



PORT of TOWNSVILLE
Nexus North Queensland

Appendix X Waste Management Technical Report

Townsville Marine Precinct Project
Environmental Impact Statement





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Executive Summary

This Waste Management Technical Report has been prepared by GHD as part of the Port of Townsville Limited Marine Precinct Environmental Impact Statement proposed for development within the mouth of the Ross River in Townsville.

Waste is an important aspect of any new development both in the construction and operational phases and has the potential to have a significant environmental impact where not addressed properly.

The report discusses the waste materials associated with the proposed Port of Townsville Limited Marine Precinct development ("the development") and highlights the relevant state, federal and international, legislation, standards and guidelines and discusses waste generation, potential impacts on environmental values and provides mitigation and management options.

Specifically, wastes associated with the development have been divided into those wastes associated with the construction phase and those wastes associated with the operational phase. Operational phase waste materials are further divided into the following categories, based on the source of the waste stream:

- ▶ Shipping and boating (wastes generated onboard); and
- ▶ Marina wastes (wastes generated on land)

Marina wastes have been further separated into:

- Industrial wastes (manufacturing, repair, maintenance): and
- Commercial wastes (administration, retail, restaurants)

Each waste component highlighted in the inventory of wastes associated with each source has been assessed with regard to the environmental values affected and the potential impacts. Management options and mitigation measures have been developed in accordance with the relevant legislation and guidelines and make particular reference to the waste hierarchy. Management options have been listed in descending order with the most desirable option listed first (e.g. avoidance, reuse, recycling, energy recovery and disposal). Specifically, the environmental values, potential impacts and management options are detailed in section 2 of this report.



1. Introduction

GHD was commissioned by Port of Townsville Limited (PoTL) to prepare the Port of Townsville Limited Marine Precinct Environmental Impact Statement, an integral component of which is this Waste Management Technical Report.

The Waste Management Technical Report provides a detailed assessment of potential waste impact and mitigation measures which may result from the development of the Marine Precinct.

Waste is an important aspect of any new development both in the construction and operational phases and has the potential to have a significant environmental impact where not addressed properly.

1.1 Background

The proposed Townsville Marine Precinct Project seeks to provide a dedicated marine precinct facility for commercial and recreational use at the mouth of the Ross River in the Port of Townsville.

Specifically, the project will address the ongoing and increasing demand for marine facilities in the region by providing a sheltered, purpose-built precinct for the co-location of similar marine dependant industries and public facilities currently spread around Ross Creek and South Townsville.

The current form of the proposal comprises:

- ▶ Marine industry allotments including a commercial slipway, barge ramp, ship-lift;
- ▶ Docking facility and associated marine facilities;
- ▶ Ship building and fit-out, ship maintenance and repair facilities.
- ▶ Approximately 50 trawler berths and two maintenance berths;
- ▶ Potential relocation of the Volunteer Coastguard office and mooring; and
- ▶ Potential for private pile moorings and associated tender berthing facilities.

1.2 Waste Definition

The definition of waste as outlined in the Environmental Protection Act (1994) (Qld) is as follows:

- (a) Leftover or an unwanted by-product, from an industrial, commercial, domestic or other activity; or
- (b) Surplus to the industrial, commercial, domestic or other activity generating waste.



1.3 Legislation, Guidelines and Objectives for Waste Management

Pollution of the marine environment by ships of all types, including fishing vessels, is strictly controlled by the *International Convention for the Prevention of Pollution from Ships 1973 (Amended 1978)* (known as MARPOL). Australia is a signatory to this convention, which is now enforced in over 100 countries.

This convention deals with all forms of waste disposal from ships except the disposal of land generated wastes (eg dredge spoil) by dumping and includes five technical Annexes as listed below:

- ▶ Annex I: Regulation for the prevention of pollution by oil (2 October 1983)
- ▶ Annex II: Regulations for the control of pollution by noxious liquid substances in bulk (6 April 1987)
- ▶ Annex III: Regulations for the prevention of pollution by harmful substances carried by sea in packaged forms (1 July 1992)
- ▶ Annex IV: Regulations for the prevention of pollution by sewage from ships (27 September 2003)
- ▶ Annex V: Regulations for the prevention of pollution by garbage from ships (31 December 1988)

Parties to the convention must cooperate in the detection of any violations and take action against violators.

Australia is a full member of the International Maritime Organisation and a signatory to MARPOL 73/78 (all annexes). Australia's jurisdiction and marine environmental responsibilities extend to the economic exclusion zone where the Protection of the Sea (Prevention of Pollution from Ships) Act 1983 gives effect to the core provisions of the MARPOL 73/78 convention. The Australian Maritime Safety Authority (AMSA) applies the Convention in Australian waters. Its regulations are implemented through Commonwealth and State legislation.

It is assumed that all vessels will be required to clear quarantine prior to entering marine precinct and as such the specific requirements of quarantine are not relevant to this project.

In addition to the international and national conventions, legislation and regulations, waste management in ports, harbours, marinas, and shipping terminals in Queensland, at state level is governed by the following legislation:

- ▶ Environmental Protection Act (1994);
- ▶ Environmental Protection (Water) Policy (1997);
- ▶ Environmental Protection (Waste Management) Policy (2000);
- ▶ Environmental Protection (Waste Management) Regulation (2000);



- ▶ Transport Operations (Marine Pollution) Act (1995); and
- ▶ Transport Operations (Marine Pollution) Regulation (2008).

Specifically in Queensland, the Transport Operations (Marine Pollution) Act (2008) gives effect to the Annexures I, II, III and V of MARPOL 73/78 where Part Ten of the Act only enables the Queensland government to issue a directive to establish or have established by an owner occupier of a port, terminal or establishment, facility for the receipt or disposal of residues of ships as well as maintain the facility to enable ships to dispose of residues. The act prohibits the disposal of oils, garbage, harmful substances, noxious liquids and sewage in coastal waters.

The Australian Maritime Safety Authority (AMSA) is responsible for the application and enforcement of MARPOL 73/78 in areas of Commonwealth jurisdiction, which is to the limit of the 200 nautical mile exclusive economic zone. State government is responsible for coastal waters up to three nautical miles (5.5 km) offshore.

The construction and operation of the PoTL marine precinct project must comply with relevant local, state, federal and international regulatory requirements regarding waste management and should aim to adopt best practice waste management and go beyond compliance where economically feasible options are identified. The “user pays” and “polluter pays” principals outlined in the Environmental Protection (Waste Management) Policy (2000) (EPP Waste) are central to the management of wastes from such developments. These principals are defined as follows:

The polluter pays principle is the principle that:

All costs associated with the management of waste, if practicable, are borne by the persons who generated the waste.

