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RISK ASSESSMENT – LANDFILL OPERATIONAL ACTIVITIES FOR ALLAWUNA FARM LANDFILL

This document describes the Occupational Safety and Health and Environmental risks associated with the Landfill Operational Activities of Cell 1 and Site Infrastructure for the Allawuna Farm Landfill, as identified during the design and approvals process.

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OPERATIONAL RISK ASSESSMENT AND REVIEW

Bowman & Associates has considered the operational activities and likely risks to be faced by SITA and its contactor(s) for operational activities at the Allawuna Farm Landfill, St Ronans, WA.

The assessment of the specific human and environmental aspects for the construction of the site infrastructure and Landfill Cell 1 has been addressed in separate risk assessment reports prepared by Bowman & Associates and Golder Associates as referenced in this document.

The risk management approach outlined in this document is based on the framework in the Australian Standard Risk Management (AS/NZS ISO 31000:2009) on which the Victorian EPA Licence Assessment Guidelines (2010) have been based. We have also considered the Western Australian Occupational Safety and Health Regulations (1996).

The below tables describe the risk ranking system used when assessing a particular activity for both personnel and environmental risk using the Victorian EPA Assessments Guidelines structure.



Table 1 Qualitative measures of likelihood

Rating	Indicator	Description	Frequency
5	Almost certain	Multiple incidents have been recorded	Is expected to occur almost all of the time
4	Likely	Several incidents have been recorded	Is expected to occur most of the time
3	Probable	Some incidents have been recorded	Might occur
2	Not likely	Few recorded or known incidents	Might occur but not expected to
1	Rare	No recorded or known incidents	Only expected to occur under atypical conditions

Table 2 Qualitative measures of consequence/impact

Rating	Indicator	Description
5	Severe	Human deaths, operations cause catastrophic off-site impacts, immense financial loss
4	Significant	Extensive human injuries or illness, operations cause substantial off-site impacts, major financial loss
3	Medium	Some health impacts to humans, operations cause some external impacts, large financial loss
2	Minor	First aid treatment, operations cause minimal off-site impacts, small financial loss
1	Negligible	Operations cause no injuries, negligible off-site impacts, and negligible financial loss

Table 3 Qualitative risk analysis matrix – Level of risk

Consequence	Likelihood				
	Almost certain	Likely	Probable	Not likely	Rare
Severe	V	V	V	V	H
Significant	V	V	V	H	H
Medium	V	H	H	M	M
Minor	H	H	M	L	L
Negligible	H	M	L	L	L

V = Very high risk; immediate action required

H = High risk; management required from senior staff

M = Medium risk; specify required management

L = Low risk; manage with standard operating procedure



Table 4 below describes some of the typical risks that have been identified during the design phase, including their impacts, assessed levels of risk and control measures that have been taken to mitigate them to acceptable levels.

The risk assessment generally covers the following site operational activities:-

- General site activities,
- Site activities related to operational waste facilities, including
 - Odours
 - Dust
 - Noise
 - Litter
 - Surface water
 - Leachate Management
 - Landfill Gas
- General Earthworks (excavation and filling),
- Transport of materials to and from site,
- Transport of waste within the site,
- Placement and compaction of waste in the the active cell,
- Pumping of leachate from the Cell sump to the leachate pond,
- Chemical Storage and handling,
- Landfill or facility fires,
- Handling of pumps and tools,
- Manual handling tasks, and
- Site Visitors.

This list is by no means exhaustive, as many risks are a function of the operational methods and techniques employed by the SITA and its contractor(s), and cannot be clearly defined during the design and Works Approval phase.



Table 4 Risk Assessment - Operational Activities for Allawuna Farm Landfill

Operational Element	Description of Risk	Potential Impacts	Likelihood / Frequency	Consequence Severity Rating	Level of risk	Control Measures
General						
General	Travel of site personnel to and from the site.	Minor to extensive human injuries.	2	3	Medium	Suitably designed roads to site and within site boundary. Upgraded Great Southern Highway intersection. Training and awareness.
General	Slip, trip and falls.	Minor human injuries	3	2	Medium	Personnel training, HSE toolboxes, awareness.
General	Manual handling Human injury when handling or lifting objects.	Injury/strains from incorrect lifting techniques.	4	2	High	Current manual handling techniques. Two or more person lifts where required. Heavy items to be lifted or carried by appropriate lifting equipment.
General	Snakes	Snake bites, injury to humans	2	3	Medium	Suitable PPE - boots, trousers Senior first aid officers onsite First aid kits
General	Insects, rodents, birds and site fauna	Bites and stings, injury to humans	2	3	Medium	Suitable PPE - boots, trousers Senior first aid officers onsite First aid kits



