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15. Waste Management

15.1 Waste Management Regulations

The regulatory requirements governing waste management are contained within the Queensland *Environmental Protection Act 1994* (EP Act), the *Environmental Protection Regulation 1998* and associated *Environmental Protection (Waste Management) Policy 2000* (EPP (Waste)), and the *Environmental Protection (Waste Management) Regulation 2000.*

15.1.1 Waste Definitions

The EP Act defines 'Waste' as anything that is:

- left over, or an unwanted by-product, from an industrial, commercial, domestic or other activity; or
- surplus to the industrial, commercial, domestic or other activity generating wastes.

The *Environmental Protection Regulation 1998* defines 'general waste' as waste other than regulated waste. Regulated wastes are defined in Schedule 1 of the *Environmental Protection (Waste Management) Regulation 2000* as 'non-domestic' waste (which is defined in Schedule 7 of the Regulation).

The EPP (Waste) states 'Regulated waste', means a waste that:

- contains a significant quantity and concentration of a hazardous contaminant; or
- the hazardous contaminant exhibits hazardous characteristics because of its toxicity, carcinogenicity, mutagenicity, teratogenicity, flammability, corrosivity, reactivity, ignitability or infectiousness, through its physical, chemical or biological characteristics; or
- the waste may cause environmental harm if improperly transported, treated, stored, disposed or otherwise managed.

15.2 Waste Management Strategy

The waste generated during construction and operation should be handled, stored, treated, transported and disposed with minimal impact on environmental values. Environmental harm will only occur if wastes are not managed properly, especially where there is the potential for hydrocarbon wastes and waste waters to cause land contamination, water and/or groundwater pollution.

In response, the waste management strategy for the project will consider waste management from the pre preparation and planning stage through to design, construction and operation. By necessity, there is appropriate flexibility in the management of all wastes.

An important first principle for the project is a sustainable waste management practice. In terms of the environmental value, waste will be managed to avoid adverse impacts on the life, health and wellbeing of people and the diversity of ecological processes and associated ecosystems surrounding the project. For example, the separation of components of the waste stream at the point of generation (e.g. the segregation of steel, glass, and paper, and maintaining segregation during generation, storage or transportation) will be undertaken to optimise the management of waste and thus prevent on-site and off-site pollution and enhance recovery and opportunities for reuse/recycle such as aluminium cans, containers such as glass bottles, paper and scrap steel or, pallets.

A review of the marketability of waste for recycling and reuse will also be undertaken on a regular basis throughout the project.

15.2.1 Waste Management Procedure

The principles for waste minimisation and management for the project are:

- implementation of a waste minimisation hierarchy with the following waste management options:
  - waste avoidance;
  - waste re-use; and
  - waste recycling.
- water conservation, treatment and reuse;
- efficient energy usage;
- compliance with federal and state waste management policies, the EP Act and associated regulatory instruments as a minimum; and
- effective waste disposal if there is no other option.

All waste generated on-site during the construction and operation phase will be disposed of in accordance with the project Waste Management Plan (WMP). This plan includes:

- waste stream characterisation and separation;
- assessment of waste reduction opportunities for identified waste; and
- management of waste in accordance with the waste management hierarchy.

15.2.2 Cleaner Production

Generally, cleaner production can be achieved through any or all of the following techniques:

- input substitution;
- product reformulation;
- production process modification - selection of the best available practicable technologies;
- improved operation and maintenance - this refers to the selection and use of the most appropriate processes and equipment;
- reuse of resources that are otherwise wastes; and
- closed-loop recycling – where a product is recycled and used again in the same form.

Aspects of the project that contribute to cleaner production outcomes include:

- selection of the best available practicable technology (fixed and mobile plant and equipment) for dam construction to optimise efficiencies; and
- recycling of glass, aluminium, steel and cardboards.

All contractors will be encouraged to adopt best practice waste minimisation procedures. This includes the purchase of materials cut to standard sizes, reuse of concrete formwork where practicable, and source separation and segregation of all recoverable materials.

Separate skips will be provided to maintain segregation and maximise economic reuse and recycling, in preference to disposal to landfill.

15.2.3 Waste Tracking

The movement of regulated waste in Queensland is subject to a waste tracking system. The WMP for the project will incorporate an approved waste tracking system for those wastes that require tracking. The WMP includes procedures for identification of regulated wastes that will apply to the project.