The costs associated with the management of waste may include the costs of:

- (a) Minimising the amount of waste generated; and*
- (b) Containing, treating and disposing of waste; and*
- (c) Rectifying environmental harm caused by waste.*

The user pays principle is the principle that:

All costs associated with the use of a resource should, if practicable, be included in the prices of goods and services.

The project must comply with all regulations outlined in the EPP Waste and adopt the objectives of the legislation into the project’s waste management practices. Specifically “minimising the impact of waste on the environment” and “...manage waste under principles of ecologically sustainable development”.

With these principles in mind the waste management hierarchy that is also defined in the EPP Waste has been utilised as the basis for reviewing waste handling and management options for the project. The hierarchy encourages waste to be managed



in the following order of preference

- ▶ Waste avoidance;
- ▶ Waste re-use;
- ▶ Waste recycling;
- ▶ Energy recovery from waste; and
- ▶ Waste disposal.

1.4 Waste Generation

Waste materials associated with the PoTL Project have been separated according to the waste generating activity.

Primarily, wastes have been divided into those waste streams associated with construction phase and those waste streams associated with the operational phase. Operational phase wastes have been further separated into shipping and boating wastes associated with commercial fishing and recreational boating and marina and associated industry wastes. Waste types likely to be associated with each of the waste generating activities are detailed, along with the associated legislation, typical management practices and the proposed management of the impacts of the waste streams for the PoTL Project.

1.4.1 Construction Phase Waste

Waste management practices for construction sites in Queensland are based on the principals and requirements outlined in the following documents:

- ▶ Environmental Protection Act 1994 (Qld);
- ▶ Environmental Protection (Waste Management) Policy 2000 (Qld); and
- ▶ Environmental Protection (Waste Management) Regulation 2000 (Qld).

Inventory of Construction Waste

Whilst detailed quantification of waste streams from the construction phase of works will be completed during preliminary design, this section outlines the likely waste streams.

The most significant wastes generated during the construction phase of the PoTL project are likely to be excess spoil from earthworks and foundations, excess concrete and building material waste.

Liquid waste arising from the construction phase are likely to be limited to stormwater runoff, groundwater from dewatering, sewage from toilets and ablution facilities for construction workers and small quantities of chemicals which along with the sewage should be collected and disposed of off-site to an approved waste facility unless there



is a trade waste permit in place for the site.

It is expected that only minor quantities of hazardous wastes such as paints and oils will be generated and authorised waste contractors can readily manage these.

Emissions to air are discussed in a separate technical report on Air Quality.

Table 1 summarises the primary waste materials, along with the source and provides a description of the wastes that are likely to be associated with the construction phase of the project.

Table 1 Construction Phase Waste Materials

Material	Source / Description
Fill	Excavated material such as sand, gravel, clay, soil and rock that has been mixed with another waste or excavated from areas that are contaminated with manufactured chemicals as a result of industrial, commercial, mining or agricultural activities.
Virgin Excavated Natural Material (VENM)	Excavated material such as sand, gravel, clay, soil and rock that is not mixed with any other waste or contaminated by any other activity.
Concrete	Mixture of cement, sand and aggregates. May include additives or substitutes such as fly ash.
Asphalt	Any materials containing bituminous hydrocarbons. May contain additives such as concrete. Includes recycled asphalt pavement (RAP)
Timber	Wood materials used for formwork or other construction purposes.
Besser blocks and other brick products	Broken or offcut besser blocks and other brick products may be mixed together. This can include small amounts of concrete or plaster render.
Glass	Sheet glass used for doors, windows, partitioning, etc.
Plasterboard	Composite material of gypsum and cardboard used for interior panels of buildings.
Steel	Metal building products and materials e.g. reinforcing steel, sheet roofing (galvanised steel or zincalume) , structural columns and beams, etc.
Non-ferrous metals	Metal building materials other than steel e.g. aluminium, brass, copper, etc.
Mixed waste	Mixed waste of which no one material comprises 50% or more of the load, e.g. paper and plastic packaging etc.



Material	Source / Description
Paints and other chemicals	Paint and other chemicals used in various construction activities.

1.4.2 Operational Waste

Operational wastes have been broken into those wastes directly associated with shipping and boating (e.g. wastes produced onboard) and those associated with the operation of the marina (e.g. commercial / industrial operations).

Inventory of Shipping and Boating Wastes

The major components of the liquid and solid waste streams associated with shipboard operation include the following;

Solid

- ▶ General, non-hazardous wastes;
 - Paper;
 - Metals;
 - Glass;
 - Plastics;
- ▶ Fishing nets and other equipment;
- ▶ Medical wastes;
- ▶ Hold sweepings;
- ▶ Galley waste;
- ▶ Fish / other animal wastes;
- ▶ Batteries ; and
- ▶ Fluorescent and mercury vapour lamp bulbs.

Liquid

- ▶ Waste oil;
- ▶ Oily mixtures including fuel residues;
- ▶ Oily mixtures containing chemicals;
- ▶ Tank wash water;
- ▶ Noxious liquids;
- ▶ Sewage (grey water); and
- ▶ Sewage (black water).



Inventory of Marina Waste

Table 2 Inventory of Marina waste

Material	Description / Source
<i>Industrial</i>	<i>Manufacturing, seafood processing and packaging, ship building, fit-out, repair, maintenance etc.</i>
Paper and cardboard	Paper from packaging of goods, cardboard boxes (e.g. packing of seafood products) etc.
Plastic	Plastic packaging from industrial operations, other waste plastic associated with repair maintenance of vessels, plastic containers from various industries (e.g. fish processing), shrink wrap and packing tape.
Foam	Foam containers (e.g. seafood storage / transport), packaging, protective covers, other foams used in vessels, floats and other items.
Non ferrous metals	Scrap metals such as aluminium / brass from maintenance or industrial operations, paint tins etc.
Steel	Scrap from maintenance or industrial operations.
Sandblasting sand	Sandblasting sand and associated contaminants.
Paint chips	Paint chips and material from maintenance/repair of boats.
Fibreglass and related products	Fibreglass, resin, hardener, foams from vessel maintenance / repair and other industrial process.
Biological waste	Fish and other waste from processing and packaging. Organisms from anti fouling maintenance.
Oil / fuel / residues	From service, repair, maintenance and other industrial processes
Chemical wastes	Anti-fouling, cleaning and other industrial chemicals, adhesives, glues, etc.
Sewage grey water / black water	Sewage from site facilities
Timber	Wood products used in repair and maintenance of vessels and in various industrial processes, pallets, formwork, etc.
Paint	paint used in repair and maintenance of vessels.
Glass	Sheet glass, screens bottles and containers.



