Residual Exposure Risk Assessment

Proposed Resource Recovery Facility
Block 11, Section 21, Hume, ACT

August, 2019

Certificate of approval for issue of documents

Document Name	Inherent Exposure Risk Assessment – Proposed Resource Recovery Facility, Block 11, Section 21, Hume, ACT		
Date of Issue	Draft 1: 22 January 2020	**Job Number**	1090502
Client	Flexible Australia		

Risk Assessment and Report Preparation	Reviewed	Approved
Nicola Power MAIOH BSc (Hons) MSc Occ. Hyg. Occupational Hygiene Manager Robson Environmental Pty. Ltd.	Marcus Brooks MAIOH COH BSc. MSc Occ. Hyg. Occupational Hygienist Robson Environmental Pty. Ltd.	Marcus Brooks MAIOH COH BSc. MSc Occ. Hyg. Occupational Hygienist Robson Environmental Pty. Ltd.

Table of Contents

1 Introduction

Robson Environmental Pty Ltd (Robson) was engaged by Flexible Australia to undertake a Health Impact Assessment for the Proposed Resource Recovery Facility at Block 11, Section 21 in Hume. This report covers the Stage 2 assessment of the residual exposure risks for possible health hazards identified in Stage 1 (see Robson report 10905, May 2019).

The purpose of this Residual Exposure Risk Assessment is to inform the Environmental Impact Statement for the development of the Proposed Resource Recovery Facility, as per Section 8.1.8 of the Scoping document, to "describe the potential for health impacts where personnel come into contact with or are exposed to material on-site", as an Exposure Risk Assessment.

This Risk Assessment is to determine the residual exposure risk for expected quantities of materials on the site with controls intended to be put in place, based on information provided by Robert Thompson from Flexible Australia. Assessment of the inherent risk for these exposures was previously undertaken (see Robson report 1090501, August 2019).

Possible exposure risks have been assessed for the following waste streams shown in Table 1.

Table 1: Types, expected composition and expected quantities of waste streams

Waste Stream	Expected Composition	Expected Annual Quantity Processed
Stormwater (wet and dry)	Water, organic matter (e.g. leaves), soil/sand, litter including plastics, paper and metal, small quantities of vehicle and industrial related contaminants such as oil etc.	6900 tonnes
Stormwater Retention Chambers		450 tonnes
Sedimentation Basins		110 tonnes
Street Sweepings	Organic matter (e.g. leaves), soil/sand, water, litter including plastics, paper and metal, vehicle related contaminants including oils, fuels, tyre particulates etc.	11400 tonnes
Hydromud	Rock, soil, organic matter (e.g. grass), water	4070 tonnes
Bunker Sand	Sand (silica), minor contaminants (e.g. litter)	350 tonnes

2 Exposure Risks Not Assessed

During hazard identification all hazards which could conceivably be present within the waste streams were identified, but further risk assessment of all of these hazards is not practical or necessary. Prioritisation of hazards has been undertaken, and hazards not expected to be significant have been excluded from this risk assessment, as per Table 2.

Table 2: Hazards excluded from further risk assessment

Hazard	Justification for exclusion
Per and Poly Fluoroalkyl Substances (PFAS – PFOS, PFOA)	Waste streams from within the Canberra area are not expected to have significant volumes of PFAS. If waste from outside of Canberra is to be processed, or volumes of hydromud are to increase this risk may need to be reassessed.
Bentonite clay	Hazards from process additive are to be managed as per the Manufacturer's Safety Data Sheet

Hazard	Justification for exclusion
Fungicides and Insecticides	Street sweepings and stormwater waste from the Canberra area are not expected to have significant volumes of fungicides and insecticides. If waste from outside of Canberra is to be processed this risk may need to be reassessed.
Faeces	The hazards from exposure to faeces are covered in the exposure risk assessment for 'Viruses, Bacteria and Fungi'
Cigarette butts	Exposure is not expected to be significant as litter material will be removed early in processing
pH Adjusters, Flocculants, Coagulants	Hazards from process additive are to be managed as per the Manufacturer's Safety Data Sheet

3 Risk Assessment Method

The risk assessment method used in this assessment is based on the guidance of the *Health Monitoring for Exposure to Hazardous Chemicals – Guide for Persons conducting a Business or Undertaking* (Safe Work Australia, 2013). The level of risk posed by exposure to a contaminant is dependant on the intrinsic hazard of the substance and the dose (frequency, duration and amount of exposure). In this assessment, only the residual hazard has been assessed.