Operational Element	Description of Risk	Potential Impacts	Likelihood / Frequency	Consequence Severity Rating	Level of risk	Control Measures
General	Stormwater event - excessive rainfall	Erosion of partially completed construction works, wash out of road, or temporary works.	3	2	Medium	Design has considered storm events and has allowed adequate drainage along roads, hardstand areas, along creek lines, near low lying areas. Stormwater culverts have been designed for stormwater events. Contractor(s) to employ temporary stormwater control during works as per the specification.
General	Electric shock or electrocution	Human minor injury to severe injury	2	3	Medium	Safe work procedures in place. Licensed and trained personnel only to repair/replace electrical facilities. Isolation switches.
General	Waste truck travelling along entrance and internal access roads	Truck rollover or collision Injury or death of driver	2	3	Medium	Entrance road designed with 8 m wide pavement width, with drainage grades, culverts. Good driver visibility along road. Sealed section of road and suitable road grades. Suitable speed and traffic signage. Upgraded Great Southern Highway intersection for site traffic.



Operational Element	Description of Risk	Potential Impacts	Likelihood / Frequency	Consequence Severity Rating	Level of risk	Control Measures
Operations						
Operations	Landfill Gas	Gas migration offsite	2	3	Medium	During initial stages of operations, minimal gas will be produced. Landfill Gas management plan prepared for Works Approval and ongoing operations. Specific risk assessment for landfill gas prepared by Golder Associates.
Operations	Greenhouse Gas from machinery / trucks	Carbon dioxide emissions from plant and machinery	2	1	Low	Diesel powered plant Plant maintained in good working condition and serviced on a regular basis. Pre-start checks on all machinery. Landfill management plan prepared for Works Approval and ongoing operations.



Operational Element	Description of Risk	Potential Impacts	Likelihood / Frequency	Consequence Severity Rating	Level of risk	Control Measures
Operations	Dust Emissions from truck movements, material stockpiles, waste placement etc	Windblown dust outside of site boundary, complaints	3	1	Low	Operations have a suitable buffer distance to site boundary. Minimise material handling. Specific material stockpile locations. Selected roads will be sealed. Unsealed roads, exposed areas, stockpiles will be watered down when deemed necessary. Mud shaker designed to remove excess dust and mud from trucks. Designated roads for traffic. Waste loads in trucks will be covered.
Operations	Noise from machinery, waste trucks and process operations	Offsite receptors Complaints	2	1	Low	Suitable buffer distances from site boundary. Managing operating hours of noise intensive machinery. Construction of bunds around landfill area. Maintenance of equipment Enforcing vehicle speed limits Noise Assessment prepared by Vipac for construction and operational phases.



Operational Element	Description of Risk	Potential Impacts	Likelihood / Frequency	Consequence Severity Rating	Level of risk	Control Measures
Operations	Odour from waste decomposition, landfill gas and leachate	Offsite receptors Complaints	3	1	Low	Operations have a suitable buffer distance to site boundary. Waste delivered to site in covered vehicles. Good operational and housekeeping practices. Waste tipping face kept as small as possible and daily cover placed progressively. Immediate burial of odorous waste. Effective collection and management of leachate. Odour assessment prepared by ENVALL for operational phase.
Operations	Leachate	Spills, odours, contamination	2	2	Low	As per specific Environmental Risk assessment prepared by Golder Associates.
Operations	Stormwater	Spills, contamination, erosion	2	2	Low	As per specific Environmental Risk assessment prepared by Golder Associates.
Operations	Litter	Windblown litter beyond site boundary	2	1	Low	As per specific Environmental Risk assessment prepared by Golder Associates.