Material	Description / Source
Batteries	Lead acid and other batteries from vessels and other machinery used in the industrial processes at the site.
<i>Commercial</i>	<i>Retail, administration, restaurants, etc.</i>
Paper	Food packaging, wrapping, other product packaging, office paper, etc.
Plastic	Packaging, bottles, other containers, wrapping, shrink wrap, packing tape, etc.
Glass	Glass bottles, jars, etc.
Metals	Aluminium drink cans, other food cans, etc.
Food waste	Left over food from restaurants and other services.
Sewage grey water / black water	Sewage from toilets, showers, sinks, kitchens and other facilities.
Mixed waste	Mixed waste of which no one material comprises 50% or more of the load, e.g. paper and plastic packaging etc.



2. Waste Management

2.1 Environmental Values, Potential impacts and Management Options

This section describes the existing environmental values that may be affected by the projects wastes. Waste streams identified and outlined in the inventory are assessed with reference to the environmental values described in other sections of this EIS.

Given the environmental values of the surrounding area of the project site, effective waste management will be an important aspect of any development in the area including the marine industrial allotments, trawler fleet, pile mooring and public boat ramp, car and trailer parking bays.

The waste streams expected to be generated by each component of the project are detailed with an assessment of the potential environmental impacts of the wastes and options for waste management aimed at protecting environmental values are also provided.

2.1.1 Construction Waste

As construction involves the change of an existing environment there is an inherent impact on the environment associated with all construction. The challenge in any construction activity or development is to undertake the construction with as little impact as possible. With regard to construction waste management, preplanning and adherence to the waste management hierarchy is integral to the minimisation of impacts associated with the construction phase of any project.

Table 3 builds on the inventory of construction waste provided in section 1.4.1 and 1.4.2 by detailing the environmental values affected by the waste type and the potential impacts on the environmental values associated with each waste type.

Detail on management of the impacts highlighted and options for the implementation of the waste hierarchy are provided in the discussion that follows table 3.



Table 3 Construction Waste

Material	Description	Environmental value / potential impacts	Management options
Fill	Excavated material such as sand, gravel, clay, soil and rock that has been mixed with another waste or excavated from areas that are contaminated with manufactured chemicals as a result of industrial, commercial, mining or agricultural activities.	Water, soil, flora, fauna. Degradation of water quality, contamination of other soils / sediments through leaching. Toxicity to aquatic flora and fauna.	Remediate contaminants (if present) and utilise fill on site. Remove fill from site to an appropriately licensed facility for treatment and resale. Ensure disturbance and stockpiling of fill is conducted in a manner that minimises the potential for environmental impacts e.g. implement appropriate sediment and erosion controls, do not mix with clean material etc.
Virgin Excavated Natural Material (VENM)	Excavated material such as sand, gravel, clay, soil and rock that is not mixed with any other waste or contaminated by any other activity.	Water, flora, fauna. Degradation of water quality, sediment and erosion control issues. Issues associated with high turbidity on aquatic flora and fauna.	Implement sediment and erosion controls prior to excavation or stockpiling. Only excavate where required and avoid excavation in the vicinity of waters. Locate stockpiles outside of drainage lines and area where there is potential for runoff during rain events.



Material	Description	Environmental value / potential impacts	Management options
Concrete	Mixture of cement, sand and aggregates. May include additives or substitutes such as fly ash.	Water, soil, flora, fauna. Degradation of water quality, increased turbidity. Toxicity to aquatic flora and fauna.	Ensure lined, bunded concrete wash out areas are provided. Ensure concrete and related products are stored / stockpiled appropriately e.g. covered, bunded, sediment and erosion control measures in place.
Asphalt	Any materials containing bituminous hydrocarbons. Mau contain additives such as concrete. Includes recycled asphalt pavement (RAP)	Water, soil, flora, fauna. Degradation of water quality. Contamination of soil and sediment. Toxicity to flora and fauna.	Ensure excess asphalt and related products are disposed of appropriately. Ensure tar and other related chemicals are stored in bunded, covered locations.
Timber	Wood materials used for formwork or other construction purposes.	Visual amenity.	Provide stockpile area for excess / waste timber. Utilise excess / waste timber in other construction processes where possible.
Besser Blocks and other Brick products	Concrete blocks and Clay bricks which may be mixed together. This can include small amounts of mortar or plaster render.	Visual amenity Degradation of visual amenity	Provide stockpile area for excess / waste bricks / roof tiles. Utilise in other construction processes where possible. Dispose of to recycling facility.



Material	Description	Environmental value / potential impacts	Management options
Glass	Sheet glass used for doors, windows, partitioning, etc.	Visual amenity. Degradation of visual amenity.	Provide separated stockpile / storage where appropriate. Dispose of to recycling facility.
Plasterboard	Composite material of gypsum and cardboard used for interior panels of buildings.	Visual amenity. Degradation of visual amenity.	Provide separated stockpile / storage where appropriate. Reuse / recycle where possible (likely offsite).
Steel	Metal building products and materials e.g. reinforcing steel, sheet roofing, structural columns and beams, etc.	Water, soil, visual amenity. Contamination of water and soil through decomposition. Degradation of visual amenity.	Provide separated stockpile / storage where appropriate. Reuse where possible. Dispose of to recycling facility.
Non-ferrous metals	Metal building materials other than steel e.g. aluminium, brass, copper, etc.	Water, soil, visual amenity. Contamination of water and soil through decomposition. Degradation of visual amenity.	Provide separated stockpile / storage where appropriate. Reuse where possible. Dispose of to recycling facility.
Mixed waste	Mixed waste of which no one material comprises 50% or more of the load, e.g. paper and plastic packaging etc.	Water, soil, visual amenity, flora, fauna. Contamination of water and soil. Kill or injure fauna through ingestion or entanglement.	Provide waste receptacles. Provide recycling receptacles to fit with local recycling system where possible. Avoid commingling with other separated waste streams.



Material	Description	Environmental value / potential impacts	Management options
Paints and other chemicals	Paint and other chemicals used in various construction activities.	Water, soil, flora, fauna.	Provide specific disposal facility. Provide covered / bunded facility for storage prior to disposal to appropriate facility.



Management of impacts

In order to manage the impacts of the construction of the project and to minimise the amount of waste generated by the construction process it is recommended that a waste minimisation strategy be developed for the construction phase. A number of key items are required to be addressed in order to achieve waste minimisation and capitalise on recycling opportunities, these are as follows;

- ▶ Coordinate and communicate the strategy to site project managers, supervisors, workers and contractors;
- ▶ Appoint a responsible person (site manager) to oversee the implementation of the waste minimisation plan, promote the plan and reward best performances where possible;
- ▶ Develop reporting arrangements to monitor waste minimisation; or alternatively, ensure disposal and recycling contractors separate monitor and recycle all site waste as far as practicable so that the objective of the plan are met;
- ▶ Involve any waste contractors before construction commences to ensure waste management strategies are compatible with collection systems; and
- ▶ Provide relevant training and ongoing education to ensure the strategy is effectively implemented.

