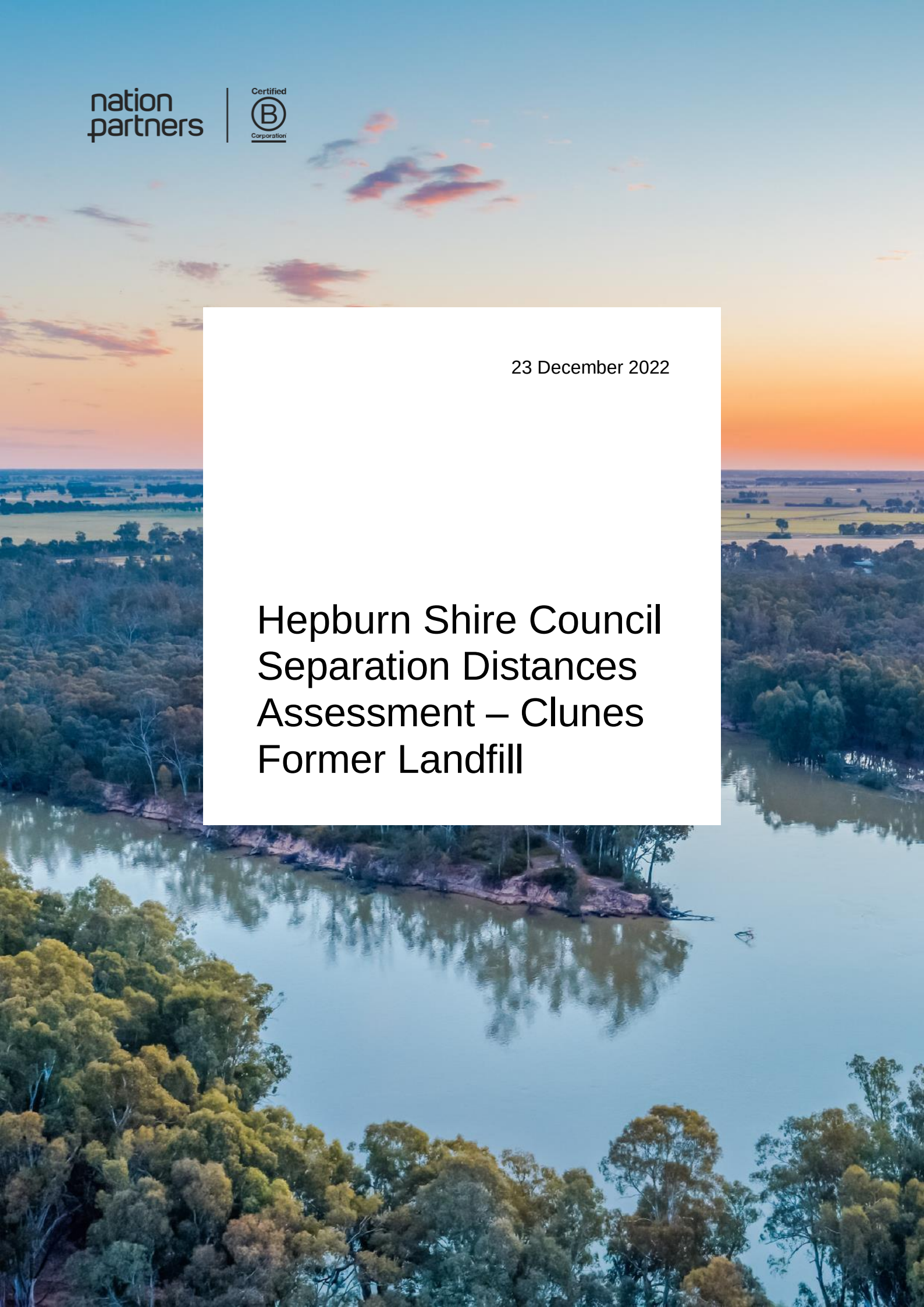

23 December 2022

Hepburn Shire Council Separation Distances Assessment – Clunes Former Landfill

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Document title
Hepburn Shire Council Separation Distances Assessment – Clunes Former Landfill

Version
1.1

Date
23 December 2022

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Executive Summary

Hepburn Shire Council (HSC) engaged Nation Partners Pty Ltd (Nation Partners) to undertake a review and qualitative assessment (the Assessment) of key former landfill sites, plus other potentially contaminated sites and sensitive land use interfaces within the Hepburn Shire. The assessment comprised four former landfills managed by HSC in Daylesford, Creswick, Clunes and Trentham. Three of which are active waste transfer stations (Daylesford, Creswick and Trentham). Two sites not managed by HSC were also part of the Assessment, including a Major Hazard Facility (MHF) and a former foundry in Trentham. Each HSC-managed site has a separate report with the site reported herein the: **Clunes former landfill (the Site)**.

The Assessment was undertaken as an initial, qualitative step to support HSC in increasing and consolidating its understanding of the Site regarding the associated environmental, amenity and societal risks, thereby informing options and next steps that would support the application of and/or "risk-based" refinement of potential planning controls.

A review of standard separation distances applicable to existing uses at the Site with reference to the requirements of applicable Victorian Environment Protection Authority (EPA) and Department of Environment, Land, Water and Planning (DELWP) guidelines was undertaken and mapped to support visualising the land use and surrounding context for the Site.

Current and historical activities, available records, previous reports and the site inspection informed the development of a Preliminary Conceptual Site Model (CSM) for the Site which fed into a high-level qualitative assessment. Whilst an assessment of level of risk of potential for contamination was initially proposed, due to a number of information gaps relating to contamination risk at the Site, the level of risk could not be meaningfully assessed.

The Assessment found that:

- Information gaps and uncertainties pertaining to groundwater, surface water and from landfill gas contamination potential were identified and further work is required to understand the status of previous assessments and monitoring programs;
- Groundwater monitoring reportedly occurs at the Site, however a documented monitoring program was not available at the time of the Assessment;
- The Site does not appear to hold or implement a documented aftercare management plan; and
- Closing information gaps and resolving uncertainties with respect to compliance and impacts of current historical landfilling operations, including the potential for offsite impacts, should be undertaken concurrently with consideration of planning controls, such as implementing a Buffer Area Overlay (BAO).

Details of the specific recommendations are included within the Discussion and Recommendations section of this report.

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1 Introduction

Nation Partners Pty Ltd (Nation Partners) was engaged by Hepburn Shire Council (HSC) to undertake a review and qualitative assessment (the Assessment) of key former landfill sites, plus other potentially contaminated sites (the Sites) and sensitive land use interfaces. The Assessment is intended to inform the implementation of appropriate planning controls to mitigate impacts to the environment and/or the local community from the Sites, within the Shire of Hepburn (the Shire). Each HSC managed site has been reported on separately. The site reported herein is the **Clunes former landfill (the Site)**.

1.1 Project objectives

The purpose of the assessment was to:

- Contribute to establishment of the basis for application of relevant planning buffers for the Sites based on existing regulatory context and published guidance;
- Understand the current land use and planning context plus the strategic planning direction that interfaces with each of the Sites; and
- Provide recommendations for additional actions to consider reduction from “baseline” separation distances, should Council wish to consider site-specific controls.

This assessment is an initial, qualitative step to support HSC in increasing and consolidating its understanding of the Sites regarding the associated environmental, amenity and societal risks, thereby informing options and next steps that would support the application of and/or “risk-based” refinement of potential planning controls.

1.2 Project scope

The scope of works included review of available information of six (6) contaminated and potentially contaminated sites, namely: historic landfills; a major hazard facility; and a former foundry, within the Shire, and included the following:

- Desktop review of site information sources, including:
  - Previous studies and reports;
  - Documentation provided by HSC; and
  - Public information held by government and regulatory authorities.
- Site inspections at the historic landfill sites;
- A review of standard separation distances applicable to existing uses at the Sites with reference to the requirements of:
  - *Department of Environment, Land, Water and Planning (DELWP), Managing buffers for land use compatibility, Planning Practice Note* (March 2021)
  - *EPA Publication 788.3 Siting, design, operation and rehabilitation of landfills (Landfill BPEM)* (August 2015)
  - *EPA Publication 1518 Recommended separation distances for industrial residual air emissions (IRAEs)* (March 2013)
  - *Ministerial Direction No. 20 Major Hazard Facilities* (October 2018)
  - *Ministerial Direction No. 1 Potentially Contaminated Land* (August 2021)
- Assessment of data gaps and uncertainties in characterising potential contamination risks, and the corresponding potential risk to receptors;
- Development of preliminary conceptual site models (CSMs) for HSC-managed sites;
- Mapping of land use context, environmental context and separation distances; and

- Preparation of recommended next steps and further investigation, where warranted.

1.3 Limitations of this assessment

- This assessment is based solely on publicly available information, information provided by HSC and site visits conducted by Nation Partners in August 2022.
- No engagement was undertaken with broader stakeholders nor the Regulator(s) – EPA, WorkSafe and Department of Environment Land, Water and Planning (DELWP).
- Nation Partners produces technical and advisory documents in the course of providing its services, which includes this document.
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2 Background

2.1 The Site

The Site is located is located at Downes Street, Clunes, Victoria and is managed by HSC. The Site's location within the Shire is shown in Figure 2.1. Further site identification details are summarised in Section 5.