The nature and severity of the hazard for each chemical was assessed based on GHS Hazard Categories provided in the Safe Work Australia Hazardous Chemical Information System (HCIS) sources, to give a consequence rating from the assessment tool shown in Table 1, for the GHS Hazard Categories, as classified in Table 4.

Table 3: Consequence assessment for GHS Hazard Categories

Rating	Consequence - the outcome if event occurs
Severe	Known carcinogens, mutagens, reproductive toxins, chemicals which could cause fatality or injury causing significant permanent loss of function
Major	Suspected carcinogens, mutagens, reproductive toxins, chemicals which could cause injury causing permanent loss of function
Moderate	Chemicals which could cause injury causing temporary loss of function or hospital admission
Minor	Chemicals which could cause minor injury, requiring first aid or out-patient medical treatment
Insignificant	Chemicals not expected to cause injury or injury requiring notification only

Table 4: Classification & hazard statements assigned under GHS criteria, and consequence ratings, as per Table 3

Classification		Hazard statement
Acute Toxicity	Category 4	H332- Harmful if inhaled
		H312 - Harmful in contact with skin
		H302 - Harmful if swallowed
	Category 3	H331 - Toxic if inhaled (gas, dust, mist)
		H311 - Toxic in contact with skin
		H301 - Toxic if swallowed

Classification		Hazard statement
	Category 2	H330 - Fatal if inhaled (vapour)
		H330 - Fatal if inhaled (gas, dust, mist)
		H300 - Fatal if swallowed
	Category 1	H330 - Fatal if inhaled (vapour)
		H310 - Fatal in contact with skin
Skin Irritation – Category 2		H315 - Causes skin irritation
Skin Corrosion	Sub-category 1B or 1C	H314 - Causes severe skin burns and eye damage
	Sub-category 1A	
Eye Irritation – Category 2A		H319 - Causes serious eye irritation
Eye Damage – Category 1		H318 - Causes serious eye damage
Specific Target Organ Toxicity – Single exposure	Category 3	H335 - May cause respiratory irritation
		H336 - May cause drowsiness and dizziness
	Category 2	H371 - May cause damage to organs
		H371 - May cause damage to organs
	Category 1	H371 - May cause damage to organs
		H370 - Causes damage to organs
Specific Target Organ Toxicity – Repeated Exposure	Category 2	H373 - May cause damage to organs through prolonged or repeated exposure
	Category 1	H372 - Causes damage to organs through prolonged or repeated exposure
Respiratory Sensitisation – Category 1		H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
Skin Sensitisation – Category 1		H317 - May cause an allergic skin reaction
Effects on or via lactation		H362 - May cause harm to breast-fed children
Aspiration hazard – Category 1		H304 - May be fatal if swallowed and enters airways
Carcinogenicity	Category 2	H351 - Suspected of causing cancer
	Category 1B	H350 - May cause cancer
		H350i - May cause cancer via inhalation
	Category 1A	H350 - May cause cancer
		H350i - May cause cancer via inhalation
Mutagenicity	Category 2	H341 - Suspected of causing genetic defects
	Category 1A	H340 - May cause genetic defects
	Category 1B	
Toxic to Reproduction	Category 2	H361 - Suspected of damaging fertility or the unborn child
	Category 1A	H360 - May damage fertility or the unborn child
	Category 1B	H360 - May damage fertility or the unborn child

The degree of workers' possible exposure (without controls) was based on the expected volume of the contaminant in the waste stream, based on the literature review presented in Robson report 1090501. This information was used to determine the likelihood rating from Table 5. This rating is the likelihood that an adverse health effect will occur from uncontrolled exposure to the volume of contaminant expected to be present within the waste streams.