In addition to the overall objectives of the waste minimisation strategy, specific options that can be utilised to address the principles of the waste management hierarchy in order of preference are provided below:

Waste Avoidance

- ▶ Use designs that minimise the generation of waste during construction and allow waste management facilities during the building operations;
- ▶ When selecting a product or material consider the durability of materials and future cost savings of buying an item once and reusing it in a number of ways over the life of the development;
- ▶ Include clauses in contracts that discourage over supply of materials and the generation of waste;
- ▶ As far as possible accurately estimate the quantities of materials required for the job to avoid over supply;
- ▶ Minimise the handling and transport of materials on and off-site; and
- ▶ Implement erosion and sediment control procedures to ensure that sediment content in stormwater is appropriately managed to minimise erosion on site.

Waste Reuse

- ▶ Ensure waste is separated into recoverable and non-recoverable streams. Also



ensure new and undamaged recovered waste materials are kept separated;

- ▶ Establish a specific area within the site for the storage and removal of different streams of recovered waste materials. It should be secure and access restricted to authorised personnel;
- ▶ Mulch or chip and reuse vegetation wastes in landscaping;
- ▶ Crush large quantities of concrete, brick and other suitable materials and use as roadbase footings (where specifications can be met) retaining walls, drainage etc.;
- ▶ Organise pallet returns with follow on deliveries with suppliers where possible;
- ▶ Plan to use excess or waste materials effectively, for example:
 - identify which waste materials will be generated (eg concrete, timber, plasterboard, fill etc) and determine how they could be reused;
 - coordinate use of material between jobs, excess materials can be used on other sites if required;
 - consider how excess or waste material could be used if they become available (e.g. fill, drainage material, soil conditioners, framing etc);
 - advertise the availability of free recovered waste materials locally;
 - maximise the separation of wastes and minimise the contamination of recoverable materials;
- ▶ Stockpile unused waste material for future use, ensure stockpiles are well managed;
- ▶ Reuse off-cuts where possible and store appropriately in the interim; and
- ▶ Engage a recovery contractor to remove recoverable materials from site.

Waste Recycling

- ▶ Consider using products and materials with recycled content where possible. Check the performance of recycled content products to ensure they meet engineering specification;
- ▶ Notify suppliers that recycled content products are preferred where other technical specifications are also met;
- ▶ Use fixtures / materials in fit-outs that can be reused in later refurbishments; and
- ▶ Consider using fly ash as a component of concrete to reduce the use of virgin materials.

Waste Disposal

- ▶ Collect data and record the movement of waste and recovered materials on and off site. Require contractors to supply this information as part of the contract;
- ▶ Identify the specific locations of potential sources of waste material (e.g. site sheds



and offices, particular trades, particular work activities or areas);

- ▶ Develop disposal procedures such as the types of containers to be employed, clear and appropriate signage, suitable location for bins and stockpiles;
- ▶ Provide relevant training and ongoing education to ensure efficient disposal (e.g. minimal contamination, maximum resource recovery);
- ▶ Utilise chemical toilet and ablutions facilities for construction workers or drain waste water to holding tanks that can be emptied by a contractor; and
- ▶ Early installation of stormwater control devices and cut off drains to manage runoff from construction areas to ensure appropriate disposal and handling of stormwater sources.

Specific reference should be given to the typical types of construction materials likely to be used in North Queensland and at this development, namely:

- ▶ Sheet metal (galvanised corrugated steel etc) used for roofing and in shed construction;
- ▶ Concrete (besser) blocks used in building construction.

It is considered likely that these materials will form a large fraction of the materials used in construction.

Sheet metal can be recycled and should be separated from general mixed waste. A specific metal recycling bin should be provided during construction for waste metals to be placed. Generally scrap metal skips will be provided by scrap metal contractors on request.

Concrete blocks can also be recycled with waste concrete and should be separated from general waste. A designated waste concrete area should be provided during construction and concrete blocks (off-cuts or waste) should be stockpiled here prior to removal to a concrete recycling facility. It is noted that most landfills provide concrete recycling.

2.1.2 Operational waste

Wastes associated with the operation of the marina and the affected environmental values, potential impacts and management options have been further broken down into shipping and boating waste (wastes generated on board) and industrial and commercial wastes (wastes generated on land).

Table 4 details the environmental values, potential impacts and management options associated with shipping and boating wastes whilst Table 5 deals with those wastes generated on land by industrial and commercial operations.

Table 4 Shipping and Boating Waste

Material	Environmental value	Potential impacts	Management options
Paper	Visual amenity, flora.	Degrade visual amenity. Kill / injure fauna via ingestion, entanglement	Provide receptacles for general waste and recyclables at appropriate locations. Provide separate facilities for commercial and recreational users.
Metals	Visual amenity, fauna.	Degrade visual amenity. Kill / injure fauna via ingestion, entrapment.	Provide receptacles for general waste and recyclables at appropriate locations. Provide separate facilities for commercial and recreational users.
Glass	Visual amenity, fauna.	Degrade visual amenity. Kill / injure fauna via ingestion, entrapment.	Provide receptacles for general waste and recyclables at appropriate locations. Provide separate facilities for commercial and recreational users.
Plastics	Visual amenity, fauna.	Degrade visual amenity. Kill / injure fauna via ingestion, entanglement, entrapment.	Provide receptacles for general waste and recyclables at appropriate locations. Provide separate facilities for commercial and recreational users.
Fishing nets and other equipment	Visual amenity, fauna.	Degrade visual amenity. Kill / injure fauna via ingestion, entanglement.	Provide receptacles for general waste and recyclables at appropriate locations. Provide separate facilities for commercial and recreational users.
Hold sweepings	Visual amenity, water, soil, fauna.	Degrade visual amenity. Increase nutrient loading in marina waters, or contaminate water and soil with toxic substances. Kill / injure fauna via contamination, ingestion, entanglement.	Ensure hold sweepings are contained and disposed of to an appropriate receptacle. Prescribe procedures for hold sweeping disposal such as removal by waste removal contractor.