In addition, the treatment, storage and transport of regulated waste requires an Environmental Authority under the EP Act. Where a contractor carries out these activities, the contractor will be required to hold the appropriate approvals. This requirement is incorporated into the WMP.

15.2.4 Waste Tracking

The movement of regulated waste in Queensland is subject to a waste tracking system. The WMP for the project will use an approved waste tracking system for those wastes that require tracking including procedures for identification of regulated wastes.

In addition, the treatment, storage and transport of regulated waste requires an Environmental Authority under the EP Act. Where a contractor carries out these activities, the contractor will be required to hold the appropriate approvals as required by the WMP.

15.2.5 Waste Monitoring

Waste monitoring and auditing will be undertaken as part of the project. The intent of monitoring waste management activities and outcomes on-site include:

- assessing actual waste results and comparing with predicted impacts and mitigation measures;
- monitoring for potential environmental impacts; and
- providing baseline data to enable continuous improvement of waste avoidance, reduction and management measures throughout the project.

15.3 Waste Characteristics and Management

15.3.1 Waste Characteristics

Waste sources will stream from activities occurring in the following site areas:

- inundation zone;
- embankment and spillway;
- cut-off wall;
- saddle dams A & B;
- intake towers;
- fishway;
- workshops (including fixed and mobile fuel storage and washdown area);
- site office;
- ablution blocks;
- waste water treatment/septic system;
- stockpile area;
- concrete batching plant (including washdown area);
- quarry, borrow pits and screening areas;
- haulage roads;
- roads and bridges upgrade areas; and
- relocated assets (powerline, kiosk, carpark, boat ramps, pump station).

The major sources of waste generation from the project during construction and operation are outlined in **Sections 15.3.6** and **15.3.7** respectively**.**

In summary they are:

- demolition waste (concrete, rock, gravel, steel and timber);
- vegetation and soils as a result of clearing;
- construction material wastes (timber framing, concrete, rock, gravel, scrap metals, cable, wire, insulation, plastics and packaging);
- regulated waste (hydrocarbon waste, chemical resides, detergents, solvents, batteries, tyres);
- drums and containers from supply of chemicals and oils;
- domestic and other general waste (food scraps, packaging, rags);
- recyclable waste (aluminium cans, glass, cardboard and paper);
- scrap metal; and
- sewage effluent and sludge.

15.3.2 Environmental Management of Waste

The practices for the management of waste are outlined in the Waste EMP and Emergency Response Plan contained in **Section 19**.

15.3.3 Spill Containment and Remediation

Standard procedures for the storage, handling, disposal and spill response for potentially hazardous waste materials will follow the Emergency Management Plan. In the event of a large spill sites will be investigated, managed and remediated in accordance with the requirements of the contaminated land provisions of the EP Act.

15.3.4 Local Waste Management Facilities

Existing waste management and landfill services/facilities in the area include:

- Tugun Commercial and Domestic Waste landfill – Boyd Street;
- Reedy Creek Commercial Waste Landfill – Rudman Parade;
- Molendinar Commercial and Domestic Waste Landfill – Harper Street;
- Stapylton Commercial and Domestic Waste Landfill – Rossmans Road; and
- Suntown Commercial and Domestic Wastes Landfill – Captain Cook Drive.

A waste contractor, holding the appropriate regulated waste transportation licences, will be engaged to manage all regulated wastes from the facility. This will involve the collection and transportation to an approved facility.

15.4 Hydrocarbons and Hazardous Wastes

Chemicals, fuels, oils and any other substances that if spilled would cause pollution or contamination of the land or water will be stored appropriately to minimise the risk of environmental impact. Chemical storage will comply with Australian Standards and Material Safety Data Sheets (MSDS) requirements. MSDS for products kept on site will be readily available to employees and contractors.

Smaller quantities of chemicals, fuels and oils will be stored in self bunded pallets, within a bunded area in the workshop, or in a bunded container on the site. Diesel will be kept in bulk quantities (up to 130,000 L) in double skinned tanks allowing self bunding.

As waste products, containment will be within weatherproofed, sealed and bunded areas to prevent any leakages or spills causing environmental harm to soils, surface water or groundwater. Regular inspections will be carried out of the tanks, bunds and storage areas to ensure integrity. Hydrocarbons and hazardous wastes present on site during construction are outlined in **Table 15-1**.