Table 5: Likelihood assessment

Rating	Likelihood – The potential for events to occur	Probability
Very Likely	The event is expected to occur. e.g. common or repetitive occurrence	>90%
Likely	The event will probably occur. e.g. has a record of occurrence	50% to 90%
Possible	The event might occur e.g. has occurred several times	10% to 50%
Unlikely	The event probably won't occur. e.g. has occurred a few times, is known to occur within the industry	2% to 10%
Very Unlikely	The event may occur in exceptional circumstances e.g. event is plausible, would only occur in exceptional circumstances in the industry	<2%

Risk assessment for each contaminant is done using the matrix in Table 6. Risk is described as:

- Not significant (Low) – workers are unlikely to be exposed at a level which would adversely affect their health; or
- Significant (High/medium) – workers may be exposed at a level which may adversely affect their health.

Table 6: Risk Assessment Matrix

Consequence	Very Likely	Likely	Possible	Unlikely	Very Unlikely
Severe	High	High	High	Medium	Medium
Major	High	High	Medium	Medium	Low
Moderate	High	Medium	Medium	Low	Low
Minor	Medium	Medium	Low	Low	Low
Insignificant	Medium	Low	Low	Low	Low

4 Assessment of Exposure Controls

4.1 Exposure Controls

The following list outlines the various controls that Robson has been advised that will be implemented to manage personal and environmental exposures, that will be used throughout the process from receipt of delivery to stockpiling of remediated product for reuse.

4.2 Elimination and Substitution

4.2.1 Automation

- Purpose-built integrated plant.

- No hand sorting of product.
- Separation of usable materials from waste by mechanical means.
- Once the product is dumped into the hopper it remains wet until stockpiled.

4.2.2 Isolation

4.2.2.1 Containment

- Isolation/containment/enclosed:
    - Concrete bunded area.
    - Drive over bunds.
    - Shroud over conveyors

4.2.2.2 Enclosure

- Metal building
- Truck and Loader Cab is sealed and air conditioned
- Process Enclosures:
    - Centrifuge – partially enclosed.
    - Receival area – liquid - Semi-enclosed.
    - Hydro cyclone – enclosed – reduce dust.
    - Waste in compound – enclosed bins.

4.2.2.3 Increase distance

- Offices, tea room, lab, toilets – separate from plant approx. 55m away.
- Separate building
- Products outside – loaded externally

4.2.3 Engineering

4.2.3.1 Dust mitigation

Water sprays:

- Conveyors.
- At pits outside.

4.2.3.2 General ventilation

General area ventilation:

- Whirlybirds
- Roller doors
- Designed by ventilation engineer

4.2.4 Administration

4.2.4.1 Maintenance

Highest likelihood for exposure to dust, metals and chemicals will occur during maintenance activities. This can be controlled by:

- Wash down procedure before/for maintenance
- Sprayer maintenance
- All in-house unless needed i.e. electrical
- Standard Procedures for maintenance
- Maintenance based on manufacturers recommendations

- Preventative maintenance
    - Oiling
    - Routine management

4.2.4.2 Work scheduling

All work will be scheduled during normal business hours (0500 -1900), where possible.

4.2.4.3 Working practices

All workers and visitors will follow site requirements for working on site. Additional controls will include:

- Training of staff.
- Drainage in floor into water treatment system – hosing.
- Non-dry methods inside building.
- Procedures.
- Housekeeping procedure.
- Operating procedures.
- Quality control procedures:
    - 9001.
    - 31000.
    - 18001.
    - 4801.
    - 14001.