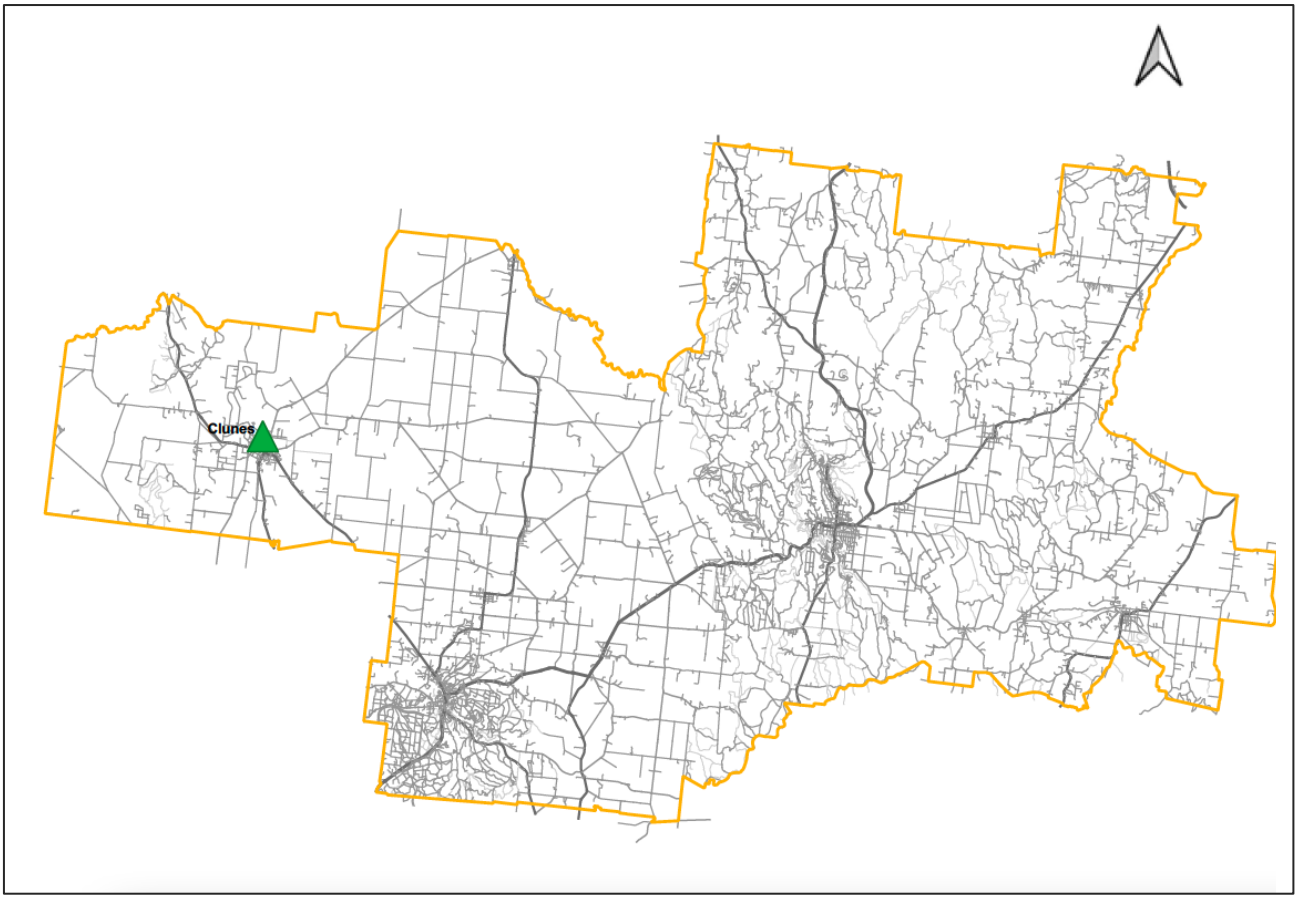


Figure 2.1: Location map of site

2.2 Previous assessments

An assessment of closed landfills within the Shire was completed in 2019 (*Closed Landfill Assessment Report for Hepburn Shire Council,* GCWWRRG, 2019) which included the HSC-managed sites. The assessment was preliminary and limited in nature and provided a qualitative assessment of risks posed by closed landfills in the region in line with EPA Publication 1671: *Local council self-assessment tool for closed landfill environmental risk* (EPA, 2018).

Whilst the assessment included additional risks not encompassed by EPA Publication 1671, several aspects listed in the self-assessment were not undertaken. EPA Publication 1671, and the assessment completed by GCWWRRG, also predate the current Victorian regulatory landscape and the promulgation of the *Environment Protection Act 2017* (EP Act 2017) and *Environment Protection Regulations 2021* (EP Regulations 2021) in particular, which articulate obligations relating to both Duty Holders, plus the

comprehensive General Environmental Duty (GED); in addition to the introduction of *Managing buffers for land use compatibility Planning Practice Note 92*, authored by DELWP in 2021.

Some environmental assessment and reports have been completed for the Site and include the following:

- SKM (2002), Clunes Hydrogeological Assessment, SKM, July 2002
- Landserv (2018), *Annual Groundwater Monitoring Report,* Landserv, June 2018

The above are discussed further in Section 7.

3 Regulatory context

Legislation, policy and guidance relating to both the management of closed landfills and land use planning framework is extensive. The EP Act 2017 and the *Planning and Environment Act* 1987 are the primary legislation that underpins this guidance, with key elements and guiding documents and how they relate to this assessment summarised below.

3.1 Environment protection framework

The EP Act 2017 and the EP Regulations 2021 are the governing Victorian Environment Protection legislation, designed to prevent harm to human health and the environment from pollution and waste including from past activities and incidents. The general environment duty (GED) is at the centre of the EP Act 2017 and is based on the concept of minimising risks of harm to human health and the environment, 'so far as reasonably practicable' (SFARP).

In addition to the GED, the EP Act 2017 establishes a range of duties that apply to those in control or management of contaminated land including the Duty to Manage Contaminated Land (DtM) and the Duty to Notify Contaminated Land (DtN). Where land may be suspected as contaminated, the first priority is to ascertain whether or not there is a duty to manage any risks of harm arising from that contamination to determine if other duties are applicable (such as the DtM and/or DtN). These new provisions may be relevant to former landfills and/or potentially contaminated sites where the requirements of notifiable contamination are met.

In addition to the GED, DtM and other requirements, operation of some sites require permissions from the EPA including sites that receive, store or process waste generated at another site for resource recovery of offsite transfer of disposal. The requirement for a permission and the permission type depends on the amount of waste received in any month or stored on the Site at any time.

To support the waste industry (including operators of transfer stations) in complying with their obligations, EPA released Publication 1825.1 *Waste and recycling – guide to preventing harm to people and the environment* in July 2021. This publication is a key guidance document for environmental management at waste transfer station sites as it provides information on how to meet the GED, DtM and other requirements, as well as assess the risk of harm to the environment and human health.

3.1.1 Environment Reference Standard 2021

The Environmental Reference Standard (ERS) 2021 is subordinate legislation made under the EP Act 2017. The ERS identifies environmental values for the segments of the environment and provides a way to assess those environmental values. The ERS comprises "reference standards" for four aspects of Victoria's environment, referred to as segments of the environment: ambient air, ambient sound, land and water (surface water and groundwater). Each reference standard identifies an environmental value. Most reference standards also have indicators and objectives. By comparing measured or predicted environmental levels of an indicator against its objective, an assessment can be made as to whether an environmental value is being achieved, maintained or threatened, and hence whether "harm" may occur (or be occurring) to that environmental value.

3.1.2 EPA Publication 1518 – Recommended separation distances for industrial residual air emissions (IRAEs)

EPA Publication 1518 identifies recommended minimum separation distances between odour- or dust-emitting industrial land uses and sensitive land uses to mitigate potential impacts of IRAEs on human health and wellbeing, local amenity and aesthetic enjoyment, in order to:

- Provide clear direction on which land uses require separation;

- Inform and support strategic land use planning decisions and the consideration of planning permit applications;
- Prevent new sensitive land uses from impacting on existing industrial land uses;
- Prevent new or expanded industrial land uses from impacting on existing sensitive land uses; and
- Identify compatible land uses that can be established within a separation distance area

Variations to the separation distances identified in EPA Publication 1518 can be sought for new use (either industrial or sensitive). In order for a variation to be approved, the new use ('agent of change') is required to provide evidence to the responsible authority that a variation is appropriate.

3.1.3 EPA Publication 788 – Siting, design, operation and rehabilitation of landfills (Landfill BPEM)

EPA Publication 788 sets out the best practice environmental measures (BPEM) for management of landfills and provides guidelines on how potential impacts of landfills can be mitigated, and the management of rehabilitation of landfills. The BPEM considers buffer distances between landfills and receptors including development around former landfills.

3.1.4 Draft separation distance and buffer EPA Publications

EPA has recently commenced public consultation on the draft *Landfill buffer guideline – EPA Publication 1950 (Draft, December 2022).* The draft guideline is proposed to support land use and development decisions that protect human health and amenity from the effects of pollution and waste associated with landfills. Once finalised, the guideline is proposed to be referenced in the Victoria Planning Provisions. The guideline is predicted to be finalised by mid-2023 and should be considered in the context of the Site's ultimate management and planning context post finalisation.

3.2 Planning policy framework

The *Planning and Environment Act* 1987 provides a legislative basis for the Victoria Planning Provisions (VPP) and sets the legislative framework implementation of state and local planning policy. Key elements of the Planning Scheme support strategic and statutory planning decision making guided by consistency with Policy, Zones, Overlays, Particular Provisions, and General Provisions.

3.2.1 Ministerial Direction No. 1 Potential Contaminated Land

Ministerial Direction No.1 requires that potentially contaminated land is suitable under an amendment to a planning scheme for sensitive land use, agriculture or public open space. A Planning Authority must be satisfied that the environmental conditions of that land are, or will be suitable for the land use.

3.2.2 Planning Practice Note 92 Managing Buffers for Land Use Compatibility

Planning Practice Note 92 (PPN92) provides guidance on the requirements of planning provisions which relate to the management of buffers including Clause 53.10 Uses and activities with potential adverse impacts, and Clause 44.08 Buffer Area Overlay (BAO).

The BAO can be used to prevent incompatible use and development or to prevent future encroachment and intensification of incompatible use and development within buffer areas surrounding land uses with potential off-site impacts. The BAO also complements Clause 53.10 by ensuring that land use and development around existing industry is appropriate. Proponents must meet criteria and provide supporting information to apply the BAO.

In accordance with PPN92, there are key steps involved in application of the BAO process, for both operators of sites, Council and relevant authorities. For sites managed by HSC, responsibilities throughout the process are twofold as HSC is both the operator/proponent and the Relevant Authority. The ten steps involved are summarised below and in PPN92 as follows:

1. Consider compliance and impacts
2. Discuss with council and relevant authorities
3. Advise on compliance and potential off-site impacts
4. Prepare assessment
5. Advise on recommendations
6. Discuss implementation
7. Draft schedule(s) informed by evidence base
8. Submit application
9. Planning scheme amendment process
10. Periodic review of BAO application

3.2.3 Planning Practice Note 30 Potentially Contaminated Land

Planning Practice Note 30 (PPN30) provides guidance for planners and applicants on how to identity potentially contaminated land, appropriate level of assessment required depending on the circumstances, appropriate provisions within planning scheme amendments and conditions on planning permits. PPN30 includes a list of land uses that may have potential for contaminating land, of note, Table 2 of PPN30 lists landfill sites as all having high potential for contamination.

