

18 WASTE MANAGEMENT

18.1 INTRODUCTION

This chapter provides further description of waste management for the Supplementary Environmental Impact Statement (EIS). The information presented builds on the EIS, Volume 1, Chapter 18 Waste Management and should be read in conjunction with the EIS chapter. This chapter provides further information on selected items of the EIS chapter, including quantification of waste volumes and waste management strategies.

This chapter does not deal with mining wastes such as tailings, rejects and overburden. Chapter 6 Project Operations and Chapter 9 Geology, Mineral Resources, Overburden and Soils should be referenced for these topics.

18.2 METHODOLOGY OF ASSESSMENT

18.2.1 REGULATORY REQUIREMENTS

On 1 January 2009, the new Environmental Protection Regulation (EPR) 2008 replaced the Regulation of 1998. No significant changes in the general approach to handling and management of wastes generated by the Project result from the updating of the regulations.

Certain waste management activities including disposal and transport of waste, are considered to be environmentally relevant activities (ERA) and require approval as described in the EPR.

18.3 EXISTING ENVIRONMENT

18.4 DESCRIPTION OF PROPOSED DEVELOPMENT

As discussed in EIS Volume 1, Chapter 18 Waste Management, section 18.3, following a preliminary analysis of waste disposal options, it has been determined that the existing Wandoan landfill facility is not a suitable long term waste disposal option for this Project due to its small capacity. The WJV, with Western Downs Regional Council as the Proponent, is continuing to explore options for development of a multi-user municipal waste facility. The facility shall be sited off the mining lease application (MLA) areas, with further information provided in the Supplementary EIS, Chapter 6 Project Operations, section 6.7.1. In the event that a new multi-user municipal waste facility is not available to receive waste from the Project from the time of construction commencement onwards, until such time the new multi-user municipal waste facility can receive wastes, wastes shall be transported by road from the Project to licensed waste reprocessors, recyclers and/or disposal facilities, whichever is the most suitable to receive a given waste stream, having the available handling, storage and/or disposal capacity.

18.5 INVENTORY OF WASTE STREAMS

18.5.2 SITE PREPARATION AND CONSTRUCTION WASTE INVENTORY

The EIS Volume 1, Chapter 18 Waste Management, section 18.5.2 identifies the types of waste generated during the site preparation and construction phases. The quantity of site preparation and construction waste for the entire construction period, being approximately 28 months, as described in EIS Volume 1, Chapter 5 Project Construction section 5.4, is presented in Table 18-1 below. Waste quantities have been quantified through application of the following methods and data sources:

- self-assessed wastage rates for building services (EPA 2002) as a percentage of the incoming construction materials for the Project (refer EIS Volume 1, Chapter 12 Transportation, section 12.4.1) allowing for defects, damage during transportation, off-cuts, etc.
- composition of construction waste for the housing sector (EPA 2002) and adjusted to reflect that some waste materials will be diverted from the Project waste stream and managed on-site, including earthen fill and green waste, and other materials will be generated at lower levels compared to the housing sector, including bricks/pavers and plasterboard

- waste data reported in absolute terms for the 2006, 2007 and 2008 calendar years from 14 of XCO's operational coal mines in Australia and South Africa.

The figures below provide a conservative estimate of waste quantities during the construction phase of the Project. Not all waste is expected to require off-site disposal due to on-site reuse/recycling and disposal initiatives, with Table 18-1 of the EIS indicating management options for various waste streams. Off-site prefabrication of some concrete and metallic structures is expected to further reduce wastage rates.

Table 18-1: Construction waste inventory for total construction period of Years -3, -2 and -1