4.2.4.4 Operation procedures

- Operation EMP
- WHS Plan
- Management plan

Testing

    - Assessment procedures.
    - Australian Standard requirements, Client specification, guidelines.
- Inductions.
- Pre-employment health assessments.

4.2.4.5 Start-up Processes

- Risk assessment.
- Effectiveness of controls review.
- Monitoring as required.
- Air quality assessments.

4.2.4.6 Emergency procedure

- Environmental.
- WHS.

4.2.4.7 Auditing – internal and 3rd party

4.2.4.8 Personal Hygiene Practices

- Wash facility separate.
- Safety shower and eyewash facilities.
- First aid training supplied.

- Changerooms:
    - Lockers.

4.2.4.9 Access controls to site

- Security fence.
    - Colourbond and spear type.
- Electric gate to weigh bridge.
- Only enter via weigh bridge.

4.2.5 Personal Protective Equipment (PPE)

4.2.5.1 Standard worker PPE

- Steel cap boots.
- Suits – heat stress management plan.
- Gloves.
- Protective clothing – as required.

4.2.5.2 Maintenance worker PPE

- Tyvek.
- No respirator.
- P2 mask.

5 Canberra Study

A summary of results taken from the provided Mid Project Review (Leslie & Yacobellis, 2017) of a study into contaminant values in street sweepings in Canberra is shown in Table 7. Comparison to the literature review values found that the contaminant levels in the Canberra street sweeping were mixed, but were mostly low.

Table 7: Canberra contaminants in Street Sweepings (from Leslie & Yacobellis, 2017)

Hazard	Curtin (mg/kg)	Giralang (mg/kg)	Monash (mg/kg)	O'Connor (mg/kg)	Wanniassa (mg/kg)	Comparison to literature review values
Arsenic	2.4	<2	<2	4.2	3.2	Middle
Cadmium	<0.4	<0.4	<0.4	<0.4	<0.4	Low – Mid (LOD is higher than median)
Chromium	21	8.1	12	11	16	Middle
Copper	6.5	9.4	13	12	19	Low
Lead	14	11	8.4	19	24	Low – Middle
Mercury	0.1	<0.1	<0.1	0.1	<0.1	Low – Mid (LOD is higher than median)
Nickel	5.8	<5	<5	<5	9.5	Low – Middle
Zinc	85	72	36	53	84	Low

Hazard	Curtin (mg/kg)	Giralang (mg/kg)	Monash (mg/kg)	O'Connor (mg/kg)	Wanniassa (mg/kg)	Comparison to literature review values
TRH C10 – C36 (Total)	13 800	5 690	1 510	8 190	10 800	High
Benzo(a)pyrene TEQ (medium bound)	0.6	0.6	0.6	0.6	0.6	Low
Benzo(a)pyrene TEQ (upper bound)	1.2	1.2	1.2	1.2	1.2	Low

6 Residual Exposure Risk

The assessment outcomes for the inherent exposure risk assessment for identified hazards are shown in Table 8. Based on the expected composition of the waste streams, as shown in Table 1, the concentrations of most contaminants (particularly metals) would be expected to be higher in the street sweeping waste stream than in the stormwater waste streams. Where concentrations of contaminants within stormwater waste streams were not found in the literature review, the concentration for street sweepings has been used. This is likely to result in a conservative estimate of likely exposures. Further, given the limited industrial activities occurring in Canberra (Table 7), concentrations of contaminants are likely to be relatively low compared to levels within the literature, which came from a range of environments.

Where available, contaminant concentrations have been compared to the Health Investigation Levels (HIL) of soil contaminants (Table 1A(1)) from Schedule B 1 – Guideline on Investigation Levels for Soils and Groundwater from the National Environment Protection (Assessment of Site Contamination) Measure 1999, for context as to the acceptable level of risk for the concentration of the contaminant in the waste stream.