Table 15-1 Hydrocarbons and Hazardous Wastes - Construction

Fuel / Chemical Name	Use on Site	Max Quantity on Site	Transport	How Stored and Bunded	How Treated/Disposed
Diesel	Fuelling plant	130 000 L	Delivered to site in tanker by licensed contractor every 2 – 3 days	Self bunded tanks 2 x 65,000 L	Procedures will be in place for the correct tank pumping to minimise the risk of incidents such as spills The tank loading area and the refuel area will contain a bunded perimeter to contain any spills Spills treated as per the EMP and Emergency Management Plan
Unleaded petrol	Fuelling plant	1000 L	Delivered to site in tanker by licensed contractor	Stored in 200 L drums in bunded pallets or in bunded container.	Procedures will be in place for the correct tank pumping to minimise the risk of incidents such as spills The tank loading area and the refuel area will contain a bunded perimeter to contain any spills Drums returned to supplier in accordance with regulated waste transport requirements, or disposed of as regulated waste Spills treated as per the EMP and Emergency Management Plan
Lubricants / oils	Lubricants required for servicing plant	11 000 L	Delivered to site in small quantities by employee or contractor	Stored 200 L drums in bunded pallets and in bunded containers. Most of the quantity of these substances will be contained in the hydraulic components of equipment.	Used oil will be collected on site in a bunded tank and taken away regularly by an approved regulated waste handler to be recycled Oil filters will either be: drained (hot draining, puncturing, crushed) and sent to landfill; or taken off site and disposed of by an approved regulated waste contractor Drums returned to supplier in accordance with regulated waste transport requirements, or disposed of as regulated waste Spills treated as per the EMP and Emergency Management Plan
Liquid Nitrogen	Lowering the placement temperature of concrete	85 500 m3	Delivered to site in vacuum insulated tankers by licensed contractor	3 x VIT 44,000 vacuum insulated vertical vessels	Unused liquid Nitrogen will be returned to the supplier at the end of construction by a licensed contractor Spills and leaks treated as per the EMP
Paints	Paint	<500 L	Delivered to site by employees or contractor	Stored in tins or drums in bunded pallets and in bunded containers within designated chemical storage areas.	During painting excess paint captured by drop sheets and temporary bunding put in place during works where ever there is potential for spills to flow to soil, drains or water bodies. Paint tins disposed of in regulated waste bin Spills and leaks treated as per the EMP
Resin and curing compounds	Curing enhancer	< 400 L	Delivered to site by licensed contractor	Stored in 200 L drums in bunded pallets or in bunded container within designated chemical storage areas.	Unused resin transported to other sites for use or returned the supplier by a licensed contractor Drums returned to supplier in accordance with regulated waste transport requirements, or disposed of as regulated waste Spills and leaks treated as per the EMP

Fuel / Chemical Name	Use on Site	Max Quantity on Site	Transport	How Stored and Bunded	How Treated/Disposed
Solvents	General use (cleaning etc)	< 200 L	Delivered to site by employees or contractor	Stored in drums in accordance with MSDS in bunded pallets or in bunded containers within designated chemical storage areas.	Excess solvents transported to other sites for use or returned to the supplier by a licensed contractor Spills and leaks treated as per the EMP
Acid Hydrochloric acid, dry acid, alum in liquid and powder forms	Washing concrete equipment, pH modifier for alkaline waste water	< 200 L	Delivered to site by employees or contractor	Stored in accordance with MSDS in bunded pallets or in bunded containers within designated chemical storage areas.	Waste water containing acid washed into settlement ponds where pH is balanced by waste materials from concrete agitators and further treatment if required Excess acids transported to other sites for further use Drums returned to supplier in accordance with regulated waste transport requirements, or disposed of as regulated waste Spills and leaks treated as per the EMP
Detergents and cleaning agents	Degreasing aid, personal hygiene, cleaning agent	< 300 L	Delivered to site by employees or contractor	Stored in 20 L pales in bunded pallets or in bunded container within designated chemical storage areas. Small quantities (<5 L containers) may be stored in shelving in workshop or offices.	Use of non-toxic and biodegradable products where possible Unused detergents transported to other sites for use. Spills and leaks contained and treated as per the EMP
Cutback bitumen or bitumen emulsion	Road sealing	Unknown	Transported to road works area by licensed delivery truck	Delivered on site and applied immediately	Unused quantities return to supplier in delivery truck Larger quantities of hardened excess able to be used as fill
Herbicide (eg roundup)	Weed management	<200 L	Delivered to site by employees or contractor	Stored in drums in accordance with MSDS in bunded pallets and in bunded containers within designated chemical storage areas.	Applied to weeds until all used. Unused quantities transported to other sites for use Spills and leaks contained and treated as per the EMP
Lime / gypsum	Concrete generation; pH modifier for acid waste water	<50 kg	Delivered to site in sealed bags by employees or contractor	Stored in bags in weatherproofed, bunded area.	Unused quantities transported to other sites for use Spills and leaks into any water body contained and treated as per the EMP