4 Methodology

The Assessment has included the following phases:

- **Existing land uses and site information:** Commencing with a desktop and site inspection of the HSC managed Site, key information was collected and reviewed to determine the existing land use context and develop a preliminary Conceptual Site Model (CSM) to support the assessment. Information utilised included publicly available information, information contained in the GCWWRRG *Closed Landfill Assessment Report – Hepburn Shire* and records provided by HSC. During each site visit a photographic record and site observations were documented, included in Appendix A.
- **Separation distances:** Relevant EPA guidelines and the Hepburn Planning Scheme were used to establish baseline separation distances between the Sites and sensitive land uses. This included a review and consideration of the requirements of:
  - *Department of Environment, Land, Water and Planning (DELWP), Managing buffers for land use compatibility, Planning Practice Note* (March 2021)
  - *Department of Environment, Land, Water and Planning (DELWP), Potentially Contaminated Land, Planning Practice Note 30* (July 2021)
  - *EPA Publication 788.3 Siting, design, operation and rehabilitation of landfills (Landfill BPEM)* (August 2015)
  - *EPA Publication 1518 Recommended separation distances for industrial residual air emissions (IRAEs)* (March 2013)
  - *Environment Protection Regulations 2021*
  - *Ministerial Direction No. 20 Major Hazard Facilities* (October 2018)
  - *Ministerial Direction No. 1 Potentially Contaminated Land* (August 2021)
- **Mapping:** Aerial base maps were used to generate clear maps of the Site and separation distance analysis was undertaken to overlay baseline separation distances. Land use and environmental context analysis was also undertaken and presented in the maps for the Site.
- **Preliminary Conceptual Site Model:** A Preliminary CSM was developed for the Site managed by HSC to support consideration of the potential for contamination and identification of possible contamination issues (sources) of relevance, possible exposure pathways and receptors using a source-pathway-receptor model.
- **Assessment of data gaps and uncertainties:** Information gaps relating to contamination risk at the Site, meant the level of risk was not quantitatively assessed. A summary table presenting a comparative description of remaining information gaps was produced relating to contamination potential and site management. Further discussion on this phase is described in Section 9.
- **Workshop:** Following the initial assessment, a workshop was held with HSC to present the work to date and to discuss and incorporate stakeholder feedback into the assessment and the report. HSC was also provided with a proforma to input assessment of redevelopment, rezoning potential and land use conflict to feed into the overall assessment.
- **Recommendations**: Identification of additional assessment and site management requirement, with consideration of the outcomes of the qualitative assessment and regulatory guidance.

5 Site summary

A site visit was undertaken by Nation Partners, accompanied by representatives of HSC, on 19 August 2022. Field notes and photos from the site visit are provided in Appendix A. Site specific observations of note and supporting information obtained through the desktop review are provided in Table 5.1 below.

5.1 Clunes former landfill

Table 5.1 Summary of information – Clunes former landfill

Item	Description
Crown Land	Yes
Current Occupier	Hepburn Shire Council
Site Address	Downes Street, Clunes
Standard Parcel Identifier	Parcel A 2002\PP2391 Parcel B 2003\PP2391
Site Area	Approximately 3.5 hectares
Zoning	Rural Living Zone 1
Overlay	ESO1 - Special waters supply catchment protection, Heritage Overlay - HO158 Victorian Quartz Mining Co. Site, off Station Flat Road, Clunes
Registered Aboriginal Party	Dja Dja Warrung
Land Use	Vacant land
EPA Priority Sites Register	No
Groundwater Quality Restricted Use Zones (GQRUZ)	No
EPA Permissions	No
EPA Victoria List of Completed Environmental Audits	No
Victorian Landfill Register	No
Nearby Sensitive Receptors	▪ Creswick Creek approximately 150 m west of the southern boundary with a tributary directly abutting the southern boundary of the Site ▪ Area of mapped Aboriginal Cultural Heritage Sensitivity on the western boundary of the Site ▪ Residential property abutting western boundary of the Site
Groundwater Use Nearby - 250 m	None registered.
Depth to Groundwater	~15 m SWL (Landserv, 2018)
Groundwater Segment (ERS, 2021)	A2 (Landserv, 2018)
Historical waste type accepted	Variable including municipal putrescible
Former landfill type (Landfill BPEM 2015)	Type 2 (putrescible waste)
Former landfill operational window	~1961 - 1998
Former landfill lined?	No
Monitoring?	Quarterly groundwater monitoring only hydraulically downgradient of former landfill (no hydraulically upgradient wells)[1]
Aftercare management plan?	No

[1] Current monitoring frequency, based on anecdotal evidence from HSC staff, however most recent records not made available

6 Separation distance requirements

The Site is subject to recommended default threshold and separation distance requirements under Clause 53.10. These separation distances are mapped for the Site, included in Appendix B. A summary of the relevant guidelines and corresponding separation distance is provided in Table 6.1.

Table 6.1: Separation distance requirements – Clunes former landfill

Guideline	Separation Distance	Notes
Landfill BPEM	500 m – Type 2 former landfill (putrescible)	
Ministerial Direction 1 (PCL)	Not specified	*The application of an Environment Audit Overlay (EAO) should be considered for the Site to manage future development.*

7 Potential for contamination risk considerations

Based on review of the available information, data gaps and the potential for contamination caused by current and historical waste management activities was qualitatively assessed including identification of data gaps. Comments based on data review, data gaps and uncertainties, and their implications, are summarised in the following section.

7.1 Clunes former landfill

Table 7.1: Potential for contamination risk considerations – Clunes former landfill

Risk Aspect	Comments	Information Gaps and Uncertainties	Information Gap Implications of Assessment Outcomes
Ambient air – odour impacts	▪ No odours observed during site inspection.	▪ Extent of former landfill areas unknown. ▪ No aftercare management plan. ▪ No detail on engineering cap of former landfill and evidence of some waste material at surface level. ▪ No detail on cap maintenance program.	▪ The nature and extent of risk of odour, dust and particulate matter impacts is not well characterised.
Ambient air – dust / particulate matter impacts	▪ No dust events observed during site inspection.		
Surface water – impacts to surface water from runoff	▪ Surface water runoff likely to drain to a tributary of Creswick Creek which directly abuts the southern boundary of the Site. ▪ No evidence of any site drainage systems.	▪ Drainage plan unknown.	▪ The nature and extent of risk of impacts from surface water runoff is not well characterised.
Groundwater – impacts to groundwater from leachate	▪ Former landfill is likely unlined. ▪ There are reportedly two groundwater monitoring wells onsite (not sighted during inspection). ▪ Monitoring from 2003 up until 2015 appeared to be undertaken on a quarterly basis. From 2015 to 2017 monitoring fluctuated between twice yearly (2015), yearly (2016), three times a year (2017). ▪ Groundwater monitoring wells are hydraulically downgradient of the former landfill with no monitoring wells hydraulically upgradient of the former landfill ▪ Hydrogeological Assessment undertaken in 2002 (SKM) detailing groundwater monitoring bore installation information. ▪ Annual groundwater monitoring report from 2018 (Landserv) noted groundwater values (maintenance of ecosystems) may be impacted for cadmium, copper, zinc, nitrate however unable to determine if this is related	▪ Extent of former landfill area unknown. ▪ Groundwater monitoring frequency is unknown. ▪ Hydraulically up-gradient groundwater quality is unknown. ▪ No aftercare management plan.	▪ The nature and extent of risk of impacts to groundwater from leachate is not well characterised.

Risk Aspect	Comments	Information Gaps and Uncertainties	Information Gap Implications of Assessment Outcomes
	to natural conditions at the Site (no hydraulically up-gradient monitoring well).		
Landfill gas	▪ There are no records available of landfill gas monitoring or risk assessment ▪ There is no evidence of a landfill gas collection system on site.	▪ No landfill gas risk assessment available. ▪ No aftercare management plan.	▪ The nature and extent of risk from landfill gas to sensitive receptors is unknown.
Exposure to waste	▪ Evidence of some waste material at surface level. ▪ No signage indicating extent or area of former landfill. ▪ No gate / fence into site.	▪ Extent of former landfill areas unknown. ▪ Capping across entire extent of landfill unknown ▪ No aftercare management plan	▪ The nature and extent of risk from exposure to waste is not well characterised.
General Environmental Duty / regulatory compliance	▪ No aftercare management plan for the Site.	▪ No aftercare management plan.	▪ The level of compliance with the General Environmental Duty and compliance with the BPEM is not well understood.

8 Preliminary conceptual site model

Based on the outcomes of the review of the available information and potential for contamination assessment, a preliminary conceptual site model (CSM) was developed for the Site. The CSM identified the potential contamination sources, transport and exposure pathways, and potential receptors to contamination. A typical cross section of the Site, illustrating potential pathways for contamination pathways and areas where gaps were identified was also developed. The CSM table and figure are presented in the following section.

8.1 Clunes former landfill

Table 8.1 provides an overview of the preliminary CSM and Figure 8.1 provides an overview of an inferred cross section, east to west of the preliminary CSM. For corresponding data gaps, indicated by question marks on the figure, refer to Table 7.1.

Table 8.1: Preliminary conceptual site model – Clunes former landfill

Source	Transport Pathway	Exposure Pathway	Receptors
Former landfill containing various chemicals and/or microbial contamination	Direct contact	▪ Dermal exposure ▪ Incidental ingestion ▪ Inhalation of dust ▪ Uptake by plants	▪ Workers ▪ Site users ▪ Trespassers ▪ Land dependent ecosystems
	Airborne dust	▪ Inhalation ▪ Ingestion following deposition on garden produce or pasture	▪ Downwind residents ▪ Workers ▪ Site users ▪ Biota (including wildlife)
	Surface run-off	▪ Ingestion following deposition on soil or in surface water used for food production or grazing ▪ Leaching to surface water and run-off discharging to waterways ▪ Accumulation in aquatic organisms	▪ Downgradient residents ▪ Land dependent ecosystems ▪ Biota (including wildlife)
	Vapour migration	▪ Inhalation of vapours from volatile chemicals that have migrated in the subsurface	▪ Workers ▪ Residents ▪ Site users
	Migration in subsurface - vertical migration through waste and landfill cap	▪ Leaching to groundwater ▪ Ingestion or dermal exposure following groundwater extraction	▪ Groundwater ▪ Groundwater users (including where groundwater is extracted for use on-site and/or livestock watering purposes) ▪ Groundwater dependent ecosystems ▪ Biota (including wildlife)

