Best practice environmental management guideline for scrap metal recycling facilities operating fragmentisers

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Version history

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Prepared by: Regional and Regulation Support, Department of Environment, Science and Innovation

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Part 1 — Guideline context

1 Introduction

The metal recycling industry in Australia is estimated to recover approximately three million tonnes of ferrous metals each year from commercial and industrial sources (Australian Council of Recyclers, 2010). In 2005 GHD reported that in Brisbane alone, nearly half a million tonnes of metals are transported to recycling facilities each year.

The growth in demand for recycled commodities, both nationally and internationally, has led to the development of recycling facilities in Australia with the capacity and technology to process large volumes and highly variable types of scrap metal (scrap metal recycling facilities). In particular, industrial-scale scrap metal recycling facilities, using technology such as shredding and hammer mills (fragmentisers), have been established. This in turn has resulted in the need for greater regulation of such facilities as the extent of environmental impacts associated with their operation becomes known.

Incidents in relation to the environmental performance of scrap metal recycling facilities in Queensland have highlighted the need to develop 'best practice' environmental guidance. Specific issues requiring improvement include:

- facility location
- facility layout
- facility operation and impact management.

1.1 Application of this guideline

The Queensland Department of Environment, Science and Innovation (DESI) has developed this Best Practice Environmental Management Guideline (the Guideline) as a reference document for assessing new and amended applications and conditioning of approvals for scrap metal recycling facilities using fragmentisers. This activity is defined as an Environmentally Relevant Activity (ERA) 54 under the Environment Protection Regulation 2019 (EP Reg). While this guideline focuses on scrap metal facilities using fragmentisers, DESI recognises that the environmental impacts and management strategies associated with other metal recovery activities are essentially a subset of those for fragmentiser facilities. Accordingly, DESI believes this Guideline may also be used by local government as a general reference for the assessment and management of environmental impacts relating to metal recovery activities, such as scrap metal yards or facilities that do not use a fragmentiser, and by the industry itself.

1.2 Guideline objective

The objective of this Guideline is to provide best practice environmental management guidance. 'Best practice' is defined in this Guideline as the techniques, methods, processes and activities that achieve an ongoing minimisation of the activity's environmental harm through cost effective and practical measures (*Environmental Protection Act 1994* (EP Act)).

The scope of this Guideline does not include ancillary activities, such as metal melting or casting, or the transport of scrap metal once it leaves the facility (for example, ship loading).

1.3 Structure of this guideline

This Guideline is organised in the following sections:

- Part 1 (Sections 1 to 4) provides guideline context.
- Part 2 (Sections 5 and 6) provides information on environmental contaminants relevant to scrap metal recycling facilities that operate fragmentisers (fragmentiser facilities).
- Part 3 provides best practice environmental management guidance during the planning / regulatory assessment

stage of proposed new fragmentiser facilities (Section 7) and the operational stage of new and existing fragmentiser facilities (Section 8).

2 Defining the scrap metal recycling industry

The scrap metal recycling industry in Queensland can be defined as the operation of private and public collection processes and facilities for the acceptance, storage, processing, waste disposal and on-sale of scrap metal from private, commercial and industrial sources. The management and recycling of scrap metal is undertaken at a range of facilities, each varying in scale and capacity to process certain classes of metals.

2.1 Sources of scrap metal

The main sources of scrap metal are from:

- domestic use (for example, used appliances)
- commercial and industrial waste streams (for example, end-of-life vehicles (EOLVs), off-cuts, discarded metal products, used equipment, steel mill by-products, used pressure vessels)
- construction and demolition waste streams (for example, steel beams, reinforcing steel, aluminium window frames, and pipes).

2.2 Classes of scrap metal

Scrap metal is generally divided into ferrous metals (for example, iron and steel) and non-ferrous metals (for example, copper, zinc and brass). Ferrous metals are also classed according to thickness:

- metals with a thickness less than 5 mm (light metal)
- metals with a thickness ranging from 5 mm to 20 mm
- metals with a thickness greater than 20 mm (heavy metal).

In addition, the industry removes lead acid batteries (LABs) from vehicles for recycling off-site by others.

2.3 Scrap metal facilities

2.3.1 Scrap metal yards

Scrap metal yards form part of the Queensland scrap metal recycling industry. These facilities operate in local areas to purchase, sort, and then on-sell ferrous and non-ferrous scrap metal to scrap metal recycling facilities. Scrap metal yards generally do not undertake processing of scrap metal materials, other than the removal and separation of ferrous and non-ferrous components of items, such as domestic appliances, or bailing for transport purposes. Scrap metal yards may operate as stand-alone businesses or as part of larger facilities, such as tips or transfer stations.

2.3.2 Scrap metal recycling facilities

Scrap metal recycling facilities employ the use of heavy equipment and machinery to separate, and then process scrap metal into different grades and sizes for export or on-sale to metal foundries. Equipment and machinery employed for the processing of scrap metal is dependent on the nature (size, location, design, etc.) of the facility and typically includes:

- tracked vehicles fitted with electromagnets, cutting shears and grabbers
- hand-held acetylene cutting equipment
- balers
- fragmentisers.

2.3.3 Scrap metal recycling facilities with fragmentisers

Fragmentisers are generally employed where the tonnage of materials to be processed is in the range of 100 tonnes or more of metal per day, or 10,000 tonnes or more of metal per year, and/or where large scrap metal items, such as EOLVs, need to be processed for recycling.

2.3.3.1 Fragmentiser process

Fragmentisers are large-scale industrial shredding machines which process light and heavy metals to a specified grade, using the general process described below:

- Pre-sorted metal products are fed along a conveyor belt into a shredder ('hammer mill'), which pulverises the material.
- During the shredding process, an air blower removes light materials such as paper and fabric.
- Steam is employed during the shredding process to reduce oxygen levels around the hammer mill and so minimise the risk of fire, explosion and odours.
- Shredded material is then fed over an eddy-current generator, which separates non-ferrous scrap (for example, aluminium, copper, brass), and a magnet to remove ferrous scrap.
- Foam, fabrics, rubber and other textiles are removed, resulting in a material known as 'shredder floc', which is disposed of as lined-landfill waste.
- The shredded metals may be further sorted by hand prior to being deposited in a stockpile for on-sale.

2.3.3.2 Fragmentiser facility products

Industry sources have indicated that typically three main classes of products are produced as the result of fragmentiser facility operation. These include:

- ferrous metals (for example, steel) approximately 80% by weight
- non-ferrous metals (for example, copper, aluminium, batteries) approximately 3% by weight
- waste products (floc) approximately 17% by weight.

3 Guideline approach

For this guideline to be used effectively, it is recognised that a fair and pragmatic approach is required to rationalise any substantial increases to costs for existing scrap metal recycling facilities. The strategic environmental and community benefits of recycling need to be balanced with managing the environmental impacts of the industry to ensure it is still cost effective for operators.

Lessons from overseas have shown that expensive soil and groundwater remediation costs on previous fragmentiser sites have, at times, been borne by the community, and this is not considered acceptable. A unique opportunity exists in Queensland to manage this emerging industry in a balanced, risk-focussed manner to minimise potential long-term and short-term environmental harm.

3.1 Existing fragmentiser facilities

Existing facilities will recognise that the long-term impacts of their industry on the environment are only partially understood and these need to be further quantified to allow cost-effective management and monitoring. An appropriate approach for existing facilities would, therefore, be to gather sufficient information from investigations on their sites and the receiving environment to quantify 'real' impacts and their extent. Ideally, existing fragmentiser facilities should be responsible for:

Management:

- Existing facilities may not have comprehensive treatment systems for stormwater and firewater management. As such, sites should assess inputs to the system by:
  - undertaking regular environmental and fire risk assessments
  - keeping abreast with industry innovations and contemporary environmental practices to demonstrate improved performance over time

- assessing environmental and community benefits when considering costings in redesign or system upgrades
- regular review and updating of SBMPs, procedures and practices
- reviewing the effectiveness of existing site stormwater treatment systems.

Treatments:

- Improving clean stormwater diversion through or around the site.
- Stormwater treatment prior to entry into urban stormwater systems.
- Stormwater treatment prior to direct entry to surface waters.

Studies:

- Additional water quality and air quality monitoring to include parameters such as metals, asbestos and polychlorinated biphenyls (PCBs) to assess release levels, quantify impacts and influence zones.
- Monitoring impacts to the receiving environment impacts during operations. This may include stormwater releases and treatment efficacy (ideally before and after each treatment system), groundwater quality, ecological impacts, ambient air quality, process air emission sources and noise (including air blasts).
- Monitoring quality, quantity and volumes of stormwater releases so that annual mass loading of contaminant releases can be assessed.
- Additional studies, such as contamination, groundwater and receiving environment investigations to establish contaminant levels and contaminant types.

Upgrade:

- Review current design for potential upgrades of source and structural controls, facility layouts and stormwater treatment systems and develop site-specific impact management strategies.

Remediation:

- Site remediation and revegetation on completion of operations.

The advantages of gathering this information would benefit both regulators and industry in managing existing fragmentiser facilities in a practical and cost effective manner to ensure relevant parameters are being monitored and relevant impacts are being managed.

3.2 New fragmentiser facilities

Lessons learnt from overseas, relating to expensive remediation of previous fragmentiser sites, support implementation of the ‘Precautionary Principle’, until such time as sufficient information can be gathered to scope long-term and short-term environmental impacts and their extent. It is recommended that new fragmentiser facilities are responsible for:

- gathering baseline data prior to works, such as groundwater and receiving water quality, soil contamination levels, ambient air quality and ecological values
- planning, designing and implementing ‘best practice’ site layouts, source controls, drainage, and treatment trains
- utilising management strategies outlined in section 3.1.1 to minimise contaminated stormwater inputs to treatment trains
- monitoring receiving environment impacts during operations. This would include stormwater releases and treatment efficacy (ideally before and after each treatment system), groundwater quality, ecological impacts, ambient air quality, process air emission sources and noise (including air blasts)
- monitoring stormwater quality, quantity and volumes for annual contaminant mass-loading calculations
- buffer efficacy studies
- best practice site remediation.

It is anticipated that once sufficient information is collected, information requirements and approval conditions can be amended to appropriate levels that balance industry, community and environmental concerns.

4 Environmental licences

4.1 General

All activities that meet the definition for ERA 54 in Schedule 2 of the EP Reg will require an environmental authority to be obtained under the EP Act prior to being able to operate the activity. They will also require a development approval to be obtained under the *Planning Act 2016* (Planning Act).