15.5 Construction Wastes

Vegetation in the inundated has been carefully mapped with results of the surveys is presented in **Section 9**. Cleared timber will be moved into non-inundation areas and scattered. Some vegetation will be placed at the edges of disturbance as a form of sediment control, as dictated by the slope and extent of clearing. Smaller shrubs and stumps will remain in the cleared areas to assist in the prevention of erosion and sedimentation and to help create fish habitat during inundation. Wood chipping of select timber will occur for use in landscaping. Vegetation cleared from the quarry areas may be burned in a designated incineration area, and in consultation with the Rural Fire Brigade.

Inert soil, rock and concrete material from excavation and demolition will be incorporated into the dam embankments and the recreation area. There will be no excess waste of this form. Some topsoil will be stockpiled for redistribution post-construction. Material awaiting use during construction will be placed in designated stockpile storage areas. The stockpile area will be graded flat with stockpiles suitably sloped, sized and incorporate appropriate containment structures to ensure stability and to minimise erosion potential. Management of erosion will be undertaken through the implementation of the Erosion and Sedimentation Control Plan (**Appendix F.4.2**).

General building materials, timber and metal off cuts and plastics from demolition and construction will be reused on site where practicable. Recyclable materials will be placed in designated bins and excess disposed of as general waste.

The regulated wastes generated during the construction of the dam include waste oils, fuels, lubricants, tyres, batteries, oily air filters, paints, resins, solvents, sewage sludges and residues, spill clean up materials and water, rags, drums and soils containing regulated wastes. These wastes will be reduced and/or recycled where possible. Collection, transport, tracking and treatment/disposal of regulated wastes will be in accordance with the relevant EPA guidelines, including appropriate licensing of the contractor, transport vehicle and facility.

Domestic wastewater from offices and toilet blocks and sewage from the twenty-one toilets located adjacent to demountables, offices, and council houses will be processed through permanent septic systems located on site. Additional portable ablution facilities (approximately ten portaloos) will be positioned in appropriate areas during construction and will be pumped out and the waste removed from site by a licensed contractor.

Washdown water will be collected in a designated, signed and properly bunded area, away from drainage lines and sediment basins. The concrete batching plant washdown water will be captured and diverted to the slimes dam. As the batching plant is an ERA, treatment and releases will be subject to EPA license requirements. The workshop vehicle washdown waste water will pass through a separator to capture any grit and oils. The separator waste will be disposed of as per the regulated waste requirements, and the wastewater will pass through to a sediment pond. Waste water captured in the sediment ponds will be treated and reused for dust suppression.

Concrete waste will be crushed and reused in the batching plant or used as fill.

During construction, colour-coded, signed bins will be used to segregate and collect food wastes, paper and recyclables. The bins will be located throughout offices, workshop and other site areas to achieve maximum economic waste recovery. These bins will be emptied into larger bins or skips regularly. All smaller bins and larger bins or skips will have lids, to reduce the potential for attracting insects and vermin. General wastes will be collected regularly and transported for disposal to landfill.

Spill kits will be available in workshop areas, fuel and chemical storage areas and around the site. Spills and environmental incidents are addressed in the Environmental Management Plan and Emergency Response Plan in **Section 19**. This will include containment and treatment of the spill, disposal of the spill and associated materials and follow up incident reporting.

The wastes generated by infrastructure construction and demolition activities at the project and their management are shown in **Table 15-2**. Please note that these quantities are indicative and may be subject to change according to the final design.