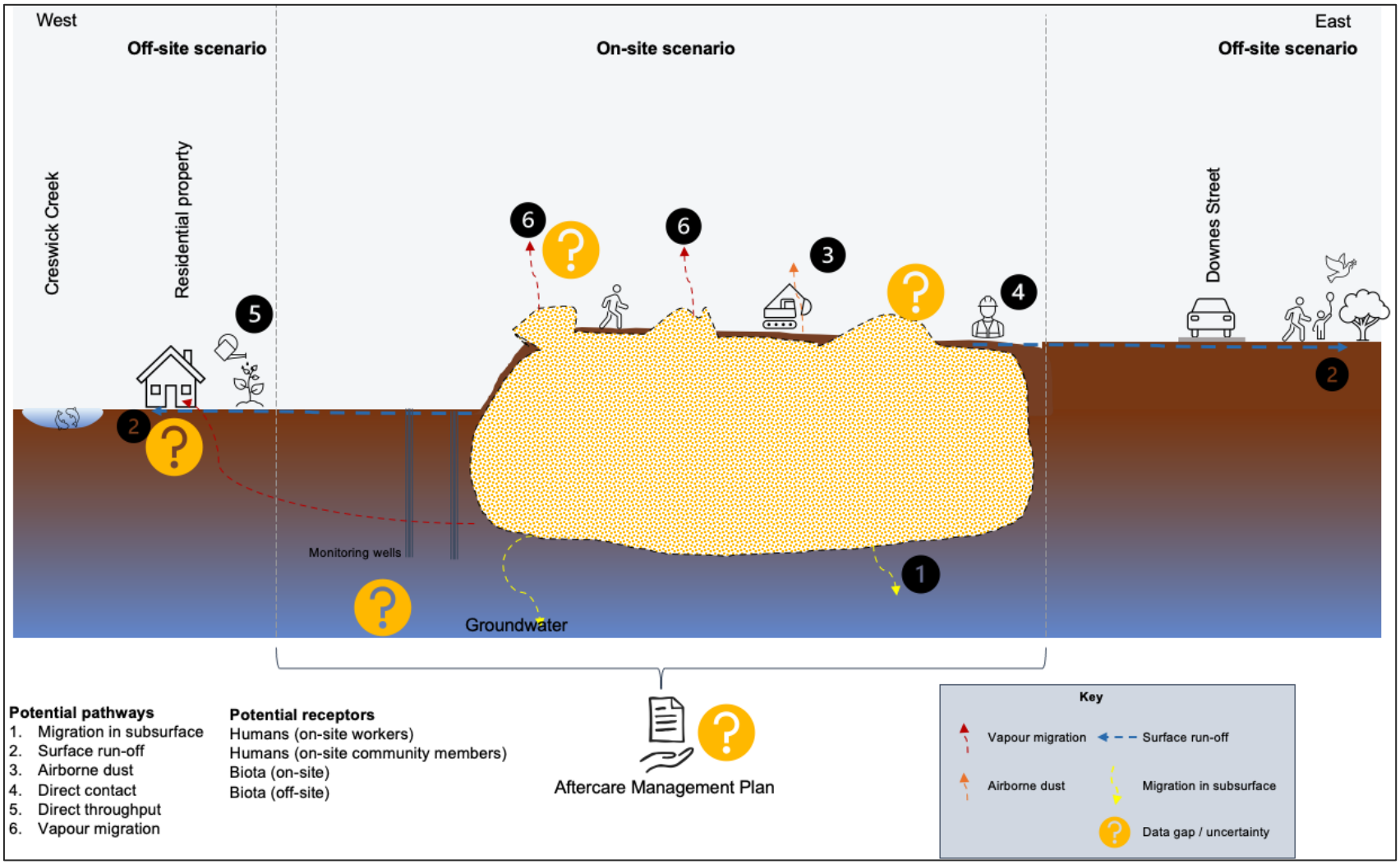


Figure 8.1: Clunes former landfill preliminary CSM

9 Qualitative assessment

Information obtained through desktop reviews, preliminary CSMs, mapping of buffers, and surrounding land use for the Site (refer to Appendix B) fed into a qualitative assessment whereby the contamination, data gaps and uncertainties and planning context was considered. Assessment of contamination risk potential could not reasonably be inferred for the Site, due to key information gaps.

The qualitative assessment summary table in Appendix C captured the following details:

- Site features (e.g. site address, site name, existing and historical site activities)
- Assessment parameters, including:
  - Contamination potential
  - Site management practices (monitoring programs, management plans, audit)
  - Proximity to sensitive receptors (humans, environment heritage)
  - Separation distance envelope details based on separation distances adopted (number of properties within buffer zone, planning zones and corresponding areas)
- Recommended actions should a reduction in separation distances be further contemplated by Council.

Land use conflicts, pressure for redevelopment and rezoning potential were not included within the qualitative assessment and will be further considered separate to this assessment by HSC.

A full copy of the assessment is provided in Appendix C. A summary of the contamination potential and site management assessment is provided in Table 9.1 below.

Table 9.1: Summary of assessment

Site	Contamination Potential			Site Management				
	Information gaps and uncertainties			Monitoring programs			Active aftercare management	Third party management (audit)
	Groundwater	Surface water	Landfill gas	Ground water	Surface water	Landfill gas	Management plans	
Clunes FL	Yes	Yes	Yes	Yes	No	No	No	No

10 Discussion and recommendations

In accordance with PPN92, discussed in Section 3.2.2, initial steps when determining the application of a BAO is to consider compliance and impacts of operations and the potential for off-site impacts. PPN92 notes that the 'use' must be compliant with existing regulations and standards relating to off-site impacts, or land use compatibility. Filling information gaps and resolving uncertainties with respect to site management practices, should therefore be prioritised before any alternative to published separation distances is considered via the planning process.

Additionally, once the level of information gap is reduced, risk assessment criteria and a risk matrix to reflect HSC's risk appetite and corporate risk profile should be considered. Alternatively, the risk exposure matrix for application of BAO (PPN92) can also be considered which uses consequence criteria based on amenity, human health and safety impacts and is based on the intensity, duration and character of unintended offsite impacts such as odour, dust, noise and landfill gas.

The following discussion is a summation of findings for the Site and recommended next steps. A summary table of recommendations is provided in Table 10.1.

10.1 Clunes former landfill

Clunes former landfill is currently vacant crown land zoned as Rural Living Zone 1. The Site is not registered on the Victorian Landfill Register.

Documentation regarding aftercare management of the former landfill was not provided, however monitoring of groundwater from two wells hydraulically downgradient of the Site reportedly occurs. No documented monitoring program or recent results were available; however we understand that the most recent assessment was undertaken by Landserv in 2018.

The Site is within proximity to sensitive receptors including a mapped area of cultural heritage sensitivity onsite, and existing residential dwellings and offsite surface water bodies located within 100 m of the Site boundary.

The preliminary CSM for the Site, illustrated information gaps and uncertainties relating to the following compliance and impact aspects:

- Extent of former landfill
- Impacts to surface water
- Impacts to groundwater from landfill leachate
- Impacts from landfill gas
- Exposure to waste (i.e., rehabilitation and capping)
- Impacts to ambient air (dust, odour)

If the above data gaps and uncertainties are not able to be addressed by locating additional assessments, reports and/or management plans, the development and implementation of a documented aftercare / environmental management plan is recommended. Site-specific actions that could be incorporated into the aftercare / environmental management plan include:

- Fencing of the Site
- Rehabilitation of the landfill including capping of areas with exposed waste
- Maintenance of landfill cap to prevent control erosion, restore depressions and seal and monitor cracks
- Environmental monitoring and assessment impacts to/from:
  - Groundwater, with a focus on the quality of hydraulically upgradient groundwater in comparison to groundwater hydraulically downgradient of the former landfill
  - Surface water

- Landfill gas

Once a level of information is developed for the site, including understanding of the extent of the former landfill, EPA should be notified to update the Victorian Landfill Register with this information.

Determination of compliance and impacts for the Site (step one of the PPN92) should be undertaken concurrently with consideration of planning controls, such as the BAO, given the Site is within proximity to sensitive receptors. The current zoning (Rural Living Zone) should be reconsidered (although it is noted that the Site is Council managed Crown Land).

Table 10.1: Summary of recommendations – Clunes former landfill

Site	Recommendations
Clunes former landfill	• Fill data gaps and uncertainties relating to: – Extent of former landfill – Potential impacts to surface water – Potential impacts to groundwater from landfill leachate – Potential impacts from landfill gas – Potential exposure to waste (i.e. rehabilitation and capping) – Potential impacts to ambient air (dust, odour) • Develop and implement documented aftercare / environmental management plan which should consider and propose management measures where needed to address: – Fencing of the Site – Rehabilitation of the landfill including capping of areas with exposed waste – Maintenance of landfill cap to prevent and control erosion, restore depressions and seal and monitor cracks – Environmental monitoring and assessment impacts to/from: ◦ Groundwater, with a focus on the quality of hydraulically upgradient groundwater in comparison to groundwater hydraulically downgradient of the former landfill ◦ Surface water ◦ Landfill gas • When additional information is available for the site, including understanding of the extent of the former landfill, EPA should be notified to update the Victorian Landfill Register with this information. • Above should be undertaken concurrently with consideration of planning controls, such as the BAO. This should also be supported by an assessment of land use conflicts, pressure for redevelopment and rezoning potential.

11 Conclusions

Historic landfills pose a challenge from a strategic planning perspective, with land use incompatibility and direct conflicts resulting where sensitive uses interface inappropriately. HSC, as a result of its historic landfill ownership and operational legacy, is required to identify, assess and regularly review the Site risks in line with the requirements set out by EPA including the GED and the duty to manage contaminated land.

To close out existing data gaps and provide sufficient basis for implementation of planning controls, further actions have been recommended, discussed in Section 10.

Following the review of current and historical activities, available records, previous reports and site inspections an assessment of level of risk of potential for contamination whilst initially proposed, was unable to be conducted due to a number of information gaps. During this assessment, qualitative risks could not be meaningfully assessed, however undertaking the recommended actions to fill information gaps and apply additional management controls, would support subsequent risk assessment activities.

12 References

Legislation

EP Act. *Environment Protection Act 2017*, Victorian Government, Act No. 15 of 2017.

PE Act. *Planning and Environment Act 1987,* Victorian Government, Act No. 45 of 1987.

ERS (2021) Environment Reference Standard, Victorian Government, No. S245.

General References

EPA Publication 1518 (2013) *Recommended Separation Distances for Industrial Residual Air Emissions – Guideline,* Environment Protection Authority Victoria, March 2013

EPA Publication 788.3 (2015) *Siting, design, operation and rehabilitation of landfills (Landfill BPEM),* Environment Protection Authority Victoria, August 2015

EPA Publication 1671 (2018) *Local council self-assessment tool for closed landfill environmental risk,* Environment Protection Authority Victoria, February 2018

EPA Publication 1825 (2021) *Waste and recycling – guide to preventing harm to people and the environment*, Environment Protection Authority Victoria, July 2021.