Table 8: Inherent Exposure Risk Assessment

Hazard	Consequence Assessment	Likelihood Assessment	Inherent Exposure Risk	How effective are the proposed controls?	Residual Exposure Risk
Elements/Metal Compounds					
Antimony	Major	Very Unlikely	**Low**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Arsenic	Severe	Possible	**High**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Barium	Major	Possible	**Medium**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Boron	Severe	Unlikely	**Medium**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Cadmium	Severe	Unlikely	**Medium**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**

Hazard	Consequence Assessment	Likelihood Assessment	Inherent Exposure Risk	How effective are the proposed controls?	Residual Exposure Risk
Chromium	Severe – Hexavalent Chromium Insignificant – Chrome metal & trivalent chromium	Very Unlikely	**Low**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Cobalt	Severe	Very Unlikely	**Medium**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Copper	Minor/ Moderate	Unlikely	**Low**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Fluoride	Insignificant	Very Unlikely	**Low**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Iron	Minor/ Moderate	Likely	**Medium**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Lead (inorganic)	Severe	Likely	**High**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Magnesium	Minor/ Moderate	Likely	**Medium**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Manganese	Severe	Possible	**High**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Mercury (inorganic)	Severe	Unlikely	**Medium**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**

Hazard	Consequence Assessment	Likelihood Assessment	Inherent Exposure Risk	How effective are the proposed controls?	Residual Exposure Risk
Molybdenum	Major – molybdenum trioxide Insignificant – other forms	Very Unlikely	**Low**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Nickel	Severe	Possible	**High**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Selenium	Major	Very Unlikely	**Low**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Silver	Minor	Very Unlikely	**Low**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Thallium	Severe	Very Unlikely	**Medium**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Tin	Insignificant	Very Unlikely	**Low**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Vanadium	Severe – vanadium pentoxide Insignificant – other forms	Very Unlikely	**Medium**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Zinc	Severe	Possible	**High**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**

Hazard	Consequence Assessment	Likelihood Assessment	Inherent Exposure Risk	How effective are the proposed controls?	Residual Exposure Risk
Minerals and Particulates					
Asbestos	Severe	Possible	**High**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element. The possibility for at risk levels of asbestos to be present will be mitigated by knowing where the material originates from.	**Mod**
Respirable and Inhalable Dust	Severe	Possible	**High**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element. Keeping the street sweepings and bunker sand wet throughout the process will reduce the amount of inhalable and respirable dust that could affect the workers.	**Mod**
Respirable Crystalline Silica	Severe	Possible	**High**	If all the proposed operating controls are implemented, there is a possibility of minimal personnel or environmental risk from this element. Keeping the street sweepings and bunker sand wet throughout the process will reduce the amount of inhalable and respirable dust that could affect the workers. The process will not be grinding the material into respirable size fractions, further reducing the RCS risk With the changes to the SWA Workplace Exposure Standard for RCS to 0.5mg/m^3, this will need to be monitored once commission to ensure compliance.	**Mod**
Volatile Organic Compounds (VOCs) & Hydrocarbons including PAHs					
Hydrocarbons	Severe	Unlikely	**Medium**	If all the proposed operating controls are implemented, there will be a possibility that hydrocarbons accumulate in during the water treatment phase. The flocculation tanks are open, so any excess should off-gas into the shed. This should be monitored until proven there is no risk.	**Mod**

Hazard	Consequence Assessment	Likelihood Assessment	Inherent Exposure Risk	How effective are the proposed controls?	Residual Exposure Risk
PAHs	Severe	Possible	**High**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, there is not likely to be a personnel or environmental risk from this element.	**Low**
Other VOCs	Severe	Possible	**High**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, it is possible that there may still be VOC present. However, it is unlikely to be a personnel or environmental risk from this element.	**Mod**
Biological Agents					
Bacteria	Severe	Possible	**High**	If all the proposed operating controls are implemented, there will be no personnel or environment risk from this element.	**Low**
Fungi	Severe	Unlikely	**Medium**	If all the proposed operating controls are implemented, there will be no personnel or environment risk from this element.	**Low**
Legionella	Severe	Unlikely	**Medium**	If all the proposed operating controls are implemented, there will be no personnel or environment risk from this element.	**Low**
Other Hazards					
Unknown chemicals	Severe	Possible	**High**	Based on the expected amount likely to be present in the material and if all the proposed operating controls are implemented, it is possible that there may still be unknown chemical contaminants present. However, it is unlikely to be a personnel or environmental risk from this element.	**Mod**

7 Summary

A summary of the inherent risk assessment outcomes is shown in Table 9.