Table 15-2 Waste Management: Construction Phase

Waste Type	Characteristic of Waste	Source	Estimated Quantity	Management Method
Vegetation	Inert	Tree clearing in construction and inundation areas	360 ha	Cleared timber moved above future storage line in-inundation areas. It is not feasible to mulch material in inundation areas due to the quantity of material and the difficulty of access into much of the area Some logs stacked in windrows others scattered depending on erosion potential of area and density of trees. Some vegetation chipped on site for landscaping and erosion control
Soil, silt and fines	Inert	Excavation of quarry material; upgrade of dam wall; fines from concrete batching plant	>10 000 tonnes	All used as fill within dam wall or in recreation areas Soil not used immediately for fill will be stockpiled in designated areas for site rehabilitation works Silt and fines captured in slimes dam and used as fill
Waste rock	Inert	Excavation of quarry material; upgrade of dam wall	>50 000 tonnes	Use of excavated and demolition rock in embankment and in the construction of recreation areas Waste rock not used immediately for fill stockpiled in designated area
Concrete	Inert	Construction of dam wall	~1% of total concrete produced (approx 60 000 m^3 produced during construction)	Minimise waste by producing/procuring only the amount necessary Use of hardened waste concrete as crushed material for the batching plant and as fill material on site
General building materials	Inert	Construction	Unknown	Reused and recycled where possible as construction material, fill etc Disposed of in general or recycle bins as appropriate
Timber – pallets and off-cuts	Inert	Construction, packaging of structures; maintenance	Minor	Minimise waste by producing / procuring only the amount necessary Pallets returned to suppliers for reuse where appropriate Reuse on-site as construction material wherever possible Convert to woodchips and mulch for landscaping and erosion control Excess disposed of in general waste to go to landfill
Steel/ metal off cuts	Inert	Weldmesh, pipework, structural material	Minor	Minimise waste by producing / procuring only the amount necessary Segregation of waste into designated recycle bins and collection on-site Transportation off-site by a waste contractor for recycling
Plastics and electrical cable	Inert	Conduit, pipework and packaging	Minor	Minimise waste by producing / procuring only the amount necessary Reuse on-site wherever possible Excess disposed of in general waste to go to landfill

Waste Type	Characteristic of Waste	Source	Estimated Quantity	Management Method
Liquid Nitrogen	Inert	Lowering the placement temperature of concrete	85 500 m^3	Stored in vacuum insulated vertical vessels and applied as necessary to avoid wastage Unused quantities transported to other sites for further use
Detergents and cleaning agents	General	Waste from cleaning activities	Minor	Use of non-toxic and biodegradable products where possible Unused quantities transported to other sites for further use Non-toxic and biodegradable agents can be drained into the sediment ponds with wastewater. Toxic agents treated as hazardous spills and cleaned up as per spill procedures and MSDS
Cutback bitumen or bitumen emulsion	Regulated	Excess from road upgrade and haul road sealing	Unknown	Minimise waste by producing / procuring only the amount necessary Unused quantities return to supplier in delivery truck Larger quantities of hardened excess able to be used as fill
Herbicide	General	Residue from containers	Minor	Drums returned to supplier for reuse or refill. Small plastic containers disposed of in general waste Spills and leaks contained and treated as per the EMP.
Oils, fuels, lubricants, spill kit clean up materials, and water, rags and soils containing these substances	Regulated	Vehicle maintenance, spilt oils collected in separators and grease trap, spill clean up	<500L / month hydrocarbons 1 skip bin / week solid waste	Storage of oils, fuels and chemicals in bunded pallets or within a bunded container Refuelling at workshop in bunded area. Some machinery (eg excavators, cranes) refuelled in situ as per site Refuelling Procedure Workshop sealed and bunded appropriately Liquids in the workshop collected in oil/water separator Solid waste contaminated by regulated waste substances deposited in regulated waste bins Regulated wastes transported off site by licensed regulated waste contractor Contaminated soil from spills – soil from small spills treated on site outside impoundment area in a location adjacent to stockpile area. Spills treated as per Emergency Management Plan
Oily air filters	Regulated	Air filters from vehicle maintenance in workshop	Minimal – likely to be generated every three months from each unit	Oil filters will either be: drained (hot draining, puncturing, crushed) and sent to landfill; or taken off site and disposed of by an approved regulated waste contractor Storage of oily air filters on-site will be in a regulated waste bin Regulated wastes transported off-site by licensed regulated waste contractor
Paints, resins and solvents	Regulated	Residue from drums	Minor	Storage of paints, resins and solvents in bunded area Collection on-site in regulated waste bins Regulated wastes transported off-site by licensed regulated waste contractor