Grampian Central West Waste and Resource Recovery Group (2018), *Implementation Plan – Land Use Planning Project,* 2018

Grampian Central West Waste and Resource Recovery Group (2019), *Closed Landfill Assessment Report for Hepburn Shire Council,* Grampians Central West Waste & Resource Recovery Group [GCWWRRG], 2019

Ministerial Direction No. 20 *Major Hazard Facilities*, Victorian Government, October 2018

Ministerial Direction No. *1 Potentially Contaminated Land*, Victorian Government, August 2021

Planning Practice Note 92, *Managing buffers for land use compatibility*, Department of Environment, Land, Water and Planning (DELWP), March 2021

Planning Practice Note 30, *Potentially Contaminated Land,* Department of Environment, Land, Water and Planning, July 2021

Victoria Unearthed (2022), *Victoria Unearthed,* accessed November 2022.

VVG (2022b), *Visualising Victoria's Groundwater,* Visualising Victoria's Groundwater, accessed November 2022

Site Specific References – Clunes Former Landfill

SKM (2002), *Clunes Hydrogeological Assessment*, SKM, July 2002

Landserv (2018), *Annual Groundwater Monitoring Report,* Landserv, June 2018

Appendices

A Site photos

Photos from site inspection – Clunes former landfill

Looking south

Waste and rubble evident at surface

Fence along south eastern border

Top of former landfill mound

Residential properties to the south

B Site maps

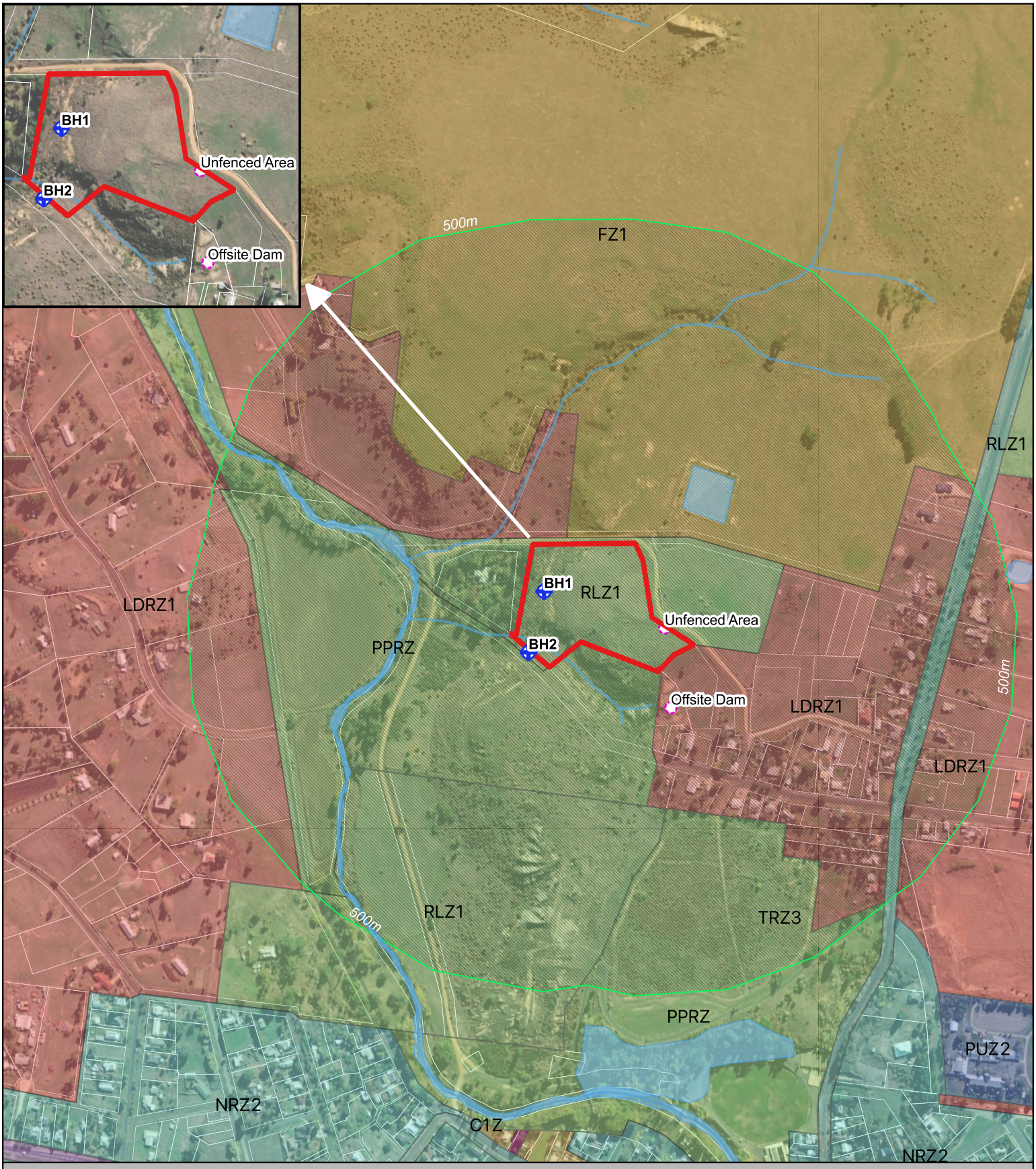


Figure 3 - Clunes Distance Assessment

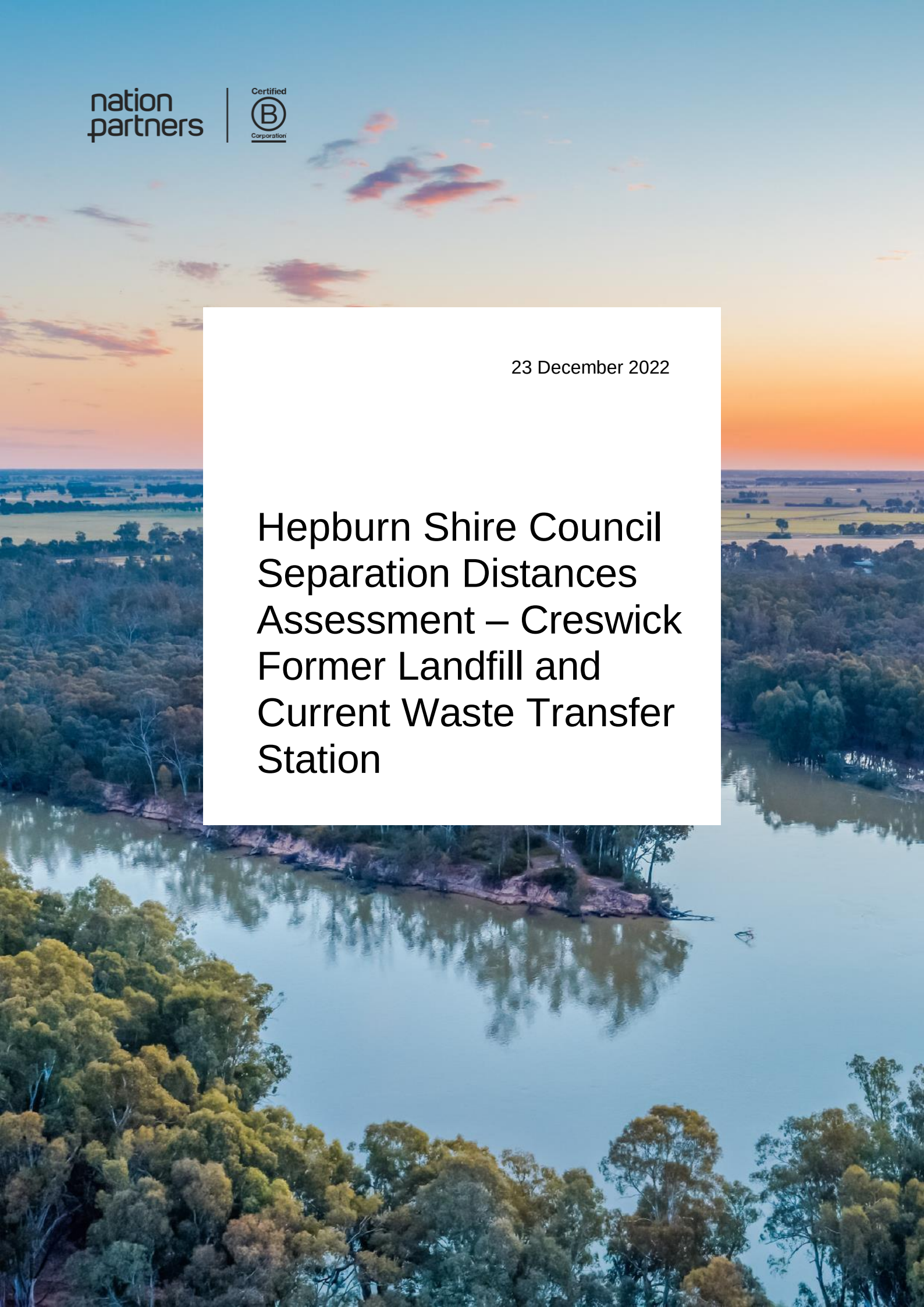
Hepburn Shire Council
Separation Distance Assessment

0 100 200 300 m

- Clunes Site Boundary
- Landfill BPEM (August 2015)
  PPN92 Hepburn Shire Council Planning Scheme (March 2021)
  (500m)
- Bodies of Water
- Property Boundaries
- Boreholes/GW Monitoring Well
- Watercourse

C Qualitative assessment

Submitted electronically – Microsoft Excel file format



23 December 2022

Hepburn Shire Council Separation Distances Assessment – Creswick Former Landfill and Current Waste Transfer Station

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We acknowledge the Traditional Custodians of the land on which we work and live, and recognise their continuing connection to land, water, and community. We pay our respects to Elders past, present and emerging.

Document title
Hepburn Shire Council Separation Distances Assessment – Creswick Former Landfill and Current Waste Transfer Station

Version
1.1

Date
23 December 2022

Prepared by
Rhiannon Hossack

Approved by
Amy Gason

File name
NP21232 Separation Distances Assessment - Creswick

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Executive Summary

Hepburn Shire Council (HSC) engaged Nation Partners Pty Ltd (Nation Partners) to undertake a review and qualitative assessment (the Assessment) of key former landfill sites, plus other potentially contaminated sites and sensitive land use interfaces within the Hepburn Shire. The assessment comprised four former landfills managed by HSC in Daylesford, Creswick, Clunes and Trentham. Three of which are active waste transfer stations (Daylesford, Creswick and Trentham). Two sites not managed by HSC were also part of the Assessment, including a Major Hazard Facility (MHF) and a former foundry in Trentham. Each HSC-managed site has a separate report with the site reported herein the: **Creswick former landfill and current waste transfer station (the Site)**.