Waste material	Waste sources	Basis of calculation	Units	Quantity
Green waste	Clearing of vegetation during early works and construction phase of mine	Total vegetation to be cleared, including remnant and regrowth vegetation = 196.3 ha (refer Supplementary EIS Volume 1, Chapter 17A Terrestrial Ecology, Table 17A-2, infrastructure on MLA areas and gas supply pipeline) Biomass per hectare = 180 tonnes, including above and below ground (Westman & Rogers 1977)	tonnes	35,500
Cardboard and paper	Construction activities, contractor crib rooms, offices, accommodation facilities	Includes construction paper and cardboard. Assume 10-15% mass equivalent of total construction waste stream (based on composition of residential and construction waste (EPA 2002) and adjusted for the Project)	tonnes	6,200
Plastics	Contractor crib rooms, offices, accommodation facilities, construction activities	Assume 5% mass equivalent of total construction waste stream (based on composition of residential and construction waste (EPA 2002) and adjusted for the Project)	tonnes	2,100
Glass	Contractor crib rooms, offices, accommodation facilities, construction activities	Assume 2% mass equivalent of total construction waste stream (based on composition of residential and construction waste (EPA 2002) and adjusted for the Project)	tonnes	1,400
Metals	Construction of conveyor, power lines and structures of the mine infrastructure area and accommodation facilities	Assume 5-10% mass equivalent of total onsite construction metal materials (based on self-assessed wastage rates for building services, EPA 2002) and 10-15% of total construction waste stream (based on composition of residential and construction waste (EPA 2002) and adjusted for the Project)	tonnes	5,500
Processed timber and wood	Left-over from new construction, and demolition of existing structures and temporary construction phase structures	Assume 15-20% mass equivalent of total construction waste stream (based on composition of residential and construction waste (EPA 2002) and adjusted for the Project)	tonnes	6,900
Concrete materials, bricks and pavers	Left-over from new construction and demolition of temporary construction phase structures	Assume 0.5% mass equivalent of total onsite construction concrete materials (based on self-assessed wastage rates for concrete trades, EPA 2002) and 20-25% of total construction waste stream (based on composition of residential and construction waste (EPA 2002) and adjusted for the Project)	tonnes	11,000
Electrical wastes	Contractor crib rooms, offices, accommodation facilities	Assume 2% mass equivalent of total construction waste	tonnes	1,200

Waste material	Waste sources	Basis of calculation	Units	Quantity
General and putrescible wastes	Contractor crib rooms, offices, accommodation facilities	Data sourced from XCO's operating coal mines and scaled for the Project based on size of the construction workforce plus 25% to allow for potential inefficiencies in recyclable waste segregation.	tonnes	5,900
Batteries	Mobile phones, radios, vehicles, equipment, etc	Data sourced from XCO's operating coal mines and scaled for the Project based on the size of the construction workforce.	tonnes	190
Oils (synthetic and mineral)	Routine servicing of vehicles and equipment at designated hardstand areas near the construction office facilities. Construction and assembly of the draglines and other mining equipment	Data sourced from XCO's operating coal mines and scaled for the Project based on size of the construction workforce.	tonnes	5,100
Other hydrocarbon and hydrocarbon contaminated materials	Routine servicing of vehicles and equipment at designated hardstand areas near the construction office facilities. Construction and assembly of the draglines and other mining equipment	Data sourced from XCO's operating coal mines and scaled for the Project based on size of the construction workforce. Assumed to include regulated waste.	tonnes	5,200
Empty waste oil containers	Small and bulk drums and containers that typically contained oils and greases			
Sealers, resins, solvents and paint materials	Construction of the MIA, accommodation facilities and conveyors, and assembly and maintenance of vehicles and equipment. Construction and assembly of the draglines and other mining equipment			
Other regulated waste	Demolition, maintenance and construction activities			
Asbestos	Demolished existing structures	Presence of existing materials to be identified by audit and investigation in advance of upgrade or demolition works.	tonnes	—
Discharge from vehicle washdown	Construction vehicle washdown facilities near construction offices	Assume construction vehicle fleet comprises 40 heavy vehicles and 150 light vehicles requiring washdown once every three weeks. Assume discharge from washdown: Heavy vehicle = 200 litres; Light vehicle = 70 litres.	kilolitres	730
Tyres	Maintenance of vehicles	Assume construction vehicle fleet comprises 40 heavy vehicles requiring annual tyre change.	Number	550
		Assume construction vehicle fleet comprises 150 light vehicles requiring tyre change once every two years.	Number	700
Sewage effluent	Contractor offices, crib room, accommodation facilities	Assumed 28 months construction using projected wastewater generation by the Project construction personnel	kilolitres	235,500

Waste material	Waste sources	Basis of calculation	Units	Quantity
Wastewater treatment plant sludge	Wandoan Wastewater Treatment Plant	Volumetric fraction of solids in the sewage effluent for the upgraded Wandoan WWTP Assuming 28 months of construction using projected sludge generation by the Project construction personnel	tonnes	56

Building wastes

Data published by the Waste Management Association of Australia (2008), indicates that up to 85% of waste from the construction and demolition sector is reprocessed and reused, with the remainder going to landfill. Almost 50% of the waste received and diverted from the waste stream for reprocessing is concrete materials.