As an application for a development approval is required, the applicant will need to lodge the application material with the assessment manager and, once properly made, with the concurrence agency. The development approval application will also need to be accompanied with the consent of the land owner.

In most instances, DESI is no longer performing the role of assessment manager or concurrence agency for development applications made under the Planning Act. For applications involving ERA 54, the chief executive of the Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) will generally either be the assessment manager or concurrence agency. However, if the activity is also assessable under a local government planning scheme, the assessment manager will generally be the relevant local council and DSDMIP the concurrence agency. DSDMIP may request technical advice from DESI when assessing the application for a development approval.

If an application for a development approval is made, the application for an environmental authority can be lodged together with, and at the same time as, the application for the development approval. The application requirements for the environmental authority form part of the Integrated Assessment Development System (IDAS) application forms. Specifically, the attachment to IDAS Form 8 collects the necessary information required to lodge an environmental authority application. Applicants will also need to address Module 4 of the State Development Assessment Provisions (SDAP) when making an application for a development approval for a material change of use for an ERA. The SDAP can be found on DSDMIP's website using 'SDAP' as a search term. If approved, the development approval will attach to the land and will contain land use conditions. The environmental authority will attach to the operator and will contain conditions pertaining to the operation of the activity.

All operators must be registered as suitable operators. The suitable operator application can be made either prior to, or together with, the application for an environmental authority.

If a change is made to the activity, the operator will need to determine whether the change will require an amendment of the development approval and/or the environmental authority. Information on amendments to an environmental authority (and impacts on a development approval) can be found on the Business and Industry Portal.

4.2 Notifiable activities

Common land uses which have been identified as likely to cause land contamination, are listed as 'notifiable activities' in Schedule 3 of the EP Act. This schedule includes landfills. As such, any land used for a landfill will need to be placed on the Environmental Management Register (EMR) and operators must notify DESI as soon as landfill operations commence.

The EMR is a land-use planning and management register. The EMR provides information on historic and current land use—including whether the land has been, or is currently used for, a notifiable activity, or has been contaminated by a hazardous contaminant. Sites recorded on the EMR pose a low risk to human health and the environment under the current land use. Entry on the EMR does not mean the land must be cleaned up or that the current land use must stop. However it does mean that if the current use was to stop or change, some land uses may not be suitable as the contamination present on site poses a risk to human health and/or the environment.

Part 2 — Environmental contaminants relevant to fragmentiser facilities

5 Primary contaminants and sources

It is well-recognised that industrial scrap metal recycling facilities which operate fragmentisers present a range of risks to the environment due to the nature of materials received on site and the activities associated with their operation. The primary sources of environmental contamination relevant to each activity are summarised in Table 2.

Table 2: Primary contaminant sources

Primary contaminant[1]		**Source activity**				**Ancillary activities**			
Group	Example	Product receipt	Product storing	Product storage	Processing	Stormwater treatment systems	Equipment wash down	Liquid storage	Waste disposal
Heavy metals		✓	✓	✓	✓	✓	✓	✓	✓
Acids	Sulphuric acid (vehicle batteries)	✓	✓	✓		✓		✓	✓
Asbestos	Vehicle brake pads, pipe lagging	✓	✓	✓	✓				✓
Organic compounds	Hydraulic oils, fuels, lubricating oils, paints, phenols	✓	✓	✓	✓	✓	✓	✓	✓
	PCBs	✓	✓	✓	✓	✓			✓

[1] These are primary contaminant sources only. Additional secondary contaminants may also need to be considered on a site by site basis dependent upon the specific waste stream and the age of the site (for example, site history).

Primary contaminant[1]		**Source activity**				**Ancillary activities**			
Radioactive		✓							
CFC		✓	✓	✓	✓				

6 Receptors, sources and pollution pathways

Table 3 describes the environmental receptors for each of the environmental aspects described in the environmental protection policies; pollution description and primary sources (based on the listing provided in Table 2) and pollution pathways.

Table 3: Environmental receptors, pollution sources and pathways

Receptor	Pollution description and primary source	Pollution pathway
Humans	• Heavy metals from product storage and processing • Hydrocarbons from contaminated products (e.g. EOLVs) • PCBs from transformers, capacitors in old white goods, etc. • Asbestos from EOLVs • Noise from plant and equipment operation • Vibration from plant and equipment operation • Odour from plant operation • Air contaminants from plant and equipment operation and storage • Noxious fumes / smoke from fire • Greenhouse gas emissions from plant and equipment operation and degrading waste products (e.g. shredder floc)	• Direct / inhalation / ingestion of contaminants via air / water (surface or ground) • Bioaccumulation through food chain • Direct exposure to noise, odour and vibration • Breathing noxious fumes / smoke and/or inhaling particulate matter in air
Ecosystems • Land • Aquatic • Fauna • Flora	As listed below for land, surface waters and groundwater.	As listed below for land, surface waters and groundwater in addition to: • Uptake by vegetation through roots • Ingestion of vegetation and water by fauna
Impacts on buildings, structures and property	• Heavy metals from product storage and processing • Hydrocarbons from EOLVs • Vibration from plant and equipment operation • Sediment deposition	• Earthworks • Contaminated ground water, surface water or overland flow waters • Dust • Smoke • Vibration through ground
Land	• Heavy metals from product storage and processing • Hydrocarbons from EOLVs • Vibration from plant and equipment operation • Solid waste (e.g., shredder floc, sediment trap waste, tyres, etc.)	• Surface water flooding • Surface water used for irrigation • Groundwater used for irrigation • Dust • Smoke ash from fire • Vibration through ground • Windblown litter

Receptor	Pollution description and primary source	Pollution pathway
Land cont'd	• Liquid waste (e.g., hydrocarbons from EOLVs, oil / water separator waste, etc.) • Sediment deposition	• Direct waste disposal
Surface waters	• Heavy metals from product storage and processing • Hydrocarbons from EOLVs • Acid, mercury and lead from LABs • Mercury from EOLVs and appliances • PCBs from shredder floc • Turbidity from stormwater releases • Sediments from stormwater releases • Foams and other litter in stormwater releases from processing and storage • Solid waste (e.g., shredder floc, sediment trap waste, tyres, etc.) • Liquid waste (e.g., hydrocarbons from EOLVs, oil / water separator waste, etc.)	• Overland flow from site (e.g., site drainage, vehicle wash down, treatment pond releases, firefighting foam) • Dust blown from site • Smoke/ash from fire • Direct waste disposal • Windblown litter
Groundwater	Leachable pollutants from materials, including: • Heavy metals from product storage and processing • Hydrocarbons from EOLVs • Acid and lead from LABs • Mercury from EOLVs and appliances • PCBs from shredder floc	• Direct seepage through soil • Direct waste disposal • Ingress through surface waters
Air	• Contaminants from plant and equipment operation • Noxious fumes / smoke from fire • Greenhouse gas emissions from plant and equipment operation and degrading waste products (e.g., shredder floc)	• Dust blown from site • Smoke/ash from fire • Direct release of gaseous emissions

Part 3 — Best practice environmental management for new and existing fragmentiser facilities

7 Assessing locations for new facilities

7.1 Overview

Ensuring new fragmentiser facilities are in an appropriate location is critical to managing future potential environmental impacts from the activity. The location of a 'best practice' fragmentiser facility should have the following attributes:

- Located away from conservation areas, parks and recreation areas.
- Located away from threatened regional ecosystems (REs) and 'critical habitat' areas.
- Located away from wetland areas and surface waters (particularly protected wetlands and 'wild rivers').
- Have deep groundwater with non-porous layers above it.
- Located more than 1500 m from dwellings and 'sensitive uses'.
- Located away from commercial / industrial neighbours in accordance with the local Planning Scheme. Consideration should be given to extending this distance to minimise future complaints.
- Have a reasonably flat contour, with site drainage to a single area.
- Have no significant flora or fauna on site or within the immediate surrounds.
- Preferably already be on the EMR.

However, these ideal attributes must be balanced with realistic, urban development constraints and a practical assessment framework for managing impacts to minimise potential environmental harm.

7.2 Development assessment

Assessment will be variable depending on whether 'pre-lodgement / pre-design' opportunities are utilised by the proponent and the scale and intensity of the activity. It is recommended that proponents attend a pre-lodgement / pre-design meeting with the assessment manager and concurrence agency for the following:

- Assessment of the proposed application.
- For advice on what information will be required from the proponent (through use of this Guideline) to make a 'properly made application', and hence guide the regulatory process.
- For advice on what environmental investigations, studies, controls etc. are required as supporting information with the application for a particular site, as all sites are different and have different environmental aspects and impacts.

The recommended minimum (mandatory) outputs from the investigations, studies etc. for assessment of new facilities are summarised in Table 4. These minimum outputs are intended to accompany (and not contradict or substitute) the mandatory supporting information currently required by IDAS Form 8 for ERAs under the SP Act.

Table 1: Minimum outputs from investigations for assessment

Risk	Minimum (mandatory) outputs	Additional outputs[2] (including large developments >1 Ha)	Possible control measures for potential Impacts
Ground water	• Proximity of users • Aquifer type and flow direction • Depth to groundwater • Baseline quality (potable, heavy metals, pH etc.) • Porosity of surface soils (clays, sands etc.) • Mitigation strategies	• Aquifer modelling • Permanent monitoring wells for ongoing monitoring	• Surface treatments to limit infiltration in operational areas • Liners, including concrete for drainage lines and ponds • Source controls • Operational monitoring (ongoing) • Groundwater management plan
Surface water	• Type / name (wetland, creek, ephemeral etc.) and distance from activity • Environmental value of receiving surface waters (statutory context / qualitative) • Protected aquatic species in surface waters (desktop) • Baseline quality of surface waters (heavy metals, PCBs, pH, dissolved oxygen, total suspended solids, turbidity, hydrocarbons etc.) • Surface water users and uses • Contours and Q50 flood line (site and drainage lines to water) • Soil dispersivity (site and to water) • Mitigation strategies	• Flood modelling (Q100) • Flow in cubic metres per second • Catchment analysis • Full parameter baseline quality (all contaminant streams) • Environmental value of water (quantitative) • Protected species (investigation) • Upstream / downstream contaminant sources • Ecology (site to water)	• Detention / treatment ponds • Source and site sediment and erosion controls • Site landscaping • Soil amelioration • Buffers • Riparian revegetation • Waste management • Gross pollutant traps • Release criteria • Stormwater monitoring • Dust controls • Stormwater quality management plan