Material	Environmental value	Potential impacts	Management options
Galley waste	Visual amenity, odour, water, fauna, flora.	Degrade visual amenity, create odour issues. Increase nutrient loading in marina waters which will inturn impact on flora and fauna. Create pest issues.	Provide specific receptacles for commercial users or ensure galley wastes are removed directly from vessel by waste removal contractor. Provide sufficient general waste receptacles for public use.
Fish / other animal wastes	Visual amenity, odour, water, flora, fauna.	Degrade visual amenity, create odour issues. Increase nutrient loading in marina waters which may inturn impact on flora and fauna. Create pest issues.	Provide specific receptacles for commercial users or ensure fish and other animal wastes are removed directly from vessel by waste removal contractor. Prescribe procedure for commercial users. Provide fish cleaning preparation areas with special disposal receptacles for public use.
Batteries	Visual amenity, water, soil, flora, fauna.	Degrade visual amenity. Contaminate marina waters and / or sediment. Kill / injure flora and fauna via toxicity. Bioaccumulation and health and safety issues.	Provide battery recycling transfer area where customers can deposit battery before battery recycling contractor collection. Provide contact details of battery recycling contractor for pickup service.
Fluorescent and mercury vapour lamp bulbs	Visual amenity, water, soil, flora, fauna.	Degrade visual amenity. Contaminate marina waters and / or sediment. Kill / injure flora and fauna via toxicity. Bioaccumulation and health and safety issues.	Provide a separate disposal receptacle where items such as these can be deposited prior to removal by contractor.

Material	Environmental value	Potential impacts	Management options
Waste oil	Visual amenity, water, soil, flora, fauna.	Degrade visual amenity. Contaminate marina waters and / or sediment. Kill / injure flora and fauna via toxicity. Bioaccumulation and health and safety issues.	Provide pump out facility or appropriate access / locations for sucker trucks to remove ¹ . Provide separate waste oil deposit facility for commercial and recreational users. Prescribe waste oil removal procedures for both commercial and recreational users.
Oily mixtures including fuel residues	Visual amenity, water, soil, flora, fauna.	Degrade visual amenity. Contaminate marina waters and / or sediment. Kill / injure flora and fauna via toxicity. Bioaccumulation and health and safety issues.	Provide pump out facility or appropriate access / locations for sucker trucks to remove ¹ . Provide separate deposit facility for commercial and recreational users. Prescribe removal procedures for both commercial and recreational users.
Oily mixtures containing chemicals	Visual amenity, water, soil, flora, fauna.	Degrade visual amenity. Contaminate marina waters and / or sediment (may include contaminants such as soaps, cleaners or engine coolant). Kill / injure flora and fauna via toxicity. Bioaccumulation and health and safety issues.	Provide pump out facility or appropriate access / locations for sucker trucks to remove ¹ . Provide separate facility for commercial and recreational users. Prescribe removal procedures for both commercial and recreational users. Avoid mixture of chemicals which may result in health and safety issues.

Material	Environmental value	Potential impacts	Management options
Tank wash water	Water, soil, flora, fauna.	<p>Contaminate marina waters and / or sediment if containing contaminants (may include contaminants such as oils, fuel and residues, soaps, cleaners or engine coolant).</p> <p>Increase nutrient loading in marina waters where containing fish / food waste, which may inturn impact on flora and fauna.</p> <p>Kill / injure flora and fauna via toxicity / eutrophication.</p> <p>Bioaccumulation and health and safety issues.</p>	<p>Provide pump out facility or appropriate access / locations for sucker trucks to remove ¹.</p> <p>Provide separate facility for commercial and recreational users.</p> <p>Prescribe removal procedures for both commercial and recreational users.</p> <p>Avoid mixture of chemicals which may result in health and safety issues.</p>
Noxious liquids	Water, soil, flora, fauna.	<p>Contaminate marina waters and / or sediment.</p> <p>Kill / injure flora and fauna via toxicity.</p> <p>Bioaccumulation and health and safety issues.</p>	<p>Provide pump out facility or appropriate access / locations for sucker trucks to remove ¹.</p> <p>Provide separate facility for commercial and recreational users.</p> <p>Prescribe removal procedures for both commercial and recreational users.</p> <p>Avoid mixture of chemicals which may result in health and safety issues.</p>

Material	Environmental value	Potential impacts	Management options
Sewage grey water / black water	Visual amenity, air, water, flora, fauna.	Degrade visual amenity. Objectionable odour. Contaminate marina waters. Increase nutrient loading in marina waters. Kill / injure flora and fauna via toxicity and eutrophication. Health and safety issues.	Provide pump out facility or appropriate access / locations for sucker trucks to remove ¹ . Provide separate facility for commercial and recreational users. Prescribe removal procedures for both commercial and recreational users.

¹ The marina management may provide pump out facility for specified types and quantities of liquid waste or direct liquid waste disposal to an appropriate liquid waste management contractor. For example marina management may prescribe that “oily bilge water not contaminated with soaps, cleaners or engine coolant and less than 150L may be pumped via the onsite pump out facility. For oily bilge water contaminated with soaps, cleaners or engine coolant or more than 150L boat owners should contact the appropriate liquid waste management contractor for removal via sucker truck.

Table 5 Commercial and Industrial Waste

Material	Environmental value	Potential impacts	Management options
<i>Industrial</i>			
<i>manufacturing, repair, maintenance, etc.</i>			
Paper Paper from packaging of goods, etc.	Visual amenity, water, soil, flora, fauna.	Degrade visual amenity. Not readily biodegradable. Potential leaching of contaminants to water and soil. Contaminants may be toxic to flora and fauna.	Minimise packaging in production and select products with minimal packaging. Provide paper recycling facilities to commercial premises. Ensure waste receptacles have sufficient capacity and are emptied as frequently as required.
Plastic Plastic packaging form industrial operations, packing tape, shrink wrap, other waste plastic associated with repair maintenance of vessels, plastic containers from various industries (e.g. fish processing)	Visual amenity, water, soil, flora, fauna.	Degrade visual amenity. Not readily biodegradable. Potential leaching of contaminants to water and soil. Contaminants may be toxic to flora and fauna. Kill / injure fauna via entanglement, entrapment, ingestion.	Minimise plastic waste in production processes, select products with minimal plastic packaging. Select / use / produce products with recyclable / reusable plastic. Provide plastic recycling receptacles to commercial and industrial clients. Include public place recycling receptacles to fit with local recycling practice.

Material	Environmental value	Potential impacts	Management options
<p>Foam</p> <p>Foam containers, packaging, protective covers, other foams used in vessels, floats and other items.</p>	<p>Visual amenity, water, soil, flora, fauna.</p>	<p>Degrade visual amenity.</p> <p>Not readily biodegradable.</p> <p>Potential leaching of contaminants to water and soil.</p> <p>Contaminants may be toxic to flora and fauna.</p> <p>Kill / injure fauna via entanglement entrapment, ingestion.</p>	<p>Minimise foam waste in production processes, select products with minimal foam packaging.</p> <p>Reuse where possible.</p> <p>Provide recycling receptacles for Expanded Polystyrene (EPS).</p> <p>Potential to include in recycling bins for separation at Material Recovery Facility (MRF).</p>
<p>Non ferrous metals</p> <p>Scrap metals such as aluminium / brass from maintenance or industrial operations, paint tins etc.</p>	<p>Visual amenity, water, soil, flora, fauna.</p>	<p>Degrade visual amenity.</p> <p>Potential leaching of contaminants to water and soil.</p> <p>Contaminants may be toxic to flora and fauna.</p>	<p>Minimise scrap in production / repair / maintenance.</p> <p>Reuse in next or another process (e.g. repair / maintenance).</p> <p>Provide recycling facilities / collection service.</p> <p>Provide recycling receptacles in public places and for commercial users for cans / tins etc.</p>
<p>Steel</p> <p>Scrap metals from maintenance or industrial operations</p>	<p>Visual amenity, water, soil, flora, fauna.</p>	<p>Degrade visual amenity.</p> <p>Potential leaching of contaminants to water and soil.</p> <p>Contaminants may be toxic to flora and fauna.</p>	<p>Minimise scrap in production / repair / maintenance.</p> <p>Reuse in next or another process (e.g. repair / maintenance).</p> <p>Provide recycling facilities / collection service.</p>