Table 9: Summary of inherent risks rating for all hazards assessed

Hazard	What is the inherent level of exposure risk?	What is the residual level of exposure risk?
Arsenic	High	Low
Lead (inorganic)	High	Low
Manganese	High	Low
Nickel	High	Low
Zinc	High	Low
Asbestos	High	Mod
Respirable and Inhalable Dust	High	Mod
Respirable Crystalline Silica	High	Mod
PAH	High	Low
Bacteria	High	Low
Unknown chemicals (inc. Other VOCs)	High	Mod
Barium	Medium	Low
Boron	Medium	Low
Cadmium	Medium	Low
Cobalt	Medium	Low
Iron	Medium	Low
Magnesium	Medium	Low
Mercury (inorganic)	Medium	Low
Thallium	Medium	Low
Vanadium	Medium	Low
Fungi	Medium	Low
Legionella	Medium	Low
Hydrocarbons	Medium	Mod
Antimony	Low	Low
Chromium	Low	Low
Copper	Low	Low
Fluoride	Low	Low
Molybdenum	Low	Low
Selenium	Low	Low
Silver	Low	Low

Hazard	What is the inherent level of exposure risk?	What is the residual level of exposure risk?
Tin	Low	Low

8 Limitations

The report, including any risk assessment presented, is based on the information available to Robson at the time of assessment. To the best of Robson's knowledge, our assessment of the data represents a reasonable interpretation of the current state of knowledge, and subsequent risk at the time of assessment. Should you have any questions or require further information please contact Robson Environmental.

9 References

- Bannerman R, Owens D, Dodds R & Hornewer 1993, *Sources of pollutants in Wisconsin stormwater*, Water Science Technical, Vol. 28 No. 3-5, pp. 241-259
- Bohan, P, Hertzberg, V, Burg, W, Clark, S, 2011, Airborne Lead, Dust and Asbestos-like Fibres ion Mechanical Street Cleaner Environments and an Evaluation of Some Contributory Factors, Applied Occupational and Environmental Hygiene, vol. 6,, pp.54-58.
- Center for Disease Control (CDC) 2018, Legionella (Legionnaires' Disease and Pontiac Fever), viewed August 14 2019, <https://www.cdc.gov/legionella/about/index.html>
- Cheah, C, Ball J, Cox R, & Peirson, 2007, 'Assessing the Quantity and Quality of Runoff from an Urban Roof Catchment', *University of New*
- Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRCCARE) 2017, *Risk Based Management and remediation guidance for Benzo(a)pyrene*, Technical Report 39, CRCCARE, Newcastle
- Department of Health 2013, *Who is at risk of developing asbestos-related diseases?*, viewed August 12, 2019, https://www1.health.gov.au/internet/publications/publishing.nsf/Content/asbestos-toc~asbestos-health~asbestos-risk-diseases
- Department of Health, 2019, *Tetanus*, viewed August 14 2019, https://www.health.gov.au/health-topics/tetanus
- Depree, C, 2008, 'Contaminant characterisation and toxicity of road sweepings and catchpit sediments: Towards more sustainable reuse options', *Land Transport NZ Research Report*, vol. 345, pp. 114
- Martin, I, Roberts, J, Griffiths, E, 2013, Leaf litter in street sweepings: investigation into collection and treatment, Horizon House, Bristol
- McLaughlin, J. 2005, *Gardens as a source of infections disease*, The John D. Campbell Agricultural Center, USA
- National Environment Protection Council 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, NEPC, Australia
- EPA Victoria, 2004, Guidelines for Environmental Management Biosolids Land Application, EPA Victoria, Southbank
- Hughes, M, Steele, T, 1994, *Occurrence and Distribution of Legionella Species in Composted Plant Materials*, Applied and Environmental Microbiology, vol. 60, pp. 2003-2005