[2] Additional outputs may be required dependent on the results of studies for minimum inputs and the site specific nature (location, size, design etc.) of the proposal

Risk	Minimum (mandatory) outputs	Additional outputs[2] (including large developments >1 Ha)	Possible control measures for potential Impacts
Soil	• Geological unit • Classification / Description / Profile depths • Baseline quality (e.g., potential acid sulphate soil, pH, dispersivity (ESP), porosity, heavy metals, etc.) • Wind directions / velocities • Mitigation strategies	• Expanded parameter baseline quality expansion of existing sites (TPH/BTEX/PAH, asbestos, PCBs, hydrocarbons, nutrients	• Surface treatments to limit infiltration in operational areas • Liners including concrete for drainage lines and ponds • Source controls • Stormwater treatment trains • Contaminant segregation • Waste management • Site and stormwater monitoring • Dust controls and monitoring • Stormwater quality management plan
Air	• Locations of sensitive users / receptors • Prevailing wind directions / velocities • Hours of operation • Fire management strategy • Mitigation strategies	• Air quality modelling • Fire evacuation plan • Assessment of baseline air quality • Comparisons with similar operations	• Dust management • Limits on stockpile dimensions • Limits on hours of operation for fragmentiser • Buffers • Air quality monitoring (e.g., total suspended particulate matter (TSP), particulate matter with an equivalent aerodynamic diameter less than 10 microns (PM10), dust deposition, heavy metals, asbestos, PCBs) • Air Quality Monitoring Plan • Fire Evacuation Plan

Risk	Minimum (mandatory) outputs	Additional outputs[2] (including large developments >1 Ha)	Possible control measures for potential Impacts
Noise	• Locations of sensitive users / receptors • Prevailing wind directions / velocities • Hours of operation • Mitigation strategies	• Noise contour modelling • Public consultation • Comparisons of similar operations	• Noise barriers • Limits on hours of operation for fragmentiser • Buffers • Boundary Revegetation • Vegetated swales • Setback distances from site boundary for high impact operations • Environmental noise monitoring • Noise Monitoring Plan
Vibration	• Surrounding land uses • Distances to adjacent structures • Insurance limits • Mitigation strategies	• Condition surveys for adjacent structures	• Limits on hours of operation • Requirements for consultation • Financial assurance • Setback distances from site boundary for high impact operations • Vibration monitoring
Site depreciation / degradation	• Distances to conservation areas / recreational areas • Site photographs • Desktop ecological searches and RE mapping • Soil and geotechnical foundation surveys • Detailed site designs including detention/treatment ponds, drainage and processing areas. • Site contours • Environmental Management Plan (Planning) • Landscape design • Mitigation strategies	• Ecological surveys • Protected species searches • ‘Offsets’ investigation • Soil logging data and profiles • Landscape detailed design • Site remediation plan • Public consultation	• Environmental Management Plan (Construction) • Environmental Management Plan (Operation) • Revegetation requirements • Additional studies • Setback distances from site boundary for high impact operations • Financial assurance for site remediation • Site condition monitoring

7.3 Assessment criteria and actions

Table 5 provides guidance on recommended actions for various assessment criteria thresholds during and following development assessment. Control measures can be drawn from the best practice examples provided in Environmental Impact Tables in Appendix A.

Other site specific impacts and actions or mitigation strategies should also be considered in conjunction with these recommendations.

Table 2: Assessment criteria and actions

Environmental impact	Criteria	Recommended action
Groundwater contamination	Aquifer confined >20 m, stiff clay above	No further assessment Minimal control measures
	Aquifer confined, between 5 and 20 m with stiff clay above	Some control measures Minimal monitoring
	Aquifer unconfined, between 5 and 20 m, non-clay above	Control measures and monitoring
	Aquifer < 5 m	Further studies[3]
Surface water contamination	Distance > 1 km	No further assessment Minimal control measures
	Distance between 100 to 1000 m, moderate to low value waterway	Some control measures monitoring
	Distance between 100 to 1000 m, high value waterway or tidal	Control measures and monitoring
	Distance < 100 m	Further studies[3]
Acid sulfate soils	Disturbance < 100 m3 and / or > 5 m AHD	No further assessment Minimal control measures
	Disturbance (excavations > 100 m3 and/or dewatering) < 5 m AHD	Further studies[3]
Soil contamination	Not listed on Environmental Management Register (EMR) or Contaminated Land Register (CLR) or history of previous prescribed uses	No further assessment Minimal control measures Notify administering authority on commencement of notifiable activity.

[3] Further study requirements should be based on site specific risk assessments

Environmental impact	Criteria	Recommended action
Soil contamination cont'd	Listed on EMR or CLR or history of previous prescribed uses	Seek pre-lodgement meeting with the DESI. Further studies may be required to enable a Site Management Plan (SMP) and Site Suitability Statement to be issued for the proposed development.
Odour and dust	Sensitive uses/receptors > 1500 m	No further assessment Minimal control measures
	Sensitive uses/receptors between 500 and 1,500 m	Control measures and monitoring
	Sensitive uses/receptors < 500 m	Further studies[3] and consultation
Noise	Sensitive uses/receptors > 1500 m	No further assessment Minimal control measures
	Sensitive uses/receptors between 500 and 1500 m	Control measures and monitoring
	Sensitive uses/receptors < 500 m	Further studies[3] (may comprise noise modelling, public consultation etc.)
Vibration	Adjacent structures > 500 m	No further assessment Minimal control measures
	Adjacent structures between 100 and 500 m	Control measures and monitoring
	Adjacent structures < 100 m	Additional studies (may include private contracts, consultation, financial assurance and/or proponent insurance)
Site depreciation / degradation	Low site values and no protected species	No further assessment Minimal control measures
	Moderate site values and no protected species	Control measures and monitoring
	High site values or protected species	Offsets/ Further studies[3]/ Financial assurance
Other environmental values	Located adjacent to protected wetlands, World Heritage Areas, National Parks or a Control District	Development refusal

Environmental impact	Criteria	Recommended action
Other environmental values cont'd	Located within conservation areas, critical habitats or endangered REs.	Development refusal

7.4 Other considerations

- Fragmentiser facilities should be located downwind of sensitive receptors and adjacent commercial / industrial neighbours, based on prevailing wind directions, to minimise the effects of noise, odour and air quality emissions on adjacent uses. Prevailing wind directions for areas are available on the Bureau of Meteorology and Weatherzone websites.
- A Queensland Fire and Rescue Service (QFRS) fire evacuation plan should be prepared and reviewed annually.
- Buffers assume that good control practices are implemented and do not eliminate the need for effective diffuse and point source emission control.
- In fragmentiser facility site layout design, consider locating similar and related activities in close proximity to each other to minimise contaminant tracking across site.
- In processing system (fragmentiser) design, consider minimising impacts of noise, vibration and air quality emissions. For example, enclose buildings where possible and design with effective ventilation systems.

7.5 Future planning

In addition to these measures, the scrap metal recycling industry needs to commence planning on future fragmentiser design to allow more flexible management options. An example would be to modify designs so that current diffuse air emissions could be collected at a single point source (for example, stack). Diffuse emissions are difficult to manage outside reducing the hours of operations, whilst point source emissions can be managed through installation of appropriate air pollution control equipment.

8 Operation of proposed and existing fragmentiser facilities

8.1 Environmental impacts

Environmental impact tables have been developed for the primary operational activities typically undertaken by fragmentiser facilities. Tables for stormwater management, energy and carbon management which are applicable to all site activities are also provided.

Each environmental impact table includes:

- associated primary operational activity.
- identification of best practice management strategies for managing each activity to ensure ongoing minimisation of the activity's impact on the environment.
- examples of the implementation of best practice management strategies where possible.

Each primary operational activity and the corresponding environmental impacts associated with each activity are discussed below in Sections 8.2 to 8.6. Environmental impacts associated with stormwater management and energy and carbon management are discussed in Sections 8.7 and 8.8 respectively.

Best practice management strategies used to ensure ongoing minimisation of an activity's environmental harm are developed by considering a number of components:

- Hierarchy of controls (outlined below in Table 6)
- Monitoring of environmental receptors.
- Monitoring of environmental releases.

In addition to the hierarchy of controls outlined in Table 6, monitoring of environmental receptors (for example, surface water, air) and releases (for example, release waters, emission points) form an important component in any

environmental management strategy by assessing effectiveness of site controls and detecting environmental impact.

Table 3: Hierarchy of controls

Priority	Hierarchy of controls	Description
High ↓	Elimination	Remove the hazard completely
	Substitution	Substitute the hazard with something less hazardous
	Engineering	Modify / guard the process to prevent the contaminant entering the receiving environment / treat stormwater in contact with the contaminant / prevent people from contacting the hazard
	Administrative controls	Implement procedures / training / signage / warnings to assist people to work with the hazard / Regulator notification
Low	Personal protective equipment / pollution control equipment	Provide equipment and clothing to protect people should they contact the hazard / Pollution control equipment readily available on site

Environmental management control strategies may be integrated into approval conditions at the discretion of the administering authority and are dependent on the site specific nature (size, location, design, etc.) of each facility.

8.2 Product receipt

Recyclable scrap metal materials are commonly delivered to site from either smaller scrap metal yards owned by the facility or external contractors and private operators in various vehicles (for example, trucks, utes, trailers, semi tippers) where they are weighed, screened (inspected and graded) and received by the facility prior to sorting and processing. On occasion, materials are also received from international sources (for example, Papua New Guinea) where quarantine restrictions apply.

Due to a combination of factors, such as the presence of a payment-by-weight based system, difficulty and expense encountered in disposing of hazardous materials by alternative means (for example, landfill), and a general lack of public awareness of the scrap metal recycling process, it is not uncommon for unacceptable[4] materials to be either inadvertently presented on site for disposal, or intentionally concealed in the waste load (for example, hidden in EOLVs). Examples of unacceptable materials include but may not be limited to the following:

- asbestos
- used pressure vessels (for example, liquid petroleum gas (LPG), oxygen, acetylene)
- non-metallic refuse (for example, tyres, foam)
- chemical substances (for example, pool chlorine, paints)
- hazardous substances (for example, syringes, needles and sharps)
- flammable or explosive substances (for example, fuels and solvents)
- poisonous materials (for example, bleaches, cleaning products and disinfectants)
- closed or sealed containers
- drums that have not been neutralised and certified as clean with tops removed
- radioactive material
- PCBs

[4] Unacceptable materials include materials unauthorized for receipt by the facility by the relevant environmental approval/s and materials unacceptable due to their associated hazards and incompatibility with fragmentiser operation

- devices containing ozone depleting substances (for example, old refrigerators).