Sewage effluent

Sewage will be discharged to the upgraded Wandoan Wastewater Treatment Plant (WWTP) as described in Supplementary EIS Volume 1, Chapter 11 Water Supply and Management, section 11.4.2. Following further assessment, the installation of a grey water management scheme at the accommodation facilities is not viewed as feasible, as the Wandoan WWTP is not designed to treat concentrated sewage.

18.5.3 OPERATIONS WASTE INVENTORY

The EIS Volume 1, Chapter 18 Waste Management, section 18.5.3 identifies the types of waste generated during the operational phase. The indicative quantities of operational waste are presented in Table 18-2 below. Waste quantities are largely based on waste data reported in absolute terms for the 2006, 2007 and 2008 calendar years from 14 of XCO's operational coal mines in Australia and South Africa. This data has been unitised based on ROM coal tonnes and then scaled for the Wandoan Coal Project. The extraction rate over the operational life of the Project is assumed to be 30 million tonnes per annum (Mt/a) Run of Mine (ROM) coal. Other data sources are referenced in the Table 18-2 where relevant. The figures below provide a conservative estimate of waste quantities during the construction phase of the Project. Not all waste is expected to require off-site disposal due to on-site reuse/recycling and disposal initiatives, with Table 18-2 of the EIS indicating management options for various waste streams.

Table 18-2: Operations waste inventory

Waste material	Waste sources	Basis of calculation	Units	Quantity
Green waste	Clearing of vegetation for ongoing development of the mine	Total cleared vegetation, including remnant and regrowth vegetation, less construction phase clearance = 593 ha (refer Supplementary EIS Volume 1, Chapter 17A Terrestrial Ecology, Table 17A-2, mining pits) Biomass per hectare = 180 tonnes, including above and below ground (Westman & Rogers 1977)	tonnes	106,800
General and putrescible wastes	Contractor accommodation, administration, warehouse, workshops, CHPP, crib rooms, facilities, building,	Data sourced from XCO's operating coal mines and scaled for the Project	tonnes per year	1,850
Non-hazardous waste recycled/reused	Contractor accommodation, administration, warehouse, workshops, CHPP, crib rooms, facilities, building,	Includes construction paper and cardboard, glass, recyclable plastics, rubber and aluminium cans. Data sourced from XCO's operating coal mines and scaled for the Project.	tonnes per year	1,150
Scrap recycled metal	Contractor accommodation, administration, warehouse, workshops, CHPP, crib rooms, facilities, building,	Data sourced from XCO's operating coal mines and scaled for the Project	tonnes per year	1,450

Waste material	Waste sources	Basis of calculation	Units	Quantity
	maintenance and fabrication of machines and equipment and the replacement of machinery parts.			
Batteries	Mobile phones, radios, vehicles, equipment, etc	Data sourced from XCO's operating coal mines and scaled for the Project	tonnes per year	75
Oils (synthetic and mineral)	Routine servicing and shutdown overhaul of vehicles and equipment in workshops, including synthetic and mineral oils	Data sourced from XCO's operating coal mines (defined as 'Hazardous waste recycled/reused') and scaled for the Project	tonnes per year	2,050
Grease	Waste grease from the accommodation facility kitchens, workshop, shutdowns and dragline maintenance			
Hydrocarbons and hydrocarbon contaminated materials	Routine servicing and shutdown overhaul of vehicles and equipment in workshops and maintenance facilities, refuelling and fuel storage facilities. Construction and assembly of the draglines and other mining equipment.	Data sourced from XCO's operating coal mines (defined as 'Hazardous waste disposal') and scaled for the Project. Assumed to include regulated waste.	tonnes per year	2,100
Empty waste oil containers	Small and bulk drums and containers that typically contain oils and greases.			
Sealers, resins, solvents and paint materials	Routine servicing and shutdown overhaul of vehicles and equipment in workshops, construction of conveyors, construction and assembly of the draglines and other mining equipment.			
Oil and air filters	Routine servicing and shutdown overhaul of equipment in the workshop.			
Blasting residue (from use of ANFO explosive, boosters and detonator)	Blasting of overburden	Quantity of ANFO sourced from XCO's base calculations for the Project. Assume 40% mass equivalent of explosive, forms waste residue (Kellehr 2002).	tonnes per year	14,900
Conveyor belts	Conveyor operation and maintenance	Data sourced from XCO's operating coal mines and scaled for the Project	metres per year	9,000
Tailings (including process water)	Coal handling, preparation and processing	Refer to Supplementary EIS Volume 1, Chapter 6 Project Operations, section 6.4.4.	—	—
Coarse rejects	Coal handling, preparation and processing	Refer to Supplementary EIS Volume 1, Chapter 6 Project Operations, section 6.4.4.	—	—
Discharge from vehicle washdown	Vehicle washdown facilities at MIA	Assume operational vehicle fleet of 68 heavy vehicles and 160 light vehicles, requiring washdown once every three weeks. Assume discharge from washdown: Heavy vehicle = 200 litres; Light vehicle = 70 litres.	kilolitres per year	420