The Assessment was undertaken as an initial, qualitative step to support HSC in increasing and consolidating its understanding of the Site regarding the associated environmental, amenity and societal risks, thereby informing options and next steps that would support the application of and/or "risk-based" refinement of potential planning controls.

A review of standard separation distances applicable to existing uses at the Site with reference to the requirements of applicable Victorian Environment Protection Authority (EPA) and Department of Environment, Land, Water and Planning (DELWP) guidelines was undertaken and mapped to support visualising the land use and surrounding context for the Site.

Current and historical activities, available records, previous reports and a site inspection informed the development of a Preliminary Conceptual Site Model (CSM) for the HSC managed site which fed into a high-level qualitative assessment. Whilst an assessment of level of risk of potential for contamination was initially proposed, due to a number of information gaps relating to contamination risk at the Site, the level of risk could not be meaningfully assessed.

The Assessment found that:

- Information gaps and uncertainties identified regarding contamination potential for the Creswick Waste Transfer Station are moderated at the Site as it is subject to the statutory Environment Protection Agency (EPA) audit processes associated with a Post Closure Pollution Abatement Notice (PC PAN);
- Monitoring programs for groundwater, surface water, and landfill gas are established and implemented as part of a documented Aftercare Management Plan;
- Whilst the aftercare management plan is in place, the status of the March 2021 aftercare management audit and the completion of the recommended 2019 audit actions, is yet to be confirmed; and
- Planning controls, such as the Buffer Area Overlay (BAO) should be considered, given the Site is within proximity to sensitive receptors and compliance and impacts for the site are understood.

Details of the specific recommendations are included within the Discussion and Recommendations section of this report.

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1 Introduction

Nation Partners Pty Ltd (Nation Partners) was engaged by Hepburn Shire Council (HSC) to undertake a review and qualitative assessment (the Assessment) of key former landfill sites, plus other potentially contaminated sites (the Sites) and sensitive land use interfaces. The Assessment is intended to inform the implementation of appropriate planning controls to mitigate impacts to the environment and/or the local community from the Sites, within the Shire of Hepburn (the Shire). Each HSC managed site has been reported on separately. The site reported herein is the **Creswick former landfill and active waste transfer station (the Site).**

1.1 Project objectives

The purpose of the assessment was to:

- Contribute to establishment of the basis for application of relevant planning buffers for the Sites based on existing regulatory context and published guidance;
- Understand the current land use and planning context plus the strategic planning direction that interfaces with each of the Sites; and
- Provide recommendations for additional actions to consider reduction from “baseline” separation distances, should Council wish to consider site-specific controls.

This assessment is an initial, qualitative step to support HSC in increasing and consolidating its understanding of the Sites regarding the associated environmental, amenity and societal risks, thereby informing options and next steps that would support the application of and/or “risk-based” refinement of potential planning controls.

1.2 Project scope

The scope of works included review of available information of six (6) contaminated and potentially contaminated sites, namely: historic landfills; a major hazard facility; and a former foundry, within the Shire, and included the following:

- Desktop review of site information sources, including:
  - Previous studies and reports;
  - Documentation provided by HSC; and
  - Public information held by government and regulatory authorities.
- Site inspections at the historic landfill sites;
- A review of standard separation distances applicable to existing uses at the Sites with reference to the requirements of:
  - *Department of Environment, Land, Water and Planning (DELWP), Managing buffers for land use compatibility, Planning Practice Note* (March 2021)
  - *EPA Publication 788.3 Siting, design, operation and rehabilitation of landfills (Landfill BPEM)* (August 2015)
  - *EPA Publication 1518 Recommended separation distances for industrial residual air emissions (IRAEs)* (March 2013)
  - *Ministerial Direction No. 20 Major Hazard Facilities* (October 2018)
  - *Ministerial Direction No. 1 Potentially Contaminated Land* (August 2021)
- Assessment of data gaps and uncertainties in characterising potential contamination risks, and the corresponding potential risk to receptors;
- Development of preliminary conceptual site models (CSMs) for HSC-managed sites;

- Mapping of land use context, environmental context and separation distances; and
- Preparation of recommended next steps and further investigation, where warranted.

1.3 Limitations of this assessment

- This assessment is based solely on publicly available information, information provided by HSC and site visits conducted by Nation Partners in August 2022.
- No engagement was undertaken with broader stakeholders nor the Regulator(s) – EPA, WorkSafe and Department of Environment Land, Water and Planning (DELWP).
- Nation Partners produces technical and advisory documents in the course of providing its services, which includes this document.
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2 Background

2.1 The Site

The Site is located at 32 Anne Street, Creswick, Victoria and is managed by HSC. The Site's location within the Shire is shown in Figure 2.1. Further site identification details are summarised in Section 5.

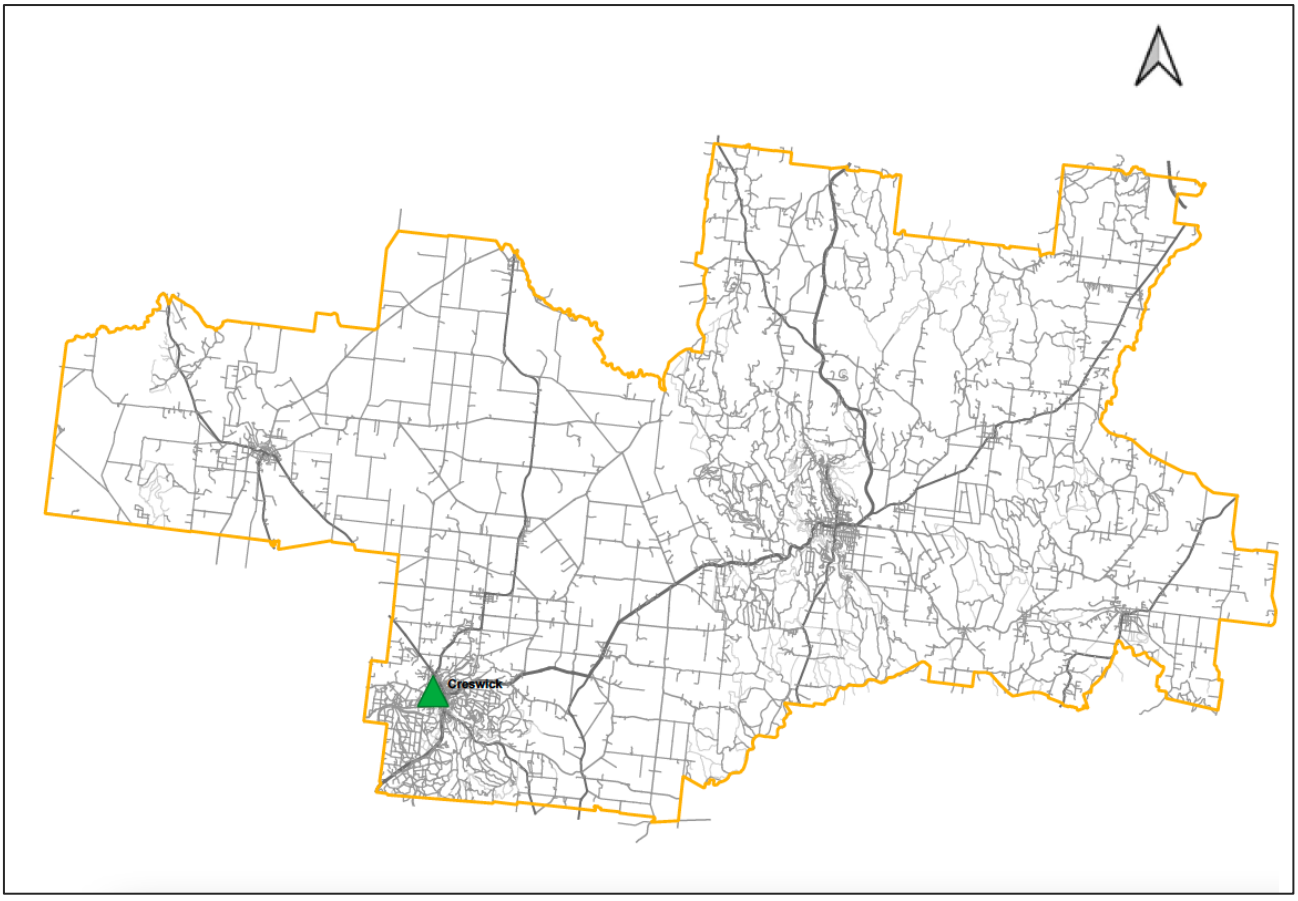


Figure 2.1: Location map of site

2.2 Previous assessments

An assessment of waste and resource recovery facilities in the planning schemes across the Grampians Central West Waste and Resource Recovery Group (GCWWRRG) region was completed in 2018 (*Grampian Central West Waste and Resource Recovery Implementation Plan – Land Use Planning Project,* 2018). The project provided an overview of the statutory and strategic planning framework applicable to resource recovery facilities in the region and provided assessment of risk of encroachment along with recommendations to improve the identification and protection of the facilities in the relevant planning schemes. Creswick waste transfer station was included within the assessment.

The report assessed 'risk of future encroachment' with a general assessment of the degree of risk having regard to zoning, size of allotments and potential for future dwellings or subdivision, pattern of surrounding development, potential for future urban expansion and growth rate of the municipality. The risk was assessed

as either low, medium or high. The report noted that the variation in such indicators was too variable to develop specific quantitative criteria.

Assessment criteria used for assessing existing encroachment is described in Figure 2.2.

Risk	Criteria
Low	• No existing sensitive uses within 500 metres (excluding farmhouse or house on large lot in Farming Zone i.e >5ha); **and** • Low potential for sensitive uses within 500 metres or surrounded by Farming Zone; **and** • No other readily identifiable industrial or commercial use within 500 metres.
Medium	• Small lots in Farming Zone (i.e. <5ha), with or without dwellings **or** • Industrial or commercial buildings within 500 metres; **and** • Low potential for sensitive uses within 500 metres.
High	• Schools, aged care within 500 metres; **or** • Dwellings in an urban zone within 500 metres; **or** • High potential for additional residential uses within 500 metres

Source: Centrum Town Planning, 2017

Figure 2.2: Assessment criteria for assessing existing encroachment Source: *GCWWRRG, 2018*

Following the above assessment, a more targeted assessment of closed landfills within the Shire was completed in 2019 (*Closed Landfill Assessment Report for Hepburn Shire Council,* GCWWRRG, 2019) which included the HSC-managed sites. The assessment was preliminary and limited in nature and provided a qualitative assessment of risks posed by closed landfills in the region in line with EPA Publication 1671: *Local council self-assessment tool for closed landfill environmental risk* (EPA, 2018).