Material	Environmental value	Potential impacts	Management options
Sandblasting grit Sandblasting grit and associated contaminants.	Air, water, soil, flora, fauna.	Contamination to air of fine particles including silica and heavy metals. Nuisance dust Contamination of water, soil by heavy metals and other contaminants associated with surfaces requiring blasting such as paints. Potential leaching of contaminants to soil and water. Contaminants may be toxic to flora and fauna.	Ensure sandblasting is conducted in contained environment to prevent discharge to air, water or soil. Ensure blasting material is collected and disposed of appropriately.
Paint chips Paint chips and material from maintenance / repair of boats.	Air, water, soil, flora, fauna.	Contamination of water and soil (sediment) by antifouling, anticorrosive paints and products (potential contamination by various metals and chemicals including TBT, PCB's lead, zinc, copper). (Contamination of air and subsequently water and soil via application of new paint) Contaminants may be toxic to flora and fauna. Bioaccumulation issues.	Ensure paint removal via sandblasting or high pressure water is conducted in enclosed, controlled facility. Sandblasting material to be collected and disposed of appropriately. High pressure water runoff to be controlled and treated to remove all contaminants prior to release to harbour (may require disposal to sewer via trade waste agreement) ¹ .

Material	Environmental value	Potential impacts	Management options
<p>Fibreglass and related products</p> <p>Fibreglass, resin, hardener, foams from vessel maintenance / repair and other industrial process.</p>	Air, water, soil, flora, fauna.	<p>Release to air of toxic substances including vapours from mixing and curing processes, via evaporation etc.</p> <p>Objectionable odour.</p> <p>Contamination of water, soil from toxic chemicals.</p> <p>Contaminants may be toxic to flora and fauna.</p> <p>Contamination of other products such as rags etc.</p> <p>Potential fire or explosions.</p>	<p>Minimise production of waste through planning and good work practice.</p> <p>Include ventilation and treatment systems for air contaminants in facilities used for fibreglass related activities.</p> <p>Localise or isolate high emission and hazardous waste producing activities.</p> <p>Store in covered, bunded facility with at least 110% capacity bunding.</p> <p>Install spill containment infrastructure.</p> <p>Do not allow mixing of hazardous and non hazardous materials.</p> <p>Ensure waste chemicals and contaminated materials such as rags are collected and disposed of appropriately.</p>
<p>Biological waste</p> <p>Fish and other waste from processing and packaging. Organisms from anti fouling maintenance.</p>	Visual amenity, air, water, flora, fauna.	<p>Degrade visual amenity, create odour.</p> <p>Increase nutrient loading in marina waters which may inturn impact on flora and fauna.</p> <p>Create pest issues.</p>	<p>Fish and other related biological waste may be able to be reused in other processes such as fertilizer / feed production.</p> <p>Contain fish and other waste in sealable containers and dispose of to appropriate facility daily or as required.</p> <p>Prohibit disposal to waters also prohibit disposal of waters contaminated with biological waste to marina waters.</p>

Material	Environmental value	Potential impacts	Management options
Oil / fuel / residues From service, repair, maintenance and other industrial processes.	Visual amenity, water, soil, flora, fauna.	Degrade visual amenity. Contaminate marina waters and / or sediment. Kill / injure flora and fauna via toxicity. Bioaccumulation and health and safety issues.	Ensure facilities have spill containment infrastructure (e.g. triple interceptors).
Chemical wastes Anti-fouling, cleaning and other industrial chemicals, adhesives, glues, etc.	Air, water, soil, flora, fauna.	Release to air of toxic substances including vapours from mixing or via evaporation etc. Objectionable odour. Contamination of water, soil from toxic chemicals. Contaminants may be toxic to flora and fauna. Bioaccumulation issues. Potential fire or explosions.	Minimise production of waste through planning and good work practice. Include ventilation and treatment systems for air contaminants in facilities. Localise or isolate high emission and hazardous waste producing activities. Store in covered, bunded facility with at least 110% capacity bunding. Install spill containment infrastructure. Do not allow mixing of hazardous and non hazardous materials. Ensure waste chemicals and contaminated materials such as rags are collected and disposed of appropriately.

Material	Environmental value	Potential impacts	Management options
<p>Sewage grey water / black water</p> <p>Sewage from site facilities.</p>	<p>Visual amenity, air, water, flora, fauna.</p>	<p>Degrade visual amenity.</p> <p>Objectionable odour.</p> <p>Contaminate marina waters.</p> <p>Increase nutrient loading in marina waters.</p> <p>Kill / injure flora and fauna via toxicity and eutrophication.</p> <p>Health and safety issues.</p>	<p>Ensure facilities are connected to town sewer system or onsite wastewater treatment system.</p> <p>Ensure pump out facilities are controlled and banded as to minimise spillage.</p> <p>Ensure correct fittings are used when pumping into pump out facilities.</p>
<p>Timber</p> <p>Wood products used in repair and maintenance of vessels and in various industrial processes, pallets, formwork, etc.</p>	<p>Visual amenity, soil, water, flora, fauna.</p>	<p>Degrade visual amenity.</p> <p>May be contaminated with other chemicals from repair or maintenance works.</p> <p>Potential for contaminants to be released to waters and soil.</p> <p>Contaminants may be toxic to flora and fauna.</p>	<p>Minimise waste timber through good work practice and planning.</p> <p>Reuse timber where possible.</p> <p>Recycle uncontaminated timber products.</p> <p>Do not mix uncontaminated and contaminated timber waste.</p> <p>Dispose of contaminated timber products appropriately.</p>