Waste material	Waste sources	Basis of calculation	Units	Quantity
Tyres	Maintenance of vehicles	Assume wheeled operational vehicle fleet of 54 heavy vehicles requiring annual tyre change.	number per year	320
		Assume operational vehicle fleet of 160 light vehicles requiring tyre change once every two years.	number per year	320
Sewage and wastewater	Contractor crib rooms, accommodation facilities, administration building, warehouse, workshops, CHPP	Volumetric contribution of Project to upgraded Wandoan WWTP. Refer to Supplementary EIS Volume 1, Chapter 11 Water Supply & Management, section 11.4.2.	kilolitres per year	45,000
Wastewater treatment plant sludge	Contribution of the mine site sewage and wastewater to the Wandoan Wastewater Treatment Plant	Volumetric fraction of solids in the sewage effluent from the mine site into the upgraded Wandoan WWTP. Refer to Supplementary EIS Volume 1, Chapter 11 Water Supply & Management, section 11.4.2.	tonnes per year	14

Sewage effluent

As for the construction phase, sewage will be discharged to the upgraded Wandoan Wastewater Treatment Plant (WWTP) as described in Supplementary EIS Volume 1, Chapter 11 Water Supply and Management, section 11.4.2. Following further assessment, the installation of a grey water management scheme at the accommodation facilities is not viewed as feasible, as the Wandoan WWTP is not designed to treat concentrated sewage.

18.6 POTENTIAL IMPACTS

18.7 MITIGATION MEASURES

18.7.1 WASTE MANAGEMENT STRATEGY

Waste minimisation

As described in the EIS and the following section, certain wastes may be beneficially reused as part of the Project, primarily green waste and building wastes. The WJV will seek to have these approved under the EP Act, as a resource with a beneficial use.

Waste handling, storage, collection and disposal

Waste storage

Prior to collection from the MLA areas by licensed contractors, for both the construction and operational phases, wastes will be stored relatively close to the point of generation, thereby limiting handling of wastes. Five key locations of the Project will have waste storage facilities:

- Coal Processing Plant (CPP)
- accommodation facilities
- main gate and security building
- mine infrastructure area, including the dragline facility
- gas-fired power station (if constructed).

Other construction and operational areas may also have smaller waste storage units, with waste potentially being removed directly from these points by licensed contractor or moved to the closest of one of the five areas listed above.

As discussed in the EIS, waste streams will be segregated and stored according to the type of waste stream.

Waste tracking

The management and handling of waste was addressed in Volume 1, Chapter 18 Waste Management. As discussed in section 18.2.1 of Chapter 18, certain waste management activities including disposal and transport of waste, are considered to be environmentally relevant activities (ERAs) and require approval under the Environmental Protection (Waste Management) Regulation 2000 (Waste Regulation). The Waste Regulation also contains requirements for handling specific waste streams.

Certain regulated wastes are considered trackable wastes under section 17 of the Waste Regulation. This provides a process to allow such wastes to be tracked from the point of generation to the point of final processing, recycling or disposal.

Volume 1, Chapter 18 Waste Management, sections 18.7.2 and 18.7.3 state that waste management plans will be implemented during construction and operations. In regard to waste tracking, the waste management plan will address the following:

- training of all personnel on procedures concerning waste minimisation, handling, storage, reuse, segregation, collection and disposal
- waste removal and transport from site to be by appropriately licensed contractor/s with disposal only to licensed reprocessors, recyclers, or waste disposal facilities
- transport of any hazardous or regulated waste to comply with all relevant legislation including waste tracking requirements
- compare project waste quantities with actual waste produced to improve estimates and provide more reliable figures for future waste management plans.

On-site waste disposal

As presented in the EIS Volume 1, Chapter 18, Waste Management, Table 18-2, the only materials proposed to be disposed of on-site are waste tyres, processed timber/wood and concrete (if beneficial reuses can not be found), and green waste.