The receipt of unacceptable materials within waste loads can lead to regulatory non-compliance with site environmental approvals, in addition to the associated cost of transport and disposal, and a range of environmental hazards requiring the application of specific management procedures by facility operators. The primary control objective (refer Table 6) for product receipt activities is, therefore, to eliminate the presence of unacceptable materials on site through effective screening.

Key environmental impacts associated with product receipt are shown in Table 7. Best practice environmental management strategies that have been developed to minimise these impacts are detailed in Tables 14 to 18 of Appendix A. Table 7 below shows the product receipt activity leading to the environmental impact and refers to the relevant table that contains best practice management strategies for each impact.

Table 4: Key environmental impacts associated with product receipt

Environmental impact	Product receipt activity leading to impact	Table outlining best practice management strategies for minimising environmental impact (Appendix A)
Fire, explosion and excessive contaminant sources	Receipt of unacceptable materials.	Table 14: Environmental impact – Fire, explosion and excessive contaminant sources
Noise, vibration and/or air quality (dust and other airborne contaminants)	Generated when bulk loads of scrap metal are transported and unloaded (dumped from trucks) and from fire and explosion.	Table 15: Environmental impact – Noise (including blasts), vibration and light nuisance and loss of visual amenity Table 16: Environmental impact – Dust, odour, smoke fumes and other airborne contaminants.
Surface water, groundwater and soil contamination	Contaminant leakage during transport and unloading. Sediment laden runoff as a result of dirt and mud build up on internal access roads including entry and exit points. Over supply from suppliers requiring long term storage of excessive volumes of product.	Table 17: Environmental impact – Soil, surface water and groundwater contamination
Introduction of exotic pests and disease	Uncontrolled acceptance of contaminated materials from international sources.	Table 18: Environmental impact – Introduction of exotic pests and disease

Implementation of the environmental management strategies outlined in Appendix A is recommended for the management of key environmental impacts. It is important to note that the recommended establishment of a groundwater monitoring program and / or low permeability surface layers on access roads (including entry / exit points) for the prevention of contaminant impact to groundwater should be assessed on a site by site basis and with the use of the guideline criteria outlined in Table 5.

8.3 Product sorting

Following delivery (product receipt), accepted materials are sorted in designated areas prior to transfer to their respective storage locations for future processing. Typically product sorting areas are located in close proximity to the relevant product storage area to minimise equipment movement around the site.

Specific skill is required to identify, sort and process the range of materials received on site. Some materials, such as EOLVs require thorough screening for the presence of unacceptable materials; for example, batteries and

hydrocarbons, and larger bulky materials require breaking down into a more manageable size with specialist equipment such as large sheers or oxy-acetylene cutters.

Many products received on site are old and used, in a low state of cleanliness, which in turn become a primary source of soil, groundwater and surface water contamination if product sorting and storage areas are uncontrolled (for example, unsealed, unbunded, and/or uncovered). Examples of contaminants present in the scrap metal stream are numerous (refer to Section 5.0 and 6.0) and include chlorofluorocarbons (CFCs) in materials such as air conditioning (domestic, commercial, industrial and vehicular) and refrigeration equipment (particularly in older units); PCBs in materials such as transformers; and acid, mercury and lead in batteries.

Key environmental impacts associated with product sorting are shown in Table 8. Best practice environmental management strategies that have been developed to minimise these impacts are detailed in Tables 14 to 17 and Table 19 of Appendix A. Table 8 shows the product sorting activity leading to the environmental impact and refers to the relevant table that contains best practice management strategies for each impact.

Table 5: Key environmental impacts associated with product sorting

Environmental impact	Product sorting activity leading to impact	Table outlining best practice management strategies for minimising environmental impact (Appendix A)
Fire, explosion and excessive contaminant sources	Incorrect handling of unauthorised materials such as pressure vessels or inadequate removal of rubber prior to oxy-acetylene cutting activities.	Table 14: Environmental impact – Fire, explosion and excessive contaminant sources
Noise, vibration and/or air quality (dust and other airborne contaminants)	Equipment operation during product sorting.	Table 15: Environmental impact – Noise (including blasts), vibration and light nuisance and loss of visual amenity Table 16: Environmental impact – Dust, odour, smoke fumes and other airborne contaminants
Surface water, groundwater and soil contamination	Spills and leaks from product and equipment operation leading to the leaching of contaminants such as heavy metals and organics into soil and groundwater and discharges to offsite surface waters via stormwater runoff.	Table 17: Environmental impact – Soil, surface water and groundwater contamination
Loss of recyclable non scrap metal products	Ineffective product sorting at non-scrap metal recycling facilities.	Table 19: Environmental impact – Loss of recyclable non-scrap metal products

The environmental management strategies outlined in the tables in Appendix A are recommended for management of key environmental impacts. It is important to note the recommended establishment of a groundwater monitoring program and / or low permeability surface layers in product sorting areas for the prevention of contaminant impact to groundwater should be assessed on a site by site basis and with the use of the guideline criteria outlined in Table 5. This does not apply to areas where an Australian Standard applies such as battery and hydrocarbon storage areas (i.e. Australian Standard requirements take precedence).

8.4 Product storage

Materials are stored on site in designated stockpiles or areas waiting either on-site processing or off-site disposal / recycling. Products and waste materials are commonly stored in the following categories:

- EOLVs for processing through fragmentiser

- ferrous scrap metal for processing through fragmentiser
- non-ferrous scrap metal for processing through fragmentiser
- quarantine materials for sorting and processing through fragmentiser
- tyres for sorting and transfer off site
- pressure vessels for decommissioning and processing through fragmentiser / transfer off site
- liquid waste (for example, hydrocarbons, battery acid) for transfer off site
- batteries for transfer off site
- shredder floc for transfer off site
- materials awaiting oxy-acetylene cutting prior to processing through fragmentiser.
- due to the nature (size, location, design, etc.) of activities associated with scrap metal recycling facilities, product stockpiles tend to be:
- large in size
- located outdoors, thereby subject to weather conditions (for example, rainfall, wind and storm events including cyclones) and risk of vandalism
- containing contaminants such as foam, plastic, dirt, hydrocarbons and heavy metals.

Key environmental impacts associated with product storage are shown in Table 9. Best practice environmental management strategies that have been developed to minimise these impacts are detailed in Tables 14 to 17 and Table 20 in Appendix A. Table 9 shows the product storage activity leading to the environmental impact and refers to the relevant table that contains best practice management strategies for each impact.

Table 6: Key environmental impacts associated with product storage

Environmental impact	Product storage activity leading to impact	Table outlining best practice management strategies for minimising environmental impact (Appendix A)
Fire and explosion	Presence of flammable and combustible materials. Risk from vandalism and unauthorised entry.	Table 14: Environmental impact – Fire, explosion and excessive contaminant sources
Loss of visual amenity	Large stockpiles	Table 15: Environmental impact – Noise (including blasts), vibration and light nuisance and loss of visual amenity
Air quality	Nuisance from generation of dust and other airborne contaminants. Odour nuisance associated with storage of open piles of waste material (for example, metals, floc) and liquids drained from EOLVs (for example, fuels).	Table 16: Environmental impact – Dust, odour, smoke fumes and other airborne contaminants
Soil, groundwater and surface water pollution	Contaminant spills and subsequent contaminant leaching and runoff. Gross pollutants, such as plastics and foams, washed and blown off stockpiles.	Table 17: Environmental impact – Soil, surface water and groundwater contamination.
Damage to personnel and property	Airborne scrap metal materials that may re-deposit off site during storm events including cyclones.	Table 20: Environmental impact – Safety and environmental hazard from airborne scrap metal materials

The environmental management controls outlined in the tables in Appendix A are recommended for management

of key environmental impacts. It is important to note the recommended establishment of a groundwater monitoring program and / or low permeability surface layers in product storage areas for prevention of contaminant impact to groundwater should be assessed on a site by site basis and with the use of the guideline criteria outlined in Table 5. This does not apply to areas where an Australian Standard applies such as battery and hydrocarbon storage areas (i.e. Australian Standard requirements take precedence).

8.5 Processing through fragmentiser

Large-scale scrap metal recycling facilities operate fragmentisers which process material (sorts and reduces it to manageable sizes) for further sale and processing (for example, smelting) off site. On-site processing includes a number of ancillary activities such as:

- operation of equipment during feed stockpile material transfer, sorting and handling by equipment such as front end loaders, excavators and conveyors
- generation of metal product transferred to stockpiles with loaders for temporary storage prior to sale and transfer off site by truck
- generation of unwanted and contaminated waste by-products (shredder floc) comprising foam, plastic, electrics etc. transferred to stockpiles with loaders for temporary storage and sampling prior to transfer off site by truck and disposal to landfill.

The activity of processing through fragmentisers of various designs gives rise to a number of key environmental impacts common across the industry. Key environmental impacts associated with processing through fragmentisers are shown in Table 10. Best practice environmental management strategies that have been developed to minimise these impacts are detailed in Tables 14 to 17 and Table 19 in Appendix A. Table 10 shows the activity involved with processing through fragmentisers leading to the environmental impact and refers to the relevant table that contains best practice management strategies for each impact.

Table 7: Key environmental impacts associated with processing through fragmentiser

Environmental impact	Activity associated with processing through fragmentiser	Table outlining best practice management strategies for minimising environmental impact (Appendix A)
Fire and explosion	Presence of flammable and combustible materials	Table 14: Environmental impact – Fire, explosion and excessive contaminant sources
Noise and light nuisance	Generation of noise and light through operation of equipment during feed stockpile material transfer, sorting and handling by front end loaders, excavators, conveyors, trucks, alarms, pumps, fragmentiser operation, public address systems, reverse warning devices and explosions.	Table 15: Environmental impact – Noise (including blasts), vibration and light nuisance and loss of visual amenity
Loss of visual amenity	Large processing facilities and associated equipment.	Table 15: Environmental impact – Noise (including blasts), vibration and light nuisance and loss of visual amenity
Odour and air quality nuisance	Odour associated with storage of open piles of waste material (for example, metals, floc), liquids that drain from EOLVs (for example, fuels) during processing, and fragmentiser operation (for example, hot materials). Generation of airborne	Table 16: Environmental impact – Dust, odour, smoke fumes and other airborne contaminants

Environmental impact	Activity associated with processing through fragmentiser	Table outlining best practice management strategies for minimising environmental impact (Appendix A)
	contaminants (for example, dust, smoke, odour, fumes, CFCs, paint, paper, plastics, adhesives) through operation of the fragmentiser and associated activities, fire and explosions, wind through processing areas, stockpiling and product / floc transfer.	
Soil, groundwater and surface water pollution	Spills during equipment operation and from fluids (for example, petrol and oil) released during fragmentiser operation.	Table 17: Environmental impact – Soil, surface water and groundwater contamination
Loss of recyclable non scrap metal products	Ineffective product sorting and non-scrap metal recycling facilities.	Table 19: Environmental impact – Loss of recyclable non-scrap metal products

The environmental management controls outlined in the tables in Appendix A are recommended for management of key environmental impacts. It is important to note the recommended establishment of a groundwater monitoring program and / or low permeability surface layers in product processing areas for prevention of contaminant impact to groundwater should be assessed on a site by site basis and with the use of the guideline criteria outlined in Table 5. This does not apply to areas where an Australian Standard applies such as battery and hydrocarbon storage areas (i.e. Australian Standard requirements take precedence).