Operational Element	Description of Risk	Potential Impacts	Likelihood / Frequency	Consequence Severity Rating	Level of risk	Control Measures
Operations	Fuel Spills during truck, generator or machinery refilling	Contamination of soil or water bodies	2	2	Low	Dedicated filling points and bunded areas. Spill response established in Landfill Management Plan.
Operations	Leachate spills during pumping or transport.	Contamination of soil or natural water bodies	2	2	Low	Dedicated filling points and bunded areas. Spill response established in Landfill Management Plan.
Operations	Contamination of site with hydrocarbons or polluted water.	Polluted water source.	2	2	Low	The storage and handling of chemicals and fuels will be in accordance with the <i>Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007</i> , and Australian Standard AS 1940 <i>The storage and handling of flammable and combustible liquids</i> . Water discharge procedure described in Landfill Management Plan. Waste disposal as per waste acceptance manual.



Operational Element	Description of Risk	Potential Impacts	Likelihood / Frequency	Consequence Severity Rating	Level of risk	Control Measures
Operations	Fire in landfill or site facilities	Burning of waste, damage to facilities, human harm	2	2	Low	Fire management plan prepared for the site.
General	Waste Placement Uneven waste surfaces / subsidence / instability	Damage to plant or personnel due to subsidence or uneven surfaces	2	2	Low	Maximum fill layer depth and minimum compaction specified to ensure landform geotechnical stability during waste placement.
Operations	Waste Placement Rollover of plant equipment.	Injury or death of Plant operator or bystander.	2	3	Medium	Appropriate waste and cover soil placement. No deep excavation or steep grades. Contractors are responsible for safe operation of vehicles.
Operations	Waste Placement Machinery falling into excavated holes, trenches or large excavations.	Machinery or personnel injury from fall.	2	3	Medium	No deep excavations or high ledges Contractor(s) expected to using bunting or flagging for temporary hazards in line with their own Occupational Health and Safety procedures.



Operational Element	Description of Risk	Potential Impacts	Likelihood / Frequency	Consequence Severity Rating	Level of risk	Control Measures
Operations	Bystander being hit by machinery.	Serious injury to human.	2	4	High	Plant operators to be proficient in the use of their machinery. Bystanders to be clear of machinery when it is operating. High visibility clothing for persons on site.
Operations	Underground services.	Damage to buried services such as gas, data and power. Unintentional piercing of gas or electricity lines may result in severe injury.	2	3	Medium	Contractor required to 'dial before you dig' and locate onsite services prior to commencement of works. Underground services will be recorded as installed and record kept onsite.
Operations	Personnel falling into excavated holes or trenches.	Injury from a fall or ledge collapse.	2	3	Medium	No deep excavations or high ledges in the designed landform. Contractor(s) expected to using bunting or flagging for temporary hazards in line with their own Occupational Health and Safety procedures.



Operational Element	Description of Risk	Potential Impacts	Likelihood / Frequency	Consequence Severity Rating	Level of risk	Control Measures
Operations	Machinery falling into excavated holes, trenches or large excavations.	Machinery or personnel injury from fall.	2	3	Medium	No deep excavations or high ledges in the designed or operational landform. Contractor(s) expected to using bunting or flagging for temporary hazards in line with their own Occupational Health and Safety procedures.
Operations	Personnel struck by machinery	Serious injury to bystander.	3	3	High	Effective communication between onsite personnel and machine operators as per site procedures. UHF radios to be carried by site personnel and in every machine onsite. Onsite toolboxes to inform site personnel of current works onsite.
Operations	Cranes / Truck Lifters / Manitou Use of machinery to lift	Head trauma from falling objects.	2	4	High	Materials to be lifted using correct lifting points and with suitability sized crane or lifting equipment. No personnel to be positioned under lifting area or in front of moving lifting machinery.



Operational Element	Description of Risk	Potential Impacts	Likelihood / Frequency	Consequence Severity Rating	Level of risk	Control Measures
Operations	Site traffic Vehicle / machinery being struck or collisions.	Vehicle or machinery collisions.	3	3	High	Traffic management plan to be in place during construction works. Designated parking areas for truck and light vehicles. All contractors to be inducted. Regular toolbox talks. Entrance road and internal roads designed to suit construction and operational traffic, with good lines of sight and suitable road widths.
Operations	Lifting or moving or using pumps	Human injury	3	2	Medium	Correct lifting techniques. Suitable PPE - gloves. Machinery assisted lift where required. Installer must develop a work method statement for safe deployment.