- Marth, E., Reinthaler, F.F., Schaffler, K., Jelovcan, S., Haselbacher, S., Eibel, U. and Kleinhappl, B. 1997. Occupational health risks to employees of waste treatment facilities. *Ann Agric Environ Med*, 4(143), p.147.
- Minnesota Pollution Control Agency 2018, *Bacteria in stormwater*, viewed July 24, 2019, <https://stormwater.pca.state.mn.us/index.php?title=Bacteria_in_stormwater>
- National Institute for Occupational Safety and Health (NIOSH), 1993, *Exposure to silica dust among street-sweeper operators*, Applied Occupational and Environmental Hygiene, vol. 8, pp. 13-14.
- Safe Work Australia, 2013, *Hazardous Chemicals requiring Health Monitoring*, SWA, Australia
- Safe Work Australia (SWA) 2018, *Guidance on the Classification of Hazardous Chemicals under the Work Health and Safety (WHS) Regulations*, SWA, Australia
- Safe Work Australia (SWA) 2019, *Hazardous Chemical Information System*, accessed 31/07/2019, http://hcis.safeworkaustralia.gov.au/HazardousChemical
- Sakamoto, R., Ohno, A., Nakahara, T., Satomura, K., Iwanaga, S., Kouyama, Y., Kura, F., Kato, N., Matsubayashi, K., Okumiya, K. and Yamaguchi, K., 2009. Legionella pneumophila in rainwater on roads. *Emerging infectious diseases*, 15(8), p.1295.
- Sales-Ortells, H. and Medema, G. 2015. Microbial health risks associated with exposure to stormwater in a water plaza. *Water research*, *74*, pp.34-46.
- Sawyer C, Hayes J & English W, 2010, *Characterisation of Escherichia Coli for Sediment Basin Systems at Construction Sites*, World Environmental and Water Resources Congress 2010
- Sidhu, J.P.S., Hodgers, L., Ahmed, W., Chong, M.N. and Toze, S. 2012. Prevalence of human pathogens and indicators in stormwater runoff in Brisbane, Australia. *water research*, *46*(20), pp.6652-6660.
- Smith, S.R., 2009. Organic contaminants in sewage sludge (biosolids) and their significance for agricultural recycling, Philosophcal Transactions of the Royal Society, 367 (1904), 4005-4041.
- Tiefenthaler L, Stein E, & Schiff K, 2011, Levels and patterns of fecal indicator bacteria in stormwater runoff from homogenous land use sites and urban watersheds, Journal of Water and Health, vol. 9(2), pp. 279-90
- Tooher, R., Griffin, T., Shute, E. and Maddern, G., 2005. Vaccinations for waste-handling workers. A review of the literature. *Waste management & research*, 23(1), pp.79-86.
- Walch, M, 2006, 'Monitoring of Contaminants in Delaware Street Sweeping Residuals and Evaluation of Recycling/Disposal Options', in *21st International Conference On Solid Waste Technology and Management*, Philadelphia, USA, 26-29 March, 2006.
- *Watershed Protection Techniques*, 1990, Vol 3, No 1, Feature Article II. Microbes and Urban Watersheds – Concentrations, sources, and pathways
- Wei, B & Yang, L, 2009, A review of heavy metal contaminations in urban soils, urban road dusts and agricultural soils from China, Microchemical Journal, vol. 94, pp. 99-107
- Whiley, H. and Bentham, R., 2011. Legionella longbeachae and legionellosis. *Emerging infectious diseases*, 17(4), p.579.