8.6 Ancillary activities

A range of essential ancillary activities such as equipment refuelling and product storage, ship loading activities, wash down and waste disposal (such as floc disposal to lined landfill) are required for day to day operation of scrap metal recycling facilities which operate fragmentisers. It is recognised that some sites may also undertake ancillary activities, such as chemical storage and motor vehicle workshop operation. Separate environmental licensing conditions, best practice guidance and codes of practice apply to these activities and are outside the scope of this Guideline.

Ancillary activities give rise to their own set of environmental impacts which primarily include contamination of soil, surface water and groundwater through hydrocarbon and chemical spills and leaching. Odour nuisance can also result from the presence of open drainage / water treatment pits.

The environmental management controls outlined in the tables in Appendix A are recommended for management of key environmental impacts. It is important to note the recommended establishment of a groundwater monitoring program and / or low permeability surface layers in areas used for ancillary activities for prevention of contaminant impact to groundwater should be assessed on a site by site basis and with the use of the guideline criteria outlined in Table 5. This does not apply to areas where an Australian Standard applies such as battery and hydrocarbon storage areas (i.e. Australian Standard requirements take precedence).

8.7 Stormwater management

Protecting the various values and uses of Queensland waterways is an important component of any development activity, planned or existing. Stormwater management for scrap metal recycling facility sites requires an integrated approach aimed at managing the quality, volume and rate of runoff together with protecting riparian ecosystems.

Stormwater management should be based on the following hierarchy of control mechanisms, outlined in the Urban Stormwater Quality Planning Guideline 2010 (DESI, 2010).

- Preservation—preserving existing valuable elements of the natural stormwater system, such as natural channels, wetlands and riparian vegetation.
- Source control—limiting changes to the quantity and quality of stormwater at or near the source of potential contaminants or changes to flow. Examples of these are provided below:
  - Prevention
    - diversion
    - roofing / gutters / storage
    - bunding
    - cleaning
  - Management
    - minimise contaminated catchment areas
    - separate clean and contaminated catchments
    - capture
  - Reuse
    - production water
    - dust suppression water.
- Structural control—using structural measures, such as treatment techniques or retention basins, to improve water quality and control run-off.

Management needs to be site specific and designed with controls appropriate to the type and nature of soils and other contaminants at each location to effectively preserve the local natural values of these locations. Management measures should be documented in a Stormwater Quality Management Plan (SQMP) for implementation through construction and operational phases.

References that are considered to directly apply to the preparation of site specific SBMPs (which can include supporting Erosion and Sediment Control Plans (ESCPs) where necessary) and their key respective rainfall event design values include:

- Urban Stormwater Quality Planning Guidelines 2010 (DESI, 2010)
- Best Practice Erosion and Sediment Control (International Erosion Control Association (Australia) (IECA), 2008)

Best practice stormwater management practices for scrap metal recycling facilities are focussed on the five primary contaminant streams. The five primary streams that impact most on the receiving environment are PCBs from sources such as electrical components, acid from sources such as car batteries, heavy metals, hydrocarbons and sediment. While the whole site will be treated as contaminated, best practice stockpile and drainage separation strategies may allow for less intense treatment options for stormwater. Controls are based on the following assumptions:

- Treatment for heavy metals will be via pH control. Most heavy metals will generally not dissolve significantly in water >pH 6 and will be bound to clay colloids.
- PCBs will predominantly dissolve in organic fractions such as hydrocarbons and both can be treated in a single process.
- Foams will mostly be captured in the hydrocarbon fractions.

Stormwater management control hierarchy and options are outlined in detail by DESI, 2010 and IECA, 2008 and are also provided in Figure 1: Stormwater management hierarchy and options. It is important to note that ‘first flush’ stormwater treatment systems are not considered appropriate to scrap metal recycling facilities with use of fragmentisers, due to the presence of contaminants in product sorting, storage and processing areas which will remain in stormwater runoff after a ‘first flush’ event.

Contaminated stormwater management strategies are provided in Table 11. There are a number of options presented as the strategies used will depend on the characteristics and constraints of each site.

Stormwater release criteria are provided in Table 12 – Water quality monitoring criteria, with different criteria for planning (new facilities) and operational phases.

Figure 1: Stormwater management hierarchy and options * **NB: Dotted lines indicate best practice**

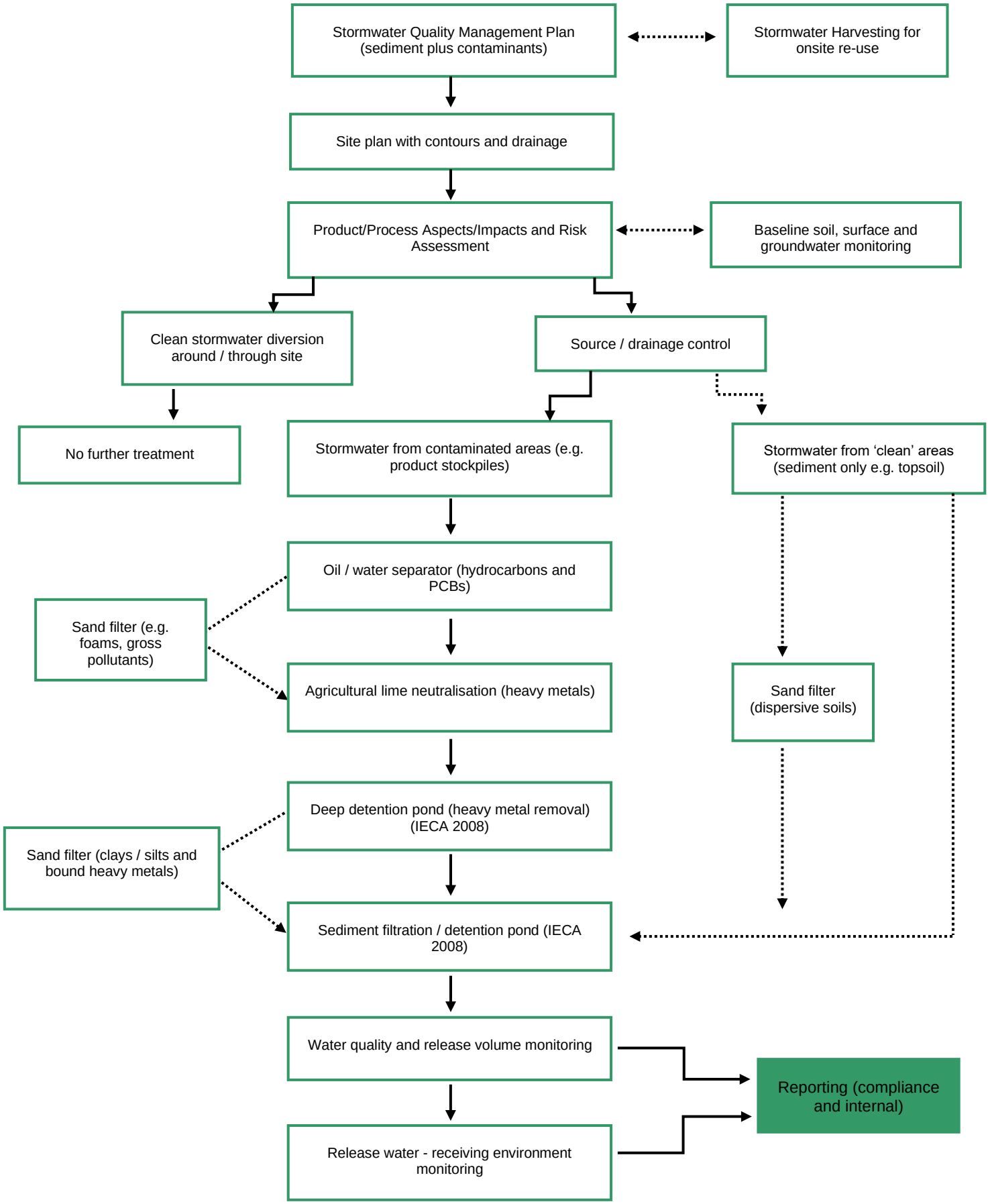

Table 8: Stormwater management strategies

Activity	Environmental impact	Environmental management strategy options			
		Source control options	Infiltration controls options (groundwater impacts)	Primary treatment options	Secondary treatment options
Drainage from all operational areas and / or drainage from areas containing dispersive soils	Generation of contaminated stormwater during rainfall event from operational areas (e.g. uncovered scrap metal stockpiles) and release off site or to groundwater.	• Clean stormwater diversion around site • Fragmentiser residues stored separately from tyres, foams, batteries and liquid storages. Separate drainage. • Hydrocarbon and refuelling areas bunded in accordance with AS1940. • Spill kits accessible on site and well-maintained • Sediment fence on down slope toe of all earthen stockpiles • Site tidiness and general waste hierarchy practices	• Fragmentiser residues, batteries and liquid storages stored in hard stand areas • Detention / filtration ponds are lined • Concentrated flow drainage pathways are lined • Access roads are sealed • Operational areas sealed (dependant on site characteristics)	• Skimmer (hydrocarbons, PCBs and foam) • Oil / water separator (hydrocarbons and PCBs) • Calcium carbonate (agricultural lime) nodules in reno mattress at inlet to ponds (acid neutralisation) • Sandbag check-dams (inlet pits and drainage lines).(Note: Should be compulsory treatment prior to entry to urban stormwater systems) • Sediment filtration/detention pond (IECA 2008) (heavy metals and sediment)	• Deep detention pond (heavy metal removal) (IECA 2008) • Sand/media filter (heavy metals and sediment) • Vegetated swale at final pond outlet (polishing).