Waste Type	Characteristic of Waste	Source	Estimated Quantity	Management Method
Acid Hydrochloric acid, dry acid, alum in liquid and powder forms	Regulated	Reside from washing concrete equipment	Minor	Waste water containing acid washed into settlement ponds where pH is balanced by waste materials from concrete agitators and further treatment if required. Excess acids transported to other sites for further use. Spills and leaks treated as per the EMP.
Empty drums and containers – suitable for return to supplier	Regulated – if they contain regulated waste products such as paint, oil etc; otherwise inert	Supply of chemicals, paints, oils, acids, cleaning agents etc	Minor	Drums and containers that held regulated waste stored in a bunded area during use and prior to disposal. Drums and containers that held regulated wastes transported off-site by licensed regulated waste contractor or collected by supplier Non-regulated waste drums and containers returned to supplier
Empty drums and containers – suitable for recycling	Regulated – if they contain regulated waste products such as paint, oil etc; otherwise inert	Supply of chemicals, paints, oils, acids, cleaning agents etc	Minor	Drums and containers that held regulated waste stored in bunded area during use and prior to disposal Drums and containers that held regulated wastes transported off-site by licensed regulated waste contractor Non-regulated waste drums and containers transported to licensed facility for recycling
Empty containers (not drums) – not suitable for recycling	Regulated – if they contain regulated waste products such as paint, oil etc; otherwise inert	Supply of chemicals, paints, oils, acids cleaning agents etc	Minor	Drums and containers that held regulated waste stored in bunded area during use and prior to disposal Drums and containers that held regulated wastes transported off-site by licensed regulated waste contractor Non-regulated waste drums and containers triple rinsed on site, crushed, punctured and sent to landfill
Tyres	Regulated	Vehicle maintenance	4 / month	Stored in designated tyre disposal area Regulated wastes transported off-site by licensed regulated waste contractor to licensed facility for recycling or disposal.
Batteries	Regulated	Vehicle maintenance	1 / month	Stored at workshop on pallet off the ground Regulated wastes transported off-site by licensed regulated waste contractor
Sewage	Regulated	Visitors and employees	1.4 ML / 3 years of construction	Sewage from 21 toilets directed to on-site septic system maintained as required by licensed contractor Additional portable toilets (approx 10) provided on site to accommodate construction workforce pumped out by licensed contractor and transported off-site to licensed treatment facility
Concrete Batching Plant wastewater	Wastewater	Concrete batching plant operations	0.4 ML / 3 years of construction	Treated on site to appropriate pH, transferred to settling tanks and reused in the Plant or for dust suppression on site

Waste Type	Characteristic of Waste	Source	Estimated Quantity	Management Method
Aggregate crushing and screening plant wastewater	Wastewater	Aggregate processing operations	400 ML / 3 years of construction	Pumped to sediment pond and treated on-site as part of water quality regime
Workshop washdown wastewater	Wastewater	Vehicle washdown	32 ML / 3 years of construction	Washdown area to be designated with separator in place
Domestic wastewater	Wastewater	Domestic use in offices and basins in toilet blocks	6 ML / 3 years of construction	Processed as part of existing septic systems
Domestic waste – putrescible and organic (food waste), wrapping, paper and packaging with food / non-regulated waste contamination	General	Employees lunches	Minor	Collected in covered bins marked and colour coded as “general waste” Removed from site by licensed contractor at least weekly and disposed to landfill
Cans, bottles, jars	General	Employees lunches, general works	200 L container / month	Collected in covered bins marked and colour coded for recyclable items Removed from site by licensed contractor and transported to recycling facility
Paper/cardboard	General	Office paper, packaging of goods	Minor	Collected in covered bins marked and colour coded for recyclable paper and cardboard Removed from site by licensed contractor and transported to recycling facility

15.6 Operational Wastes

The operation of the dam is unlikely to produce any significant waste emissions. Waste will be generated predominantly from maintenance activities, recreation and personnel, and will not differ significantly from waste produced during the current Stage 2 dam operations.

The operation of the pumping facility from the intake towers to the pump station generates very little waste. Principal waste generated at the facility is kitchen and office waste and left over materials from maintenance and cleaning of buildings and equipment. Day to day rubbish associated with the pump facility is collected in a 200 L drum which is taken off site to a landfill as required.

