns	Financial loss in excess of \$100 million

Table notes:

- 1 Quantification of impacts should use the impact with the greatest magnitude in order to determine the consequence category
- * For Matters of National Environmental Significance (MNES) protected under the provisions of the EPBC Act the *Matters of National Environmental Significance – Significant Impact Guidelines 1.1 – Environmental Protection and Biodiversity Conservation Act 1999* (DoE 2013b) are to be used to determine the consequence category

Table 14.5 Likelihood category definitions (adapted from GBRMPA 2009)

Description	Frequency	Probability
Rare	Expected to occur once or more over a timeframe greater than 101 years	0 to 5% chance of occurring
Unlikely	Expected to occur once or more in the period of 11 to 100 years	6 to 30% chance of occurring
Possible	Expected to occur once or more in the period of 1 to 10 years	31 to 70% chance of occurring
Likely	Expected to occur once or many times in a year (e.g. 1 to 250 days per year)	71 to 95% chance of occurring
Almost certain	Expected to occur more or less continuously throughout a year (e.g. more than 250 days per year)	96 to 100% chance of occurring

Once the likelihood and the consequence has been defined, determination of the HRG of the potential hazard will be determined through the use of a five by five matrix (refer Table 14.6).

Table 14.6 Hazard risk assessment matrix (adapted from GBRMPA 2009)

Likelihood	Consequence rating				
	Negligible (insignificant)	Low (minor)	Moderate	High (major)	Very high (catastrophic)
Rare	Low	Low	Medium	Medium	Medium
Unlikely	Low	Low	Medium	Medium	High
Possible	Low	Medium	High	High	Extreme
Likely	Medium	Medium	High	High	Extreme
Almost certain	Medium	Medium	High	Extreme	Extreme

Table note:

Hazard risk categories identified in Table 14.6 are defined in Table 14.7

Table 14.7 Risk definitions and actions associated with hazard risk categories (adapted from GBRMPA 2009)

Hazard risk category	Hazard risk grade definition
Low	These risks should be recorded, monitored and controlled. Activities with unmitigated environmental risks that are graded above this level should be avoided.
Medium	Mitigation actions to reduce the likelihood and consequences to be identified and appropriate actions (if possible) to be identified and implemented.
High	If uncontrolled, a risk event at this level may have a significant residual adverse impact on MNES, MSES, GBRWHA and/or social/cultural heritage values. Mitigating actions need to be very reliable and should be approved and monitored in an ongoing manner.
Extreme	Activities with unmitigated risks at this level should be avoided. Nature and scale of the significant residual adverse impact is wide spread across a number of MNES and GBRWHA values.

14.7.2 Summary of risk assessment.

The potential waste impacts risk assessment is summarised in Table 14.8.

The implementation of mitigation measures (refer Section 14.6), will result in the residual waste risks to human health and environmental values being generally assessed as low to medium.

Table 14.8 Potential waste impacts and risk assessment ratings

Potential impact	Project phase					Preliminary HRG			Post mitigation HRG		
	Reclamation area and BUF establishment	Dredging	Navigational aids	Demobilisation	Maintenance	Likelihood	Consequence	HRG	Likelihood	Consequence	HRG
Hydrocarbons, fuels, oils and lubricants (including oily bilge)											
<ul style="list-style-type: none"> ■ Contamination of soil and sediment through leaching ■ Contamination of water ■ Toxicity to marine and/or intertidal flora and fauna ■ Odour 	✓	✓	✓			Likely	Moderate	High	Unlikely	Moderate	Medium
Hazardous and potentially hazardous waste											
<ul style="list-style-type: none"> ■ Public health risks ■ Contamination of soil and sediments through leaching ■ Toxicity to marine and/or intertidal flora and fauna ■ Contamination of water 	✓	✓				Possible	Moderate	High	Unlikely	Moderate	Medium
Sewage/grey water											
<ul style="list-style-type: none"> ■ Contamination of soil and sediments through leaching ■ Odours ■ Public health risks ■ Contamination of water 	✓	✓				Possible	Low	Medium	Unlikely	Low	Low
Municipal and office waste (food waste, plastics and paper)											
<ul style="list-style-type: none"> ■ Degradation of visual amenity ■ Injury to terrestrial or intertidal animals ■ Introduction or increase of feral or pest species 	✓	✓		✓		Likely	Low	Medium	Unlikely	Low	Low

Potential impact	Project phase					Preliminary HRG			Post mitigation HRG		
	Reclamation area and BUF establishment	Dredging	Navigational aids	Demobilisation	Maintenance	Likelihood	Consequence	HRG	Likelihood	Consequence	HRG
General building material											
<ul style="list-style-type: none"> ■ Degradation of visual amenity ■ Injury to terrestrial or intertidal animals ■ Potential to encourage pests and mosquito breeding 	✓			✓		Likely	Low	Medium	Unlikely	Low	Low
Dunnage and quarantine waste											
<ul style="list-style-type: none"> ■ Introduction of foreign pest species (terrestrial or marine) ■ Environmental, economic and community impacts 		✓				Possible	Medium	High	Unlikely	Medium	Medium
Green waste (grass clippings and landscaping)											
<ul style="list-style-type: none"> ■ Potential to encourage pests and mosquito breeding ■ Potential fire hazard 	✓				✓	Possible	Low	Medium	Unlikely	Low	Low

14.8 Summary

The Project activities will generate a range of waste types, including hydrocarbons, potentially hazardous wastes, sewage/grey water, municipal and office wastes, general building materials, dunnage and quarantine waste and green waste. The generation of waste from Project activities is expected to be minimal due to the dredged material being beneficially reused within the WB and WBE reclamation areas, the construction materials for the bund walls and BUF being sourced from existing local quarries and sheet pile or similar earth retaining structure supplier, and the construction workforce numbers being relatively low.

Potential impacts from uncontrolled waste may include contamination of soil and sediment through leaching, contamination of water, toxicity or injury to marine/intertidal flora and fauna, and degradation of visual amenity. A range of mitigation measures are proposed to manage potential waste impacts from hazardous, regulated and general wastes which have been incorporated into the Project EMP and the contractors' EMPs. With these measures effectively implemented, the residual waste risks to human health and environmental values are assessed as being low to medium.