Table 9: Water quality monitoring criteria

Testing category	Parameters	Release criteria	Timing	Location / comment
Operational phase				
In-situ (surface water)	Turbidity	Site specific assessment	Daily when release waters	Release point/final pond and inlet/final pond
	pH	6.5 – 8	Daily when release waters	Release point/final pond and inlet/final pond
	Dissolved oxygen (DO)	Site specific assessment	Daily when release waters	Release point/final pond and inlet/final pond
	Total release volume	N/A	Daily when release waters	Release point/final pond – cumulative monthly records kept.
Laboratory (surface water)	Heavy metals (NEPM suite)	Site specific assessment	Monthly – in-situ pH > 6 Fortnightly - in-situ pH <6 (plus rain event triggers)	Final pond outlet. If compliance for 12 consecutive months – reduce monitoring to 3 monthly (unless in-site pH <6)
	TSS	Site specific assessment	Monthly	Final pond outlet. If compliance for 12 consecutive months – reduce monitoring to 3 monthly
	PCBs	Site specific assessment	2 Monthly	Final pond outlet. If compliance for 12 consecutive months – reduce monitoring to 6 monthly
	TPH (C6-C36)/BTEX/PAHs	Site specific assessment	Monthly	Final pond outlet. If compliance for 12 consecutive months – reduce monitoring to 3 monthly
	pH	Site specific assessment	Monthly	Final pond outlet. If compliance for 12 consecutive months – reduce monitoring to 3 monthly (unless in-site pH <6)

Testing category	Parameters	Release criteria	Timing	Location / comment
In-situ (if site drainage to receiving waters)	Turbidity (upstream vs. downstream)	Site specific assessment	Daily when release waters	20 m upstream and 20 m downstream from agreed site drainage entry point (if applicable)
	pH (upstream vs. downstream)	Site specific assessment	Daily when release waters	20 m upstream and 20 m downstream from agreed site drainage entry point (if applicable)
	DO (upstream vs. downstream)	Site specific assessment	Daily when release waters	20 m upstream and 20 m downstream from agreed site drainage entry point (if applicable)
Groundwater	Heavy metals (NEPM suite)	Site specific assessment	Site specific assessment (min 6 monthly)	At groundwater monitoring point nominated on approval
	TPH (C6-C36)/BTEX/PAHs	Site specific assessment	Site specific assessment (min 6 monthly)	At groundwater monitoring point nominated on approval
Planning phase				
Baseline (new activities)	Soil – exchangeable sodium percentage (ESP)	N/A	Prior to site works	Only for new fragmentiser approvals. Minimum of 5 locations for each test.
	Soil – Emerson aggregate	N/A	Prior to site works	As above
	Soil – acid sulfate soils (if < 5m AHD)	N/A	Prior to site works	As above
	Groundwater – heavy metals (NEPM suite)	N/A	Prior to site works	One sample greenfield site additional samples for brownfield sites with historical industrial activities (seek specialist consultant advice)
	Groundwater – total recoverable hydrocarbons	N/A	Prior to site works	One sample greenfield site additional samples for brownfield sites with historical industrial activities (seek specialist consultant advice)

Testing category	Parameters	Release criteria	Timing	Location / comment
Baseline (new activities) cont'd	Adjacent waterway - pH	N/A	Prior to site works	Minimum one sample (consider additional samples where seasonal effects may be an issues)
	Adjacent waterway – heavy metals (NEPM suite)	N/A	Prior to site works	One sample greenfield site additional samples for brownfield sites with historical industrial activities (seek specialist consultant advice)
	Adjacent waterway – total recoverable hydrocarbons	N/A	Prior to site works	One sample greenfield site additional samples for brownfield sites with historical industrial activities (seek specialist consultant advice)
	Adjacent waterway – PCBs	N/A	Prior to site works	One sample greenfield site additional samples for brownfield sites with historical industrial activities (seek specialist consultant advice)

8.8 Energy and carbon management

Energy management, and the associated management of energy related carbon emissions, is becoming increasingly important for organisations. Proactive energy and carbon management should be considered for a variety of reasons, including:

- increasing energy costs – energy costs may increase as much as 50 per cent over the next five years.
- greenhouse gas emissions associated with energy – Australia has high greenhouse gas emissions per capita value, mainly due to our high dependence on coal fired electricity generation.
- future carbon reduction schemes, for example an emissions trading scheme or a carbon levy, could potentially increase effective energy costs by adding a ;cost of carbon' to the existing price structure.
- increases in operating costs, particularly for those materials with a high 'embedded' energy component.

While carbon impacts can be somewhat offset by increasing the proportion of renewable electricity in the supply, this alternative energy source does come at a cost that is currently significantly higher than traditional supply options.

Energy and carbon management is an important aspect within any company's environmental and sustainability program. Energy use within scrap metal recycling facilities includes:

- transportation – energy consumption in transferring scrap to the facility together with associated transportation during sorting, stockpiling and transfer off-site
- processing, including fragmentising of scrap metal, blowing, separation and ventilation
- process utilities, including compressed air systems, lighting and water circuits.

Integrated scrap metal facilities (that include melting, casting and rolling) are not considered in this guideline; however, for facilities where this is applicable, it is even more important to establish a sustainable energy and carbon management program that addresses these high-energy processes.

Carbon emissions associated with scrap metal industries are primarily energy related, although there could be opportunities for other greenhouse gas emissions, for example, CFCs from refrigeration systems.

Facilities should consider implementing a detailed energy and carbon audit or operational review. This review should consist of the following steps:

- Energy usage analysis and carbon footprint evaluation.
- Energy supply strategy assessment (including carbon emission impacts).
- Energy end use analysis and key performance indicators.
- Energy efficiency opportunities analysis.
- Management practice review.
- Energy and carbon target assessment.
- Action and implementation plan development.
- Opportunities assessment for carbon offsets.

Such a review should target practical cost effective projects. A listing of potential considerations is provided in Table 13 and while this is not an exhaustive list, it highlights a range of typical opportunities that could be considered, should a facility wish to adopt best practices in energy and carbon management. Scrap metal facilities should consider their specific operations and review the potential application of these energy efficiency opportunities and where applicable develop additional projects that could result in energy reductions or greenhouse gas mitigation.

Table 10: Energy and carbon management strategies

Energy and carbon management	
Process / equipment	**Energy & carbon management opportunities & strategies**

Pumps and fans	• Variable speed drives, examples include:
	  o Ventilation fans
	  o Cooling water pumps, etc.
	• Trim or replace impellers
	• Optimal sizing, etc.

Motors	• Optimal sizing • High efficiency motor options • Assessment of belt drive efficiencies • Motor controls
Compressed air systems	• Compressor selection and control, including load matching and variable speed drives • Optimal pressure setting • Leak management • Reticulation system design and optimisation
Boiler and steam systems	• Combustion control • Insulation • Condensate return • Optimal steam supply • Steam trap assessment • Boiler blowdown management • Leak management • Waste heat recovery
Material handling and transportation	• Conveying review and controls • Reduce double handling • Vehicle maintenance • Fuel supply options
Lighting systems	• Lighting controls (occupancy, photo-electric, etc.) • Lamp replacement / substitution • Lighting level evaluation • Daylight harvesting
HVAC controls	• System controls (unit matching, end-point controls, etc.) • Compressor discharge pressure controls • Suction pressure management • Duct design assessments • System maintenance • Variable speed drives on compressors, pumps and fans, etc.

Management practices	• Range of management practices might exist that help improve overall efficiency and encourage sustainable practices, including:
	  o Energy awareness training and technical training for energy efficiency
	  o Target setting and performance tracking
	  o Automated monitoring and targeting
	  o Equipment selection guidelines
	  o Metering equipment

Energy and carbon management	
Process / equipment	**Energy & carbon management opportunities & strategies**
Energy supply options	• Demand control strategies to reduce cost impacts • Power factor controls • Bill consolidation • "Green" power supply options • Opportunities for fuel switching

9 References[5]

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[5] Reference list is reflective of when content was sourced (2012)

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Appendix A

Table 14: Environmental impact – Fire, explosion and excessive contaminant sources

Activity	Item	Best practice environmental management strategy	Actions

Product receipt	1	Clear signage.	• Install clear signs across the whole site including site entry.
			• Signage can include:
			  ○ conditions of entry including material acceptance requirements located at site entry
			  ○ list of unacceptable materials
			  ○ contact details for the nearest disposal site for unacceptable materials.
			• Maintain signs in a clear and legible condition at all time.

	2	Waste screening undertaken prior to acceptance of material.	Screening should be undertaken by experienced staff that are familiar with site specific product receipt conditions and should be undertaken in accordance with procedures outlined in a Site Based Management Plan (SBMP).
	3	Accept only volumes of waste that can be managed at the facility.	• Know the maximum volume of material that can be managed on site at any one time. Consider plant maintenance, malfunction and shutdown risks in assessing maximum volumes. • Do not accept material that exceeds the maximum storage volume. • Establish an alternative licensed facility for intermediate storage of materials should the maximum storage volume be exceeded.
	4	Rejection of all unacceptable materials.	• Develop and implement a procedure for inclusion in the SBMP for rejection of unacceptable materials and their handling whilst on site. • Charge offenders with costs of disposal prior to acceptance of any further loads. • Consider suspension of repeat offenders.

Activity	Item	Best practice environmental management strategy	Actions

Product receipt cont'd	5	DESI notified of all rejected loads of unacceptable hazardous material.	• Examples of unacceptable hazardous material requiring notification to DESI include:
			  ○ asbestos
			  ○ medical waste
			  ○ radioactive waste.
			• Record details of rejected loads to provide to DESI.
			• Notify DESI– this can be in the form of a summary at the end of each calendar month or the submission of an annual return notice.

	6	No incidents on site resulting from fire or explosion events.	• Develop and implement a Fire Emergency Plan (FEP) in accordance with DESI conditions:
			  ○ From commencement of an ERA to which an approval relates, a FEP must be implemented. The FEP must identify all sources of potential fire risk, and must include but is not limited to:
			  ▪ the identification of all potential sources of fire onsite
			  ▪ procedures for managing the risks associated with those sources
			  ▪ staff procedures in the event of fire
			  ▪ a site plan detailing fire-fighting infrastructure and internal roadways
			  ▪ procedures for the management of any potential fire water generated onsite.