Whilst the assessment included additional risks not encompassed by EPA Publication 1671, several aspects listed in the self-assessment were not undertaken. EPA Publication 1671, and the assessment completed by GCWWRRG, also predate the current Victorian regulatory landscape and the promulgation of the *Environment Protection Act 2017* (The EP Act 2017) and *Environment Protection Regulations 2021* (The EP Regulations 2021) in particular, which articulate obligations relating to both Duty Holders, plus the comprehensive General Environmental Duty (GED); in addition to the introduction of *Managing buffers for land use compatibility Planning Practice Note 92*, authored by DELWP in 2021.

Various environmental assessments and reports have been completed for the Site and include the following:

- Jacobs (2014) Landfill Cap and Hydrogeological Assessment, Jacobs, November 2014
- Mackenzie Environmental (2015) *Aftercare Management Plan Part 1: Inspection and Maintenance Plan,* June 2015
- Mackenzie Environmental (2015b) *Aftercare Management Plan Part 2: Environmental Risk Assessment and Monitoring Program,* Mackenzie Environmental, June 2015
- Senversa (2019) *Audit of Aftercare Management EPA CARM's No: 75350-1 (Service Order No. 8005541),* Senversa, December 2019
- Ventia (2022) *2020/2021 Annual Monitoring Report – Creswick Landfill,* Ventia, March 2022

Outcomes of these assessments are summarised further in Section 7.

3 Regulatory context

Legislation, policy and guidance relating to both the management of closed landfills and land use planning framework is extensive. The EP Act 2017 and the *Planning and Environment Act* 1987 are the primary legislation that underpins this guidance, with key elements and guiding documents and how they relate to this assessment summarised below.

3.1 Environment protection framework

The EP Act 2017 and the EP Regulations 2021 are the governing Victorian Environment Protection legislation, designed to prevent harm to human health and the environment from pollution and waste including from past activities and incidents. The general environment duty (GED) is at the centre of the EP Act 2017 and is based on the concept of minimising risks of harm to human health and the environment, 'so far as reasonably practicable' (SFARP).

In addition to the GED, the EP Act 2017 establishes a range of duties that apply to those in control or management of contaminated land including the Duty to Manage Contaminated Land (DtM) and the Duty to Notify Contaminated Land (DtN). Where land may be suspected as contaminated, the first priority is to ascertain whether or not there is a duty to manage any risks of harm arising from that contamination to determine if other duties are applicable (such as the DtM and/or DtN). These new provisions may be relevant to former landfills and/or potentially contaminated sites where the requirements of notifiable contamination are met.

In addition to the GED, DtM and other requirements, operation of some sites require permissions from the EPA including sites that receive, store or process waste generated at another site for resource recovery of offsite transfer of disposal. The requirement for a permission and the permission type depends on the amount of waste received in any month or stored on the Site at any time.

To support the waste industry (including operators of transfer stations) in complying with their obligations, EPA released Publication 1825.1 *Waste and recycling – guide to preventing harm to people and the environment* in July 2021. This publication is a key guidance document for environmental management at waste transfer station sites as it provides information on how to meet the GED, DtM and other requirements, as well as assess the risk of harm to the environment and human health.

3.1.1 Environment Reference Standard 2021

The Environmental Reference Standard (ERS) 2021 is subordinate legislation made under the EP Act 2017. The ERS identifies environmental values for the segments of the environment and provides a way to assess those environmental values. The ERS comprises "reference standards" for four aspects of Victoria's environment, referred to as segments of the environment: ambient air, ambient sound, land and water (surface water and groundwater). Each reference standard identifies an environmental value. Most reference standards also have indicators and objectives. By comparing measured or predicted environmental levels of an indicator against its objective, an assessment can be made as to whether an environmental value is being achieved, maintained or threatened, and hence whether "harm" may occur (or be occurring) to that environmental value.

3.1.2 EPA Publication 1518 – Recommended separation distances for industrial residual air emissions (IRAEs)

EPA Publication 1518 identifies recommended minimum separation distances between odour- or dust-emitting industrial land uses and sensitive land uses to mitigate potential impacts of IRAEs on human health and wellbeing, local amenity and aesthetic enjoyment, in order to:

- Provide clear direction on which land uses require separation;

- Inform and support strategic land use planning decisions and the consideration of planning permit applications;
- Prevent new sensitive land uses from impacting on existing industrial land uses;
- Prevent new or expanded industrial land uses from impacting on existing sensitive land uses; and
- Identify compatible land uses that can be established within a separation distance area

Variations to the separation distances identified in EPA Publication 1518 can be sought for new use (either industrial or sensitive). In order for a variation to be approved, the new use ('agent of change') is required to provide evidence to the responsible authority that a variation is appropriate.

3.1.3 EPA Publication 788 – Siting, design, operation and rehabilitation of landfills (Landfill BPEM)

EPA Publication 788 sets out the best practice environmental measures (BPEM) for management of landfills and provides guidelines on how potential impacts of landfills can be mitigated, and the management of rehabilitation of landfills. The BPEM considers buffer distances between landfills and receptors including development around former landfills.

3.1.4 Draft separation distance and buffer EPA Publications

EPA has recently commenced public consultation on two draft guidelines that are relevant to the assessments:

- *Separation distance guideline – EPA Publication 1949 (Draft, December 2022)*
- *Landfill buffer guideline – EPA Publication 1950 (Draft, December 2022)*

These draft guidelines are proposed to support land use and development decisions that protect human health and amenity from the effects of pollution and waste associated with the operation of industry and landfills and to protect industry and landfills from inappropriate development nearby. Once finalised, the guidelines are proposed to be referenced in the Victoria Planning Provisions. The guidelines are predicted to be finalised by mid-2023 and should be considered in the context of the Site's ultimate management and planning context post finalisation.

3.2 Planning policy framework

The *Planning and Environment Act* 1987 provides a legislative basis for the Victoria Planning Provisions (VPP) and sets the legislative framework implementation of state and local planning policy. Key elements of the Planning Scheme support strategic and statutory planning decision making guided by consistency with Policy, Zones, Overlays, Particular Provisions, and General Provisions.

3.2.1 Ministerial Direction No. 1 Potential Contaminated Land

Ministerial Direction No.1 requires that potentially contaminated land is suitable under an amendment to a planning scheme for sensitive land use, agriculture or public open space. A Planning Authority must be satisfied that the environmental conditions of that land are, or will be suitable for the land use.

3.2.2 Planning Practice Note 92 Managing Buffers for Land Use Compatibility

Planning Practice Note 92 (PPN92) provides guidance on the requirements of planning provisions which relate to the management of buffers including Clause 53.10 Uses and activities with potential adverse impacts, and Clause 44.08 Buffer Area Overlay (BAO).

The BAO can be used to prevent incompatible use and development or to prevent future encroachment and intensification of incompatible use and development within buffer areas surrounding land uses with potential off-site impacts. The BAO also complements Clause 53.10 by ensuring that land use and development around existing industry is appropriate. Proponents must meet criteria and provide supporting information to apply the BAO.

In accordance with PPN92, there are key steps involved in application of the BAO process, for both operators of sites, Council and relevant authorities. For sites managed by HSC, responsibilities throughout the process are twofold as HSC is both the operator/proponent and the Relevant Authority. The ten steps involved are summarised below and in PPN92 as follows:

1. Consider compliance and impacts
2. Discuss with council and relevant authorities
3. Advise on compliance and potential off-site impacts
4. Prepare assessment
5. Advise on recommendations
6. Discuss implementation
7. Draft schedule(s) informed by evidence base
8. Submit application
9. Planning scheme amendment process
10. Periodic review of BAO application

3.2.3 Planning Practice Note 30 Potentially Contaminated Land

Planning Practice Note 30 (PPN30) provides guidance for planners and applicants on how to identity potentially contaminated land, appropriate level of assessment required depending on the circumstances, appropriate provisions within planning scheme amendments and conditions on planning permits. PPN30 includes a list of land uses that may have potential for contaminating land. Of note, Table 2 of PPN30 lists landfill sites/waste depots as all having high potential for contamination.

4 Methodology

The Assessment has included the following phases:

- **Existing land uses and site information:** Commencing with a desktop study and site inspection at the Site, key information was collected and reviewed to determine the existing land use context and develop preliminary Conceptual Site Model (CSM) to support the assessment. Information utilised included publicly available information, information contained in the GCWWRRG *Closed Landfill Assessment Report – Hepburn Shire* and records provided by HSC. During the site visit a photographic record and site observations were documented, included in Appendix A.
- **Separation distances:** Relevant EPA guidelines and the Hepburn Planning Scheme were used to establish baseline separation distances between the Site and sensitive land uses. This included a review and consideration of the requirements of:
  - *Department of Environment, Land, Water and Planning (DELWP), Managing buffers for land use compatibility, Planning Practice Note* (March 2021)
  - *Department of Environment, Land, Water and Planning (DELWP), Potentially Contaminated Land, Planning Practice Note 30* (July 2021)
  - *EPA Publication 788.3 Siting, design, operation and rehabilitation of landfills (Landfill BPEM)* (August 2015)
  - *EPA Publication 1518 Recommended separation distances for industrial residual air emissions (IRAEs)* (March 2013)
  - *Environment Protection Regulations 2021*
  - *Ministerial Direction No. 20 Major Hazard Facilities* (October 2018)
  - *Ministerial Direction No. 1 Potentially Contaminated Land* (August 2021)
- **Mapping:** Aerial base maps were used to generate clear maps of the Site and separation distance analysis was undertaken to overlay baseline separation distances. Land use and environmental context analysis was also undertaken and presented in the maps for the Site.
- **Preliminary Conceptual Site Models:** A preliminary CSM was developed for the Site to support consideration of the potential for contamination and identification of possible contamination issues (sources) of relevance, possible exposure pathways and receptors using a source-pathway-receptor model.
- **Assessment of data gaps and uncertainties:** Information gaps relating to contamination risk at the Site, meant the level of risk was not quantitatively assessed. A summary table presenting a comparative description of remaining information gaps was produced relating to contamination potential and site management. Further discussion on this phase is described in Section 9.
- **Workshop:** Following the initial assessment, a workshop was held with HSC to present the work to date and to discuss and incorporate stakeholder feedback into the assessment and the report. HSC was also provided with a proforma to input assessment of redevelopment, rezoning potential and land use conflict to feed into the overall assessment.
- **Recommendations**: Identification of additional assessment and site management requirement, with consideration of the outcomes of the qualitative assessment and regulatory guidance.