Maintenance activities will be undertaken at the dam site producing minor amounts of vegetation, timber, steel, conduit, hydrocarbon, and general waste.

Permanent on-site toilet and washroom facilities during operation will consist of existing facilities and the new facilities constructed as part of the recreation facilities. These will function using on-site systems and composting toilets and will be designed in accordance with current best practice. Maintenance will be undertaken regularly by a licensed contractor.

Waste from recreation areas (ie picnic facilities, boat ramp areas) is generally only domestic rubbish which is collected by a private contractor. Separate coloured bins will be provided for the collection of recyclable materials such as glass and aluminium.

Colour-coded, signed bins will be provided to aid in the segregation of regulated, general and recyclable wastes. The bins will be located appropriately in office, recreation and other personnel areas.

Contractors will be commissioned to collect and transport the waste to the appropriate disposal or waste sorting facilities.

The estimated volumes of each waste type likely to be generated during dam operation and their management method are shown in **Table 15-3.** Please note that these quantities are indicative and may be subject to change according to the final design.

15.7 Summary and Conclusions

Construction of the dam will generate some volume of waste material, particularly soils, rock, tyres and waste oils from machinery, and wastewater from the construction site facilities. During operation the volume of waste is significantly less, and will be of a more general nature, being predominantly office and domestic waste.

The contractor for the works will be responsible for:

- reducing the amount of wastes generated, where possible;
- collection of wastes, other than natural earth, soil or rocks in suitable skips or bins;
- reusing or recycling waste at an appropriate facility where feasible;
- disposal of wastes at an appropriate licensed landfill; and
- arranging transport of wastes with a licensed carrier, and in accordance with the EPA tracking system as defined in *Environment Protection (Waste Management) Regulation 2000.*

Table 15-3 Waste Management: Operation Phase

Waste Type	Characteristic of Waste	Source	Estimated Quantity	Management Method
Vegetation	Inert	Trimming, lopping and clearing for maintenance, access and safety	Minor	Chipped and used in landscaping and erosion control, or removed from site Off-cuts placed in appropriate areas to decompose
Scrap steel	Inert	Weldmesh, pipework, maintenance	Minor	Minimise waste by producing / procuring only the amount necessary Segregation and collection on-site Transportation by contractor for off-site recycling
Plastics and electrical cable	Inert	Conduit, pipework, electrical maintenance	Minor	Minimise waste by producing / procuring only the amount necessary Reused on site where possible Transported off site by contractor and disposed of as general waste to landfill
Timber – crates, pallets and off-cuts	Inert	Packaging of structures; maintenance	Minimal during operation	Minimise waste by producing / procuring only the amount necessary Pallets returned to supplier
Oils and fuels, and spill kit clean up materials and rags and water containing these substances	Regulated wastes	Maintenance, spill clean up	Very minor	Storage of oils, fuels and chemicals in bunded area in shed Solid waste contaminated by regulated waste substances deposited in regulated waste bins Regulated wastes transported off site by licensed regulated waste contractor as required Emergency Management Plan to be generated for operational phase
Paints, resins and solvents	Regulated wastes	Residue from drums	Minor	Storage of paints, resins and solvents in bunded area Collection on-site in regulated waste bins Regulated wastes transported off-site by licensed regulated waste contractor
Sewage	Regulated	Visitors and workers	12 400 litres/month	Sewage directed to on-site treatment facilities Pumped out by licensed contractor and transported off-site to licensed treatment facility
Domestic Wastewater	Wastewater	Domestic use in offices	31 000 litres/month	Processed through on-site treatment facility
Domestic waste – putrescible and organic (food waste), wrapping, paper and packaging with food / non-regulated waste contamination	General	Employees lunches	Minor	Collected in covered bins marked and colour coded as “general waste” Removed from site by contractor at least weekly and disposed to landfill

Waste Type	Characteristic of Waste	Source	Estimated Quantity	Management Method
Cans, bottles, jars	General	Employees lunches, maintenance activities	Minor	Collected in covered bins marked and colour coded for recyclable items Removed from site by licensed contractor and transported to recycling facility
Paper/cardboard	General	Office paper, packaging of goods	Minor	Collected in covered bins marked and colour coded for recyclable paper and cardboard Removed from site by contractor and transported to recycling facility