Product sorting	7	Have defined product sorting areas on site.	• Allocate product sorting area. • Define area on site plans and mark the area using signs.
	8	Sort materials only in designated product sorting areas for transfer to designated product storage areas.	• Inspect waste loads immediately on unloading. • Product sorting should only be undertaken by experienced staff that are familiar with site specific product sorting procedures.

Activity	Item	Best practice environmental management strategy	Actions
Product sorting cont'd	9	Pressurised vessels dealt with separately.	• Vessels separated from stockpiles and stored, handled and disposed of in accordance with relevant Australian Standards. • Australian Standard 4332 Storage and Handling of Gases in Cylinders. • Australian Standard 1596 The Storage and Handling of LP Gas.
	10	Recovery of metal from plastic coated wire cable by mechanical means only.	• Separation via stripping. • Plastic separated and recycled where possible.

	11	No explosion events.	• Separation of incompatible products and ignition sources in accordance with relevant Australian Standards:
			  ○ Australian Standard 3780 – The Storage and Handling of Corrosive Substances.
			  ○ Australian Standard 1940 – The Storage and Handling of Flammable and Combustible Liquids.
			• No burning on site.
			• In the event of an explosion:
			  ○ Notify explosion events to DESI as soon as practicable (within 1 hour) or as specified by development approval conditions.
			  ○ Provide a written report on the air blast / explosion within 5 business days.
			• Separate, drain and collect all flammable / hazardous products (batteries, engine oils, hydraulic fluids, petrol, asbestos (particularly friable types) prior to storage.

	12	Also refer to item 6	Also refer to item 6 examples

Activity	Item	Best practice environmental management strategy	Actions
Product storage	13	Have a defined product storage area on site.	• Allocate product storage area. • Define area on site plans and mark the area using signs.

	14	No storage of unacceptable materials on site.	• Return unacceptable materials to provider.
			• Remove unacceptable materials off site for disposal at licensed facility.
			  ○ A Regulated Waste Transport Licence (ERA 57) may be required.
			• Transport of flammable, hazardous or dangerous goods must be in compliance with the following:
			  ○ *Dangerous Goods Safety Management Act 2001*
			  ○ *Transport operations (Road Use Management – Dangerous Goods) Regulation* 2008 (s94).
			• If temporary onsite storage is necessary, material should be stored in accordance with on-site storage procedures.

	15	Management and maintenance of stockpiles in accordance with:
		• site specific Stockpile Management Procedure
		• site specific QFRS advice (recommended that this is obtained)
		• elements adopted from South Australian Fire Service and Lincolne Scott / South Australian Fire Authorities Community Safety Department, February 2006
		• site specific consultation with DESI and QFRS where necessary.
			• Develop and implement site specific Stockpile Management Procedure as part of the SBMP or IEMS for the site.
			• Maintain stockpiles and areas surrounding stockpiles within storage limitations outlined in management procedure.
			• Manage stockpiles. General examples of management include:
			  ○ Use of a thermal imaging camera
			  ○ Installation and maintenance of a wind sock for fire-fighting purposes.
			  ○ No “hot works” permitted within 10 m of a stockpile or vegetation.

	16	Easy entry and exit to/from the site for emergency service vehicles.	• Internal access roads should be constructed with a minimum width of 6m. • Where this is to vary, site specific consultation with DESI and QFRS is required.
	17	Internal access roads are maintained in a good condition with clear access to traffic and	• Undertake regular road maintenance.

Activity	Item	Best practice environmental management strategy	Actions
Product storage cont'd		pedestrians at all times.	• Keep roads free from combustible materials such as hydrocarbons and vegetation at all times.
	18	Provision of security service after operating hours.	• Security fences and gates located around the site perimeter. • These should be maintained in good order and locked when site is not in use and after hours.
	19	No impact to surrounding areas in the event of a fire or explosion on site.	• All stockpiles located a minimum distance of 6 m from site boundaries in accordance with QFRS recommendations.
	20	Also refer to items 6, 9 and 13	Also refer to items 6, 9 and 13 examples
Processing through fragmentiser Processing through fragmentiser cont'd	21	Minimal impact of fire and explosion resulting from fragmentiser processes.	• Fragmentiser designed to minimise risk and impact of fire and explosion. • Steam used to suppress oxygen in fragmentiser. • Screens surrounding plant.
	22	No processing of flammable materials.	• Inspect waste loads immediately prior to processing. • Any fuel tanks to be processed should be punctured and the contents drained and contained. • Processing activities should be undertaken only by staff trained and competent in the identification of acceptable and unacceptable material to be processed. • Develop and implement site procedures regarding waste processing.
	23	Also refer to item 6 and 13	Also refer to item 6 and 13 examples

Table 15: Environmental impact – Noise, vibration and light nuisance and loss of visual amenity

Activity	Item	Best practice environmental management strategy	Actions
	1	No complaints from adjacent land users regarding noise, vibration or light nuisance.	• Install and maintain fencing and/or earthen bunds along the perimeter of the site to provide an acoustic and visual screen.

Activity	Item	Best practice environmental management strategy	Actions
Product receipt Product receipt cont'd			• Design and install lighting so as not to cause nuisance to neighbouring sensitive receptors.
	2	Adhere to a site specific Noise Monitoring Plan.	• Develop and implement a site specific Noise Monitoring Plan to accompany the SBMP/IEMS. • Sound level monitoring conducted on an annual basis in accordance with Australian Standard AS 1055.1. • Assess noise monitoring data against requirements of DESI guideline "Planning for Noise Control". • Conduct monitoring at the nearest sensitive premises and at a background site.
Product sorting	3	No generation of excess or unnecessary noise.	Regular maintenance of plant and equipment.
	4	Also refer to item 1 and 2	Also refer to item 1 and 2 examples
Product storage	5	Minimal aesthetic impact on surrounding land users.	Installation and maintenance of screening along the perimeter of the site. Screening should be finished in aesthetically pleasing colours and may include: • Fencing • Vegetation • Earthen bunds
Processing through fragmentiser	6	Minimal noise production.	• Restrict hours of operation for high noise level activities. • Enclose or screen noisy processing equipment and activities (for example, compressors and pumps). If located close to sensitive receptors, acoustic enclosure of fragmentiser might be necessary. • Fit silencers to all pressure operated equipment. • Line equipment with a sound absorbing material such as rubber. • Use a personal paging service to gain attention of staff rather than paging via loudspeaker. • Relocate sirens to face away from sensitive receptors. • Conduct regular maintenance on plant and equipment.

Activity	Item	Best practice environmental management strategy	Actions
			• Conduct maintenance in enclosed sheds where possible.
	7	Also refer to item 1 and 2	Also refer to item 1 and 2 examples

Table 16: Environmental impact – Dust, odour, smoke fumes and other airborne contaminants

Activity	Item	Best practice environmental management strategy	Actions
Product receipt	1	Minimal generation of dust.	• All access roads and internal roadways, including entry and exit points, should be sealed. • Access roads maintained clean and free from soil build up. • Establish and implement low speed limit on site. • Exclude vehicles from unsealed surfaces.
	2	No impact off site from windborne sediment.	• Install and maintain wind barriers along the site perimeter, taking into account prevailing wind direction. • Install and maintain sediment collection and removal controls.
	3	No loss of contaminants off site.	• Install barriers between the facility and adjacent land.

	4	Adhere to site specific Air Quality Monitoring Plan.	• Develop and implement a site specific Air Quality Monitoring Plan to accompany the SBMP for the site. Seek site specific advice from DESI prior to finalising an Air Quality Monitoring Plan.
			• Conduct visual inspections at regular intervals to assess adequacy of control measures and implement corrective action as required.
			• Methods, frequencies and locations of air quality monitoring are dependent on site specific requirements and may include the following:
			  ○ Insoluble solids dust deposition in accordance with Australian Standard AS/NZS 3580.10.1.
			  ○ TSP in accordance with Australian Standard AS/NZS 3580.9.3 (high volume sampler).

Activity	Item	Best practice environmental management strategy	Actions
Product receipt cont'd			○ Analysis of TSP samples to determine heavy metal concentrations (aluminium, cadmium, chromium, copper, lead, zinc and iron). ○ PM_{10} in accordance with either Australian Standards AS/NZS 3580.9.6 (high volume sampler), 3580.9.7 (dichotomous sampler), 3580.9.8 (tapered element oscillating microbalance), 3580.9.9 (low volume sampler) or 3580.9.11 (beta attenuation monitor). ○ AS/NZS 3580.1.1:2007 for sampling and analysis and need for specialist advice. ○ Asbestos in accordance with Safe Work Australia's National Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Dust [NOHSC: 3003 (2005)]. ○ PCBs in accordance with United States Environmental Protection Agency Method TO4A. ○ Insoluble solids deposition sampling is conducted on a monthly basis, whereas TSP/heavy metals, PM_{10}, asbestos and PCBs monitoring is conducted over a 24 hour period on a 1 in 6 day basis. Insoluble solids deposition sampling is conducted as a minimum on the four site boundaries with additional monitoring conducted at a background site. ○ TSP/heavy metals, PM10, asbestos and PCBs sampling is conducted on the four site boundaries, if sensitive receptors are located within 500 m. Where sensitive receptors are located in the range 500 m to 1,500 m, TSP/heavy metals, PM10, asbestos and PCBs sampling is conducted at the nearest sensitive receptor only, preferably downwind of the prevailing wind direction.
Product sorting	5	No generation of smoke fumes from on site activities.	• Remove all rubber and surface / subsurface treatments prior to oxy cutting or use a water spray in conjunction with oxy cutting to prevent burning. • No burning permitted on site.
	6	Refer to item 1, 2, and 4	Refer to item 1, 2 and 4 examples
Product storage	7	No generation of dust or loss of materials from stockpiles.	• Install dust suppression equipment and implement when necessary. • Maintain stockpiles in accordance with stockpile management procedure.

Activity	Item	Best practice environmental management strategy	Actions
Product storage cont'd	8	No impact of odour producing waste on sensitive receptors.	• Store open piles of waste / floc downwind of sensitive receptors. • Store waste in covered areas. • Assess odour from different sources of feeder stock. • Segregate and adequately isolate odorous stock from receptors or initiate plan to prevent further receipt. • Conduct routine odour intensity field surveys in response to odour nuisance complaint.
	9	Refer to item 1, 2, 3, 4 and 5	Refer to item 1, 2, 3, 4 and 5 examples
Processing through fragmentiser	10	Limit fugitive emissions of particulates.	• Use and maintain a water spray system wherever necessary. • Avoid processing of fine metal materials where suitable offsite storage and transport options are available. • Operate a closed circuit for recovery of floc from the shredder. • Dust suppression equipment installed, implemented and maintained on fragmentiser and process stockpiles. • Operator to conduct and document a pre-start check on the fragmentiser. • Keep shredder floc moist to prevent dust and airborne contaminant generation during floc recovery activities.
	11	Minimise air pollution from exhaust gases.	Install, maintain and inspect air pollution control equipment to remove pollutants from exhaust gases. These may include: • dust collection hoods • fabric filters • electrostatic precipitator • coir / zeolite filter packs.