Material	Environmental value	Potential impacts	Management options
<p>Paint</p> <p>Paint used in repair and maintenance of vessels.</p>	Air, water, soil, flora, fauna.	<p>Release to air of toxic substances including vapours from mixing or via evaporation etc.</p> <p>Objectionable odour.</p> <p>Contamination of water, soil from toxic chemicals.</p> <p>Contaminants may be toxic to flora and fauna.</p> <p>Bioaccumulation issues.</p> <p>Potential fire or explosions.</p>	<p>Minimise production of waste through planning and good work practice.</p> <p>Include ventilation and treatment systems for air contaminants in facilities.</p> <p>Do not allow painting in harbour waters, where painting is required vessels should be in dry dock and appropriate controls in place.</p> <p>Localise or isolate high emission and hazardous waste producing activities.</p> <p>Store in covered, bunded facility with at least 110% capacity bunding.</p> <p>Install spill containment infrastructure.</p> <p>Do not allow mixing of hazardous and non hazardous materials.</p> <p>Ensure waste paint and contaminated materials such as rags and brushes are collected and disposed of appropriately.</p>
<p>Glass</p> <p>Sheet glass, screens bottles and containers.</p>	Visual amenity.	Degrade visual amenity.	<p>Reuse containers, sheets etc where possible.</p> <p>Provide glass recycling receptacles for industrial users.</p> <p>Provide commingled recycling facilities that can accept glass for public use.</p>

Material	Environmental value	Potential impacts	Management options
<p>Batteries</p> <p>Lead acid and other batteries from vessels and other machinery used in the industrial processes at the site.</p>	<p>Visual amenity, water, soil, flora, fauna.</p>	<p>Degrade visual amenity.</p> <p>Contamination of water, soil from toxic chemicals.</p> <p>Contaminants may be toxic to flora and fauna.</p> <p>Bioaccumulation issues.</p>	<p>Provide battery disposal facility for the marina or ensure waste management contractor is available to collect batteries as required.</p> <p>Store batteries in covered banded facility prior to removal to battery recycling facility by appropriate waste contractor.</p>
<hr/> <p>Commercial</p> <p>Retail, administration, restaurants, etc.</p>			
<p>Paper</p> <p>Food packaging, wrapping, other product packaging, office paper, etc.</p>	<p>Visual amenity, water, soil, flora, fauna.</p>	<p>Degrade visual amenity.</p> <p>Not readily biodegradable.</p> <p>Potential leaching of contaminants to water and soil.</p> <p>Contaminants may be toxic to flora and fauna.</p>	<p>Minimise packaging in service and select products for use / sale with minimal packaging.</p> <p>Provide paper recycling facilities to commercial premises.</p> <p>Provide public place recycling facilities.</p> <p>Ensure waste receptacles have sufficient capacity and are emptied as frequently as required.</p>

Material	Environmental value	Potential impacts	Management options
Plastic Packaging, bottles, other containers, wrapping, etc.	Visual amenity, water, soil, flora, fauna.	Degrade visual amenity. Not readily biodegradable. Potential leaching of contaminants to water and soil. Contaminants may be toxic to flora and fauna. Kill / injure fauna via entanglement, entrapment, ingestion.	Minimise plastic waste in service, use / sell products with minimal plastic packaging. Select / use / sell products with recyclable / reusable plastic. Provide plastic recycling receptacles to commercial clients. Include public place recycling receptacles to fit with local recycling practice.
Glass Glass bottles, jars, etc.	Visual amenity.	Degrade visual amenity.	Provide glass recycling receptacles to commercial premises. Include public place recycling receptacles to fit with local recycling practice.
Metals Aluminium drink cans, other food cans, etc.	Visual amenity, water, soil, flora, fauna.	Degrade visual amenity. Potential leaching of contaminants to water and soil. Contaminants may be toxic to flora and fauna.	Provide recycling receptacles to commercial premises. Include public place recycling receptacles to fit with local recycling practice.
Food waste Left over food from restaurants and other services.	Visual amenity, air, water, flora, fauna.	Degrade visual amenity, create odour. Increase nutrient loading in marina waters which may inturn impact on flora and fauna. Create pest issues.	Minimise production of food waste through good work practice and planning. Provide food waste receptacles to commercial premises such as restaurants. Ensure sufficient waste receptacles are located in public areas and ensure these are emptied as required.

Material	Environmental value	Potential impacts	Management options
<p>Sewage grey water / black water</p> <p>Sewage from toilets, showers, sinks, kitchens and other facilities.</p>	<p>Visual amenity, air, water, flora, fauna.</p>	<p>Degrade visual amenity.</p> <p>Objectionable odour.</p> <p>Contaminate marina waters.</p> <p>Increase nutrient loading in marina waters.</p> <p>Kill / injure flora and fauna via toxicity and eutrophication.</p> <p>Health and safety issues.</p>	<p>Ensure facilities are connected to town sewer system or onsite wastewater treatment system.</p>
<p>Mixed waste</p> <p>Mixed waste of which no one material comprises 50% or more of the load, e.g. paper and plastic packaging etc.</p>	<p>Visual amenity, air, water, soil, flora, fauna.</p>	<p>Degrade visual amenity, create odour.</p> <p>Potential leaching of contaminants to water and soil.</p> <p>Potential to increase nutrient loading or waters, eutrophication.</p> <p>Contaminants may be toxic to flora and fauna.</p>	<p>Minimise mixed waste by providing and promoting recycling opportunities for both commercial premises and in public places.</p> <p>Provide separate receptacles for commercial premises and public.</p> <p>Ensure receptacles have lids, have sufficient capacity and are emptied as required.</p>
<p>Timber</p> <p>Wood products used in industrial processes, pallets, etc.</p>	<p>Visual amenity, soil, water, flora, fauna.</p>	<p>Degrade visual amenity.</p> <p>May be treated with chemicals.</p> <p>Potential for contaminants to be released to waters and soil.</p> <p>Contaminants may be toxic to flora and fauna.</p>	<p>Minimise waste timber through good work practice and planning.</p> <p>Reuse timber where possible.</p> <p>Recycle uncontaminated timber products.</p> <p>Do not mix uncontaminated and contaminated timber waste.</p> <p>Dispose of contaminated timber products appropriately.</p>

¹ Runoff from high pressure cleaning (using water), unlike material from sandblasting, is often not associated with contamination of harbour waters and sediment; however this pathway may be a significant source of contaminants in harbour waters and sediment (Johnsen, A. and Engoy, T.)

2.2 Recommended Management Measures

2.2.1 Shipping and Boating

The waste facilities catering for shipping and boating (commercial and recreational), should be able to receive MARPOL 73/78 Annex V wastes (garbage) and Annex I wastes (waste oil and oily mixtures) as well as being capable of handling any other wastes in the quantities that would normally be handled or discharged (e.g. by a fleet of 50 trawlers and 40 potential recreational berths / pile moorings).

Management options for shipping and boating wastes for both commercial and recreational users are described below.

In the absence of any specific guidelines for marinas within Queensland, these management measures have been based on the ANZECC (1997) *Strategy to Protect the Marine Environment – Best Practice Guidelines for Waste Reception Facilities at Ports, Marinas and Boat Harbours in Australia and New Zealand*.