If possible, tyres will be removed by the tyre supplier for recycling, or used onsite for road barriers and demarcation. Otherwise tyres will be stored and appropriately disposed of by burying in the mine overburden in designated locations, in accordance with the following principles (EPA 2006):

- tyres awaiting disposal or transport for take-back, will be stockpiled in volumes less than 3 m in height and 200 m² in area. Fire precautions will include removal of grass and other flammable materials within a 10 m radius of the tyre store. Tyres will be stored in a manner that prevents water retention and minimises mosquito breeding events
- scrap tyres may be disposed of in spoil emplacements where tyres are placed as deep in the spoil as possible but not directly on the pit floor. Placement will ensure scrap tyres do not impede saturated aquifers and do not compromise the stability of the final landform
- any scrap tyre disposal sites will be recorded on the DERM's Environmental Management Register.

As per DERM's Operation Policy titled *Licensing requirements for construction and demolition wastes* (2002), if construction and demolition waste is separated into its constituent parts, the inert parts may be used as clean fill. Under the Policy, inert waste may include bricks/pavers/ceramics, concrete, and clean earthen fill. Such waste will be disposed at a place and in a manner as approved by Western Downs Regional Council.

Green waste will be burned as a last resort, in accordance with the following principles:

- ensuring appropriate buffer distances and fire breaks around asset protection zones, including WJV, public and other privately owned assets, and protected areas, including important vegetation communities and habitats of species
- under favourable wind conditions to minimise risk of harm to sensitive receptors
- prior and informed notice provided to adjacent landowners.

Fires lit by the WJV for the purpose of burning vegetation will be done with the approval of the Queensland Fire and Rescue Service and in accordance with an agreed fire management plan.

No landfill or on-site disposal of other waste is proposed within the final MLA boundaries. Under the *Environmental Protection Act 1994*, any sites used for a notifiable activity, such as waste disposal, must be listed on the EMR. This includes notifiable activities occurring on mining leases. All items of waste buried on-site that are classed as Notifiable activities will be identified on the Environmental Management Register (EMR) managed by the Department of Environment and Resource Management (DERM). Post-mining,

potential future landowners could find out about the location and details of any tyre disposal sites through a search of the EMR as part of the conveyancing process when purchasing property.

Land can only be removed from the EMR following an investigation by a member of a prescribed organisation, as listed in the Environmental Protection Regulation 2008, and the preparation of a report that satisfies the DERM that the land is not contaminated.

18.7.2 CONSTRUCTION PHASE

Green waste

As stated in the EIS Volume 1, Chapter 18 Waste Management, section 18.7.2, green wastes, including timbers removed from stock routes, will be used as either fauna habitat, chipped and mulched for use in rehabilitation and revegetation, or as a last resort burnt in accordance with the principles outlined in section 18.7.1 above.

Building wastes

Where practicable building waste will be reprocessed and reused onsite by the WJV. Where options for beneficial reuse of building wastes are not available, these materials will be separated into their constituent parts and the inert parts may be used as clean fill onsite, or removed off-site by a licensed recycling or waste contractor.

Recyclables

Where possible cardboard, metals, plastics and glass will be segregated and reused on-site by the WJV, or removed off-site by a licensed recycling or waste contractor.

Sewage effluent

Treated effluent from the WWTP is currently used for irrigation purposes at the Council owned showgrounds and Wandoan Golf Course with surplus discharged into Juandah Creek under licence. The current irrigation scheme may be expanded to accommodate the additional inflows and the effluent reuse will comply and be maintained to Western Downs Regional Council standards, and DERM licensing requirements. Chapter 11 Water Supply and Management, section 11.4.2, provides further discussion on sewage effluent management.

18.7.3 OPERATION

Green waste

As stated in the EIS Volume 1, Chapter 18 Waste Management, section 18.7.3, green wastes, including timbers removed from stock routes, will be used as either fauna habitat, chipped and mulched for use in rehabilitation and revegetation, or as a last resort in accordance with the principles outlined in section 18.7.1 above.

Sewage effluent

Treated effluent from the WWTP is currently used for irrigation purposes at the Council owned showgrounds and Wandoan Golf Course with surplus discharged into the Juandah Creek under licence. The current irrigation scheme may be expanded to accommodate the additional inflows, and the effluent reuse will comply and be maintained to Western Downs Regional Council standards, and DERM licensing requirements.

18.8 RESIDUAL IMPACTS

18.9 CONCLUSIONS

18.10 REFERENCES

Department of Environment and Climate Change (DECC) 2007, *Report into the Construction and Demolition Waste Stream Audit 2000-2005 – Sydney Metropolitan Area*, Department of Environment and Climate Change NSW.

Environment Protection Authority (EPA) 2006, *Operational Policy – Disposal and Storage for Scrap Tyres at Mine Sites*, Queensland Government.

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