Activity	Item	Best practice environmental management strategy	Actions
Processing through fragmentiser	12	Emission concentrations do not exceed DESI limits and all development approval conditions are met.	Site specific engineering changes made to plant and equipment where emission concentration or mass rates of emissions exceed DESI limits or where ambient air quality data indicates non-compliance with DESI criteria (for example, National Environment Protection (Ambient Air Quality) Measure standards for PM_{10} and lead) or where development approval conditions have not been met.
	13	No generation of odour from fragmentiser operation.	• Fragmentisers must be operated with odour suppression sprays and other fittings as provided/recommended by the manufacturer. • If there is an emissions stack in the operation, coir/zeolite biofilter media substrate canisters must be installed to reduce odour in emissions. • If sensitive receptors are likely to be affected by odours material, only place odorous material into the fragmentiser during appropriate weather conditions.
	14	Refer to item 1, 2, 4, 5 and 8	Refer to item 1, 2, 4, 5 and 8 examples
Equipment refuelling and liquid (product and byproduct) storage	15	Minimise odour from refuelling activities and liquid storage.	• Cover water treatment pits and undertake regular maintenance and treatment of waters during storage prior to discharge. • Drain fuels only in designated drainage treatment areas with odour controls. • Storage of drained fuel should be in sealed containers.
	16	Refer to item 8	Refer to item 8 examples.

Table 17: Environmental Impact – Soil, surface water and groundwater contamination

Activity	Item	Best practice environmental management strategy	Actions
Product receipt	1	No soil, surface water or groundwater contamination.	• Install and maintain sediment collection and removal controls. Controls may include: o Vehicle shake down ramp or wheel wash on site entry / exit. o Use of road maintenance equipment such as suction sweeping machines on all internal access roads and entry / exit points. o All site areas (including access roads) drain to dirty water containment area (collection pit) for treatment to ensure all liquid contaminants, such as hydrocarbons and dirty water released during processing are contained and treated. o Treat spills immediately using appropriate methods. o Seal access roads with low permeable engineer designed and risk assessed surface layer (1 x 10^{-9} m/sec) material to prevent ingress of hydrocarbons and other contaminants to soil and groundwater. • Refer to Table 11: Stormwater Management Strategies.
	2	Regular groundwater monitoring undertaken.	• Develop and implement a site specific Groundwater Quality Monitoring Plan to accompany the SBMP for the site, which includes groundwater monitoring for key contaminants relevant to the nature of the facility. The plan should refer to Table 12: Water Quality Monitoring Criteria.

Activity	Item	Best practice environmental management strategy	Actions
Product sorting	3	No soil, surface water or groundwater contamination.	• Separate, drain and collect all flammable / hazardous products (batteries, engine oils, hydraulic fluids, petrol, asbestos (particularly friable types) prior to storage. • Seal product sorting areas with a low permeable engineer designed and risk assessed surface layer (1 x 10-9 m/sec) material to prevent ingress of hydrocarbons and other contaminants to soil and groundwater. • Sort materials in designated product sorting areas only. • Areas that receive products containing waste liquids (for example, batteries and hydrocarbons) should drain to a primary collection and treatment point or tank/s. • Storage of liquids in accordance with relevant Australian Standards: o Australian Standard 3780 – The Storage and Handling of Corrosive Substances o Australian Standard 1940 – The Storage and Handling of Flammable and Combustible Liquids. o Publication 347: Bunding Guidelines (EPA Victoria 1992) o Storage and Handling Liquids: Environmental Protection Participant's Manual (DEC NSW, 2008)
	4	Also refer to item 1 and 2	Also refer to item 1 and 2 examples
Product storage	5	Separate designated area for lead acid battery recovery.	Establish designated area using the following standards, manuals and guidelines as guidance: • Australian Standard 3780: The storage and handling of corrosive substances • Emergency spill plan and lime neutralisation materials stored in a nearby location in sufficient quantities. • Publication 347: Bunding Guidelines (EPA Victoria, 1992) • Storage and Handling Liquids: Environmental Protection Participant's Manual (DEC NSW,2008)
	6	Refer to item 1, 2 and 3	Refer to item 1, 2 and 3 examples

Activity	Item	Best practice environmental management strategy	Actions
Processing through fragmentiser	7	Prevent soil, surface water and groundwater contamination.	Seal processing areas with a low permeable engineer designed and risk assessed surface layer (1 x 10^{-9} m/sec) material to prevent ingress of hydrocarbons and other contaminants to soil and groundwater.
	8	Refer to item 1, 2 and 3	Refer to 1, 2 and 3 examples

Equipment refuelling and liquid (product and byproduct) storage	9	No impact on the site or surrounding environment from fuel or other liquid (product and by-product) storage.	• Operator may need separate ERA 8 – approval for fuel storage if storing in excess of 10 000L.
			• Install and maintain designated equipment refuelling and liquid storage area(s) on site.
			• Design storage in accordance with the following Australian standards and guidelines:
			  ○ Australian Standard 3780 – The Storage and Handling of Corrosive Substances.
			  ○ Australian Standard 1940 – The Storage and Handling of Flammable and Combustible Liquids.
			  ○ Publication 347: Bunding Guidelines (EPA Victoria 1992).
			  ○ Storage and Handling Liquids: Environmental Protection Participant's Manual (DEC NSW, 2008).
			  ○ Define refuelling and liquid storage area(s) on a site plan and mark the area(s) using signs.
			• Conduct all refuelling and liquid storage in designated area(s).
			• Minimise storage of dangerous substances on site.
			• Seal refuelling areas with a low permeable engineer designed and risk assessed surface layer (1 x 10-9 m/sec) material to prevent ingress of hydrocarbons and other contaminants to soil and groundwater.
			• Undertake integrity testing of all underground tanks to ensure no leakage is occurring.

Activity	Item	Best practice environmental management strategy	Actions
Equipment refuelling and liquid (product and byproduct) storage cont'd	10	Limited impact if a spill does occur.	• Develop and implement spill response procedures and training as part of the site SMP. • All contaminated sediment should be collected and disposed of via licensed regulated waste transport contractor for disposal to licensed facility. • Use drip trays and spill materials. • Store appropriate spill response equipment in these areas, for treating spills.
	11	No occurrence of overfilling.	• Supervise all fuel deliveries to ensure overfilling does not occur. • Install high level alarms.

Equipment wash down	12	No soil, surface water or groundwater contamination.	• Install and maintain designated equipment wash down area(s) on site.
			• Define areas on a site plan and mark with signs.
			• Equipment wash down area(s) should be designed and constructed in accordance with applicable Australian Standards:
			  ○ Australian Standard 1940 – The Storage and Handling of Flammable and Combustible Liquids.
			  ○ Publication 347: Bunding Guidelines (EPA Victoria 1992).
			  ○ Storage and Handling Liquids: Environmental Protection Participant's Manual (DEC NSW, 2008).
			• Conduct all equipment wash down and cleaning at designated wash down area(s).
			• Seal wash down areas with a low permeable engineer designed and risk assessed surface layer (1 x 10-9 m/sec) material to prevent ingress of hydrocarbons and other contaminants to soil and groundwater.

Activity	Item	Best practice environmental management strategy	Actions
Equipment wash down cont'd	13	Use of environmentally friendly chemicals/products when washing down equipment.	• Use only degreasing products which are compatible with the oil/water separator. • Quick Break products. A 'quick break' degreaser keeps the oil molecules separated for a short period allowing the oil to float on the surface of the water and be separated. Normal degreasers separate oil molecules decreasing their size allowing them to disperse in water and wash away. • Determining if a degreaser is a 'quick break': o Fill a jar with 10 parts water and 1 part oil. o Add a small amount of degreaser and shake to mix. o The degreaser should emulsify the oil or break it down into small particles that dissolve in the water. If the degreaser is a 'quick break', the oil and water should separate back into two separate layers within 10 mins.
	14	Refer to item 3 and 10	Refer to item 3 and 10 examples
Waste disposal	15	No long term storage of waste products on site.	Dispose all wastes generated on site to a facility licensed to receive the waste.
	16	Appropriate disposal of wastes and appropriate waste tracking as per the Environmental Protection Regulation 2019.	• Disposal of used tyres in accordance with established state guidelines: • Any residues from drums or other storages collected and contained in a sealed tank prior to disposal. • Steam condensate from fragmentiser operations and water for floc dust suppression to be recycled or disposed as regulated wastes. • Separate regulated waste from general waste streams. • Supervise all regulated waste collections. • Develop and implement waste management procedures and training as part of the site SBMP • Recycle by-products from processing and other site activities where possible and provide adequate storage bins.

Table 18: Environmental impact – Introduction of exotic pets and disease

Activity	Item	Best practice environmental management strategy	Actions
Product receipt	1	No exotic pests or disease introduced to the site.	Import, store and handle internationally sourced material in accordance with legislated quarantine restrictions. Legislation includes: • *Quarantine Act 1908 (Commonwealth).* • *Land Protection (Pest and Stock Route Management) Act 2002.*

Table 19: Environmental impact – Loss of recyclable non-scrap metal products

Activity	Item	Best practice environmental management strategy	Actions
Product sorting and processing through fragmentiser	1	Minimal loss of non-scrap metal products.	• Recycle by products where possible. • Provision of adequate recyclable material bins correctly and clearly labelled.

Table 20: Environmental impact – Safety and environmental hazard from airborne scrap metal materials

Activity	Item	Best practice environmental management strategy	Actions
Product storage and processing through fragmentiser	1	No incidents involving airborne scrap metal materials.	• Minimise stockpile dimensions for light materials such as light gauge (mixed) scrap and post shredding (floc) to reduce risks associated with storm events. • Develop a site specific Storm/Cyclone Management Plan in consultation with Emergency Management Queensland (EMQ) prior to commencement of site activities. • Undertake regular housekeeping on site. • Projectiles from fragmentisers can be controlled using a projectile cover i.e. steel grid cover that allows steam explosions but does not allow projectiles to leave the plant.