Solid Waste

- ▶ For general solid waste including galley waste specific receptacles are required. The location of receptacles should be accessible for both clients, marina personnel and removal contractor. Typically mobile garbage bins at the end of each pier of the marina would be required. In addition, receptacles at any public boat ramp and car and boat parking area would be required. Furthermore these facilities should be accessible to users of pile moorings;
- ▶ The sizing of bins would be dependent on the contractor however it is likely that the sizing would be one of the following:
 - 1 m³ steel skip bins;
 - 240 L mobile plastic garbage bin (“wheelie bin”);
- ▶ Receptacles for all types of waste received at the facility should be clearly labelled and sign posted. Furthermore waste storage areas should be designed so that wind and pests including birds and other animals cannot cause spreading of waste and disease;
- ▶ Information on the correct use of each facility should be displayed and readily visible on signs at the containers or receptacles;
- ▶ Additional facilities should be provided for recycling and/or reuse of suitable materials including glass, aluminium and steel, paper, plastic and batteries. Appropriate facilities may include:
 - Centralised recycling area, where marina users can segregate their recyclable material; or
 - Co-location with general solid waste (garbage bins) for non hazardous recyclables;
 - Considering the Townsville Regional Council already operates a two bin system with a separate receptacle for recycling, it would be appropriate for the marina operators to fit into this system, as such, a separate receptacle for commingled recyclables (paper, plastic, glass, cans) would be recommended;

- ▶ Spare bins should be available to ensure there is always backup capacity;
- ▶ Procedures should be put into place with the selected waste management contractor for unscheduled collection in the event that receptacles become full; and
- ▶ People who have caught fish should be encouraged to take fish home to clean or an appropriate cleaning facility should be provided.

Liquid Waste

The provisions of liquid waste reception facilities should consider the following:

- ▶ Type of liquid waste being received, any risk associated with the storage combinations of liquid wastes, segregation where necessary;
- ▶ Use of standard fittings, with adaptors where necessary;
- ▶ Treatment and disposal methods;
- ▶ Transport access; and
- ▶ Statutory approvals to store and operate.

In addition reception facilities for sewage specifically need to consider the following:

- ▶ Type of sewage, namely; septic sewage, sullage, galley waste, chemical toilet sewage, grey water, sludge from anaerobic treatment systems;
- ▶ Frequency of use and necessary capacity;
- ▶ Constraints of the receiving sewage treatment systems such as maximum daily delivery rates;
- ▶ Limitations of sewage transfer such as pump capacity and pumping rates;
- ▶ Minimisation of odour release to the surrounding environment;
- ▶ Protection from accidental spillage during waste transfer; and
- ▶ Provisions of a freshwater hose for flushing out vessel sewage holding tanks.

A number of options are available for the reception of liquid waste (including sewage) at the marina, including:

- ▶ Direct discharge of sewage to onsite storage tanks in a centralised location via the use of pumping systems for treatment or storage prior to discharge or removal by an appropriate waste contractor. In addition this should include a centralised recycling station for waste oil and grey water, solvents and thinners;
- ▶ Discharge directly into the local sewage system; and
- ▶ Direct removal by a waste management contractor via sucker truck.

A combination of these options is likely to be required, which may involve direct removal by a waste management contractor via a sucker truck for trawling vessels and removal to a storage or treatment facility for recreational vessels.

For non-sewage liquid waste typical treatment includes a settling tank or pit, which may double as a flow

equalisation tank, followed by a corrugated plate interceptor then a filter designed to suit the specific waste types encountered. Discharge may be to sewer or via a waste management contractor.

2.2.2 Commercial and Industrial Operations

Waste management at the commercial and industrial facilities at the marina including boat building, maintenance, repair facilities, restaurants and seafood processing or markets must comply with the regulations outlined in the EPP Waste and detailed in section 2.1.2 of the is report. The operators of these facilities should adopt the objectives of the legislation into their operation and waste management practices. Specifically these facilities should adopt processes that achieve alignment with the waste management hierarchy, which is as follows;

- ▶ Waste avoidance;
- ▶ Waste re-use;
- ▶ Waste recycling;
- ▶ Energy recovery from waste; and
- ▶ Waste disposal.

Specifically boat building, maintenance, repair and cleaning should be conducted only in designated area so as to optimally manage associated solid and liquid wastes. The following guidelines are provided as a means to minimise environmental impacts associated with wastes from maintenance, repair and cleaning:

- ▶ Maintenance work should be performed inside buildings or under cover where possible, to reduce contamination to stormwater;
- ▶ All maintenance activities should be performed over impenetrable surfaces that are properly drained to a collection facility to prevent contaminated or toxic materials entering the waters;
- ▶ Abrasive blast cleaning (eg sand blasting) should be performed within spray booths or suitable enclosures so all wastes and residues can be contained, collected and properly disposed of;
- ▶ High pressure water cleaning should also be performed within a controlled environment and waters from the process should be collected and treated. Washing of hulls on land by mechanical scraping is preferable to high pressure water cleaning as it can produce wastewater contaminated with marine organisms, hull paint and fragments of hull material. High pressure systems must only be used where proper collection, treatment and disposal facilities are available;
- ▶ Vacuum sanders and grinders should be used to minimise potentially polluting dust where possible;
- ▶ Boat cleaning should be performed in a way that minimises release of marine organisms and harmful paints into waters;
- ▶ Chemicals should be kept in a secure area and each container labelled clearly to make disposal and possible recycling easier;
- ▶ Areas used for storage of chemicals including paints should be covered and banded to contain spills;
- ▶ Recycling of chemicals such as oils and solvents should be encouraged with remaining unwanted

chemicals being disposed of to an appropriate facility or removed by an appropriate waste management contractor;

- ▶ Spill plans should be developed and appropriate spill response kits should be stored and kept easily accessible;
- ▶ Appropriate legislative requirements in relation to the use and storage of chemicals should be adhered to in the design and operation of the marina area;
- ▶ Recycling facilities should be included and should fit with existing recycling program for commingled recycling. Recycling of batteries, fluorescent globes, etc should be conducted and appropriate waste management contractors should be engaged for collection; and
- ▶ Consideration should be given to access to waste and recycling receptacles by waste management contractors.

Wastes associated with seafood processing and packaging specifically include expanded polystyrene containers, cardboard boxes, shrink wrap, packing tape and other plastic products. There are various opportunities for reuse and recycling of these products which should be investigated with regard to the specific types, quantities and quality (e.g. contamination) of the wastes produced. Where possible existing recycling programs should be utilised.

3. References

ANZECC (1997) Best Practice Guidelines for the Provision of Waste Reception Facilities at Ports, Marinas and Boat harbours in Australia and New Zealand.

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