5 Site summary

A site visit was undertaken by Nation Partners, accompanied by representatives of HSC, on 19 August 2022. Field notes and photos from the site visit are provided in Appendix A. Site observations of note and supporting information obtained through the desktop review are provided in Table 5.1 below.

5.1 Creswick waste transfer station

Table 5.1: Summary of information – Creswick waste transfer station

Item	Description
Crown Land?	Yes
Current Occupier	Hepburn Shire Council
Site Address	32 Anne Street, Creswick
Standard Parcel Identifier	45A~48A\PP5211
Site Area	Approximately 7.4 hectares
Zoning	Industrial Zone 1
Overlay	ESO1- Special Water Supply Catchment Protection, LSIO2 - Flooding from waterways in Clunes and Creswick (depths greater than 350 millimetres) Area of Aboriginal Cultural Sensitivity, approx. 200 m buffer from Creswick Creek
Registered Aboriginal Party	Dja Dja Warrung
Land Use	Waste transfer station, former landfill
EPA Priority Sites Register	Yes
Groundwater Quality Restricted Use Zones (GQRUZ)	No
EPA Permissions	Hepburn Shire Council currently hold the following EPA Registration for A13c (Waste and resource recovery – small): R000302226 R000302227 R000302228 From a review of the EPA permissions register, it is unclear which of the above is the Creswick permission however it is noted that the conditions across all registrations are standard.
EPA Victoria List of Completed Environmental Audits	Yes. The Site is listed as an audit site: ▪ CARMS No. 75350-2 – Environmental Audit Report for Landfill Cap Remediation Works under EPA Pollution Abatement Notice (PAN) No. 90006952 ▪ CARMS No. 75350-1 Environment Audit Report of Aftercare Management under EPA Post Closure PAN No. 90006899
Victorian Landfill Register	Yes
Nearby Sensitive Receptors	▪ Creswick Creek approximately 50 m north ▪ Residential property approximately 160 m south ▪ Calambeen Lakes Caravan Park approximately 280 m east ▪ Calambeen Lakes approximately 130 m east
Groundwater Extraction Nearby - within 250 m	No domestic or stock watering bores registered within 250 m.
Depth to Groundwater	0.63 – 12.6 m BTOC
Groundwater Segment (ERS, 2021)	A1
Historical waste type accepted	Variable including putrescible
Former landfill type (Landfill BPEM 2015)	Type 2 (putrescible waste)
Former landfill operational window	~1961 - 2001

Item	Description
Former landfill lined?	No
Leachate dam lined?	Yes[1]
Monitoring?	Quarterly monitoring of groundwater, surface water bodies, leachate dam and landfill gas[2]
Aftercare management plan?	Yes

[1] Based on information within the 2019 Audit Report (Senversa, 2019)

[2] Based on information within the 2019 Audit Report (Senversa, 2019)

6 Separation distance requirements

The Site is subject to recommended default threshold and separation distance requirements under Clause 53.10. These separation distances are mapped for the Site, included in Appendix B. A summary of the relevant guidelines and corresponding separation distance is provided in Table 6.1.

Table 6.1: Separation distance requirements

Guideline	Separation Distance	Notes
Planning Practice Note 92 / Hepburn Planning Scheme	500 m – Transfer station accepting organic waste	*In order to apply the BAO, the use must be compliant with relevant regulations and standards, such as those of the Environmental Protection Agency Victoria (EPA), WorkSafe and other regulatory authorities.*
Landfill BPEM	500 m – Type 2 former landfill (putrescible)	
Ministerial Direction 1 (PCL)	Not specified	*The application of an Environment Audit Overlay (EAO) should be considered for the Site to manage future development.*

7 Potential for contamination risk considerations

A discussion of risk is provided in the following section based on review of the available information, including the most recent available audit (Senversa, 2019).

7.1 Creswick waste transfer station

Table 7.1: Potential for contamination risk – Creswick waste transfer station

Risk Aspect	Audit Risk Assessment (Senversa, 2019)	Comments
Ambient air – odour impacts	▪ Risk of odour from transfer station = low ▪ Odour from landfill gas emissions through the cap = medium.	▪ No odours observed during site inspection.
Ambient air – dust / particulate matter impacts	▪ Risk of dust being discharged beyond the Site boundary = low.	▪ No dust events observed during site inspection. ▪ Landfill cap investigation was completed by Jacobs in 2015 (Senversa, 2019) ▪ Landfill cap remediation works completed between March 2018 and October 2018 (Senversa, 2019) ▪ Landfill cap construction audit was completed in November 2018 (Senversa, 2019) ▪ Audit of Aftercare Management was due March 2021, not available.
Surface water – impacts to surface water from runoff	▪ Risk of surface water impact from leachate pond overflowing = low. ▪ Risk of surface water impact from leachate/contaminated stormwater discharge = low. ▪ Risk of surface water impact from cap sediment = medium.	▪ Surface water runoff likely to drain to Creswick Creek, directly north of the Site ▪ Water from Wetland was observed to be flowing into Creswick Creek at time of inspection ▪ Surface water is monitored onsite and offsite including: – Creswick Creek – Upstream – Creswick Creek – Downstream (two locations) – Wetland – Downgradient of the landfill – Dredge Hole – Offsite, downgradient of the landfill ▪ Audit of Aftercare Management (Senversa, 2019) noted "*Potential leachate impact on other identified nearby sensitive surface water receptors, (the Dredge Hole and Wetland), is likely to be occurring during some periods of the year, however indicators of leachate impact*

Risk Aspect	Audit Risk Assessment (Senversa, 2019)	Comments
		measured are not considered to constitute pollution at these receiving waters."
Groundwater – impacts to groundwater from leachate	▪ Risk of leachate impacted groundwater moving offsite, impacting groundwater beneficial uses (environmental values) = medium	▪ Active groundwater monitoring network onsite. ▪ Former landfill is unlined. ▪ Landfill leachate engineering controls, comprising leachate collection pond connected to sewer (Senversa, 2019). ▪ Audit of Aftercare Management (Senversa, 2019) noted "*Based on the hydraulic gradients of the surrounding groundwater and the attenuation process outlined in Section 3.2.3 [of audit report] groundwater beneficial uses are unlikely to be precluded as a result of impact from landfill leachate."*
Landfill gas	▪ Risk of landfill gas generation and sub surface migration to the south, offsite towards residences = medium ▪ Risk of landfill gas generation and sub surface migration to the north, west and east = low ▪ Risk of landfill gas generation and ingress int underground structures and buildings = low	▪ Active landfill gas monitoring network onsite. ▪ Audit of Aftercare Management (Senversa, 2019) noted "…*presence of methane in perimeter sub-surface monitoring bores BH10 and BH11 at concentrations above the EPA action level of 1%v/v requires further assessment, particularly after completion of the cap upgrade works to understand the primary drivers for migration of gas and maximum methane concentrations."*
Exposure to waste	▪ Risk of animal and human exposure to historical wastes deposited from depletion/deterioration of cap = low	▪ Landfill cap investigation was completed by Jacobs in 2015 (Senversa, 2019) ▪ Landfill cap remediation works completed between March 2018 and October 2018 (Senversa, 2019) ▪ Landfill cap construction audit was completed in November 2018 (Senversa, 2019)
Fire risk	N/A	▪ Outside scope of works
General Environmental Duty / regulatory compliance	N/A	▪ Assessment of compliance against the requirements in the current Post Closure PAN (9 September 2019) is summarised within the Audit of Aftercare Management (Senversa, 2019). Of 12 conditions, compliance was noted likely for 6 and unlikely for 6.

8 Preliminary conceptual site model

Based on the outcomes of the on review of the available information and potential for contamination assessment, a preliminary conceptual site model (CSM) was developed for the Site. The CSM identified the potential contamination sources, transport and exposure pathways, and potential receptors to contamination. A typical cross section of the Site, illustrating potential pathways for contamination pathways and areas where gaps were identified was also developed. The CSM table and figure are presented in the following section.

8.1 Creswick waste transfer station

Table 8.1 provides an overview of the preliminary CSM and Figure 8.1 provides an overview of an inferred cross section, north to south of the preliminary CSM. Note that hydrogeological CSMs are available for the Site and are found within the After Care Management Plan for Creswick (Mackenzie Environmental 2015).

Table 8.1: Preliminary conceptual site model – Creswick waste transfer station

Source	Transport Pathway	Exposure Pathway	Receptors
Former landfill containing various chemicals and/or microbial contamination and current use of the Site as a Waste Transfer Station	Direct contact	▪ Dermal exposure ▪ Incidental ingestion ▪ Inhalation of dust ▪ Uptake by plants	▪ Workers ▪ Site users ▪ Trespassers ▪ Land dependent ecosystems
	Airborne dust	▪ Inhalation ▪ Ingestion following deposition on garden produce or pasture	▪ Downwind residents ▪ Workers ▪ Site users ▪ Biota (including wildlife)
	Surface run-off	▪ Ingestion following deposition on soil or in surface water used for food production or grazing ▪ Leaching to surface water and run-off discharging to waterways ▪ Accumulation in aquatic organisms	▪ Downgradient residents ▪ Land dependent ecosystems ▪ Biota (including wildlife)
	Vapour migration	▪ Inhalation of vapours from volatile chemicals that have migrated in the subsurface	▪ Workers ▪ Residents ▪ Site users
	Migration in subsurface - vertical migration through waste and landfill cap	▪ Leaching to groundwater ▪ Ingestion or dermal exposure following groundwater extraction	▪ Groundwater ▪ Groundwater users (including where groundwater is extracted for use on-site and/or livestock watering purposes) ▪ Groundwater dependent ecosystems ▪ Biota (including wildlife)
Leachate pond	Direct contact	• Direct contact and incidental ingestion	• Land dependent ecosystems, including wildlife that obtain their food and water from the on-site leachate dam
	Surface run-off	• Direct contact and incidental ingestion • Leaching to surface water and run-off discharging to waterways	• Downgradient residents • Land dependent ecosystems

Source	Transport Pathway	Exposure Pathway	Receptors
		• Accumulation in aquatic organisms	• Biota (including wildlife)
	Migration in subsurface	• Leaching to groundwater • Ingestion or dermal exposure following groundwater extraction	• Groundwater • Groundwater users (including where groundwater is extracted for use on-site and/or livestock watering purposes) • Groundwater dependent ecosystems • Biota (including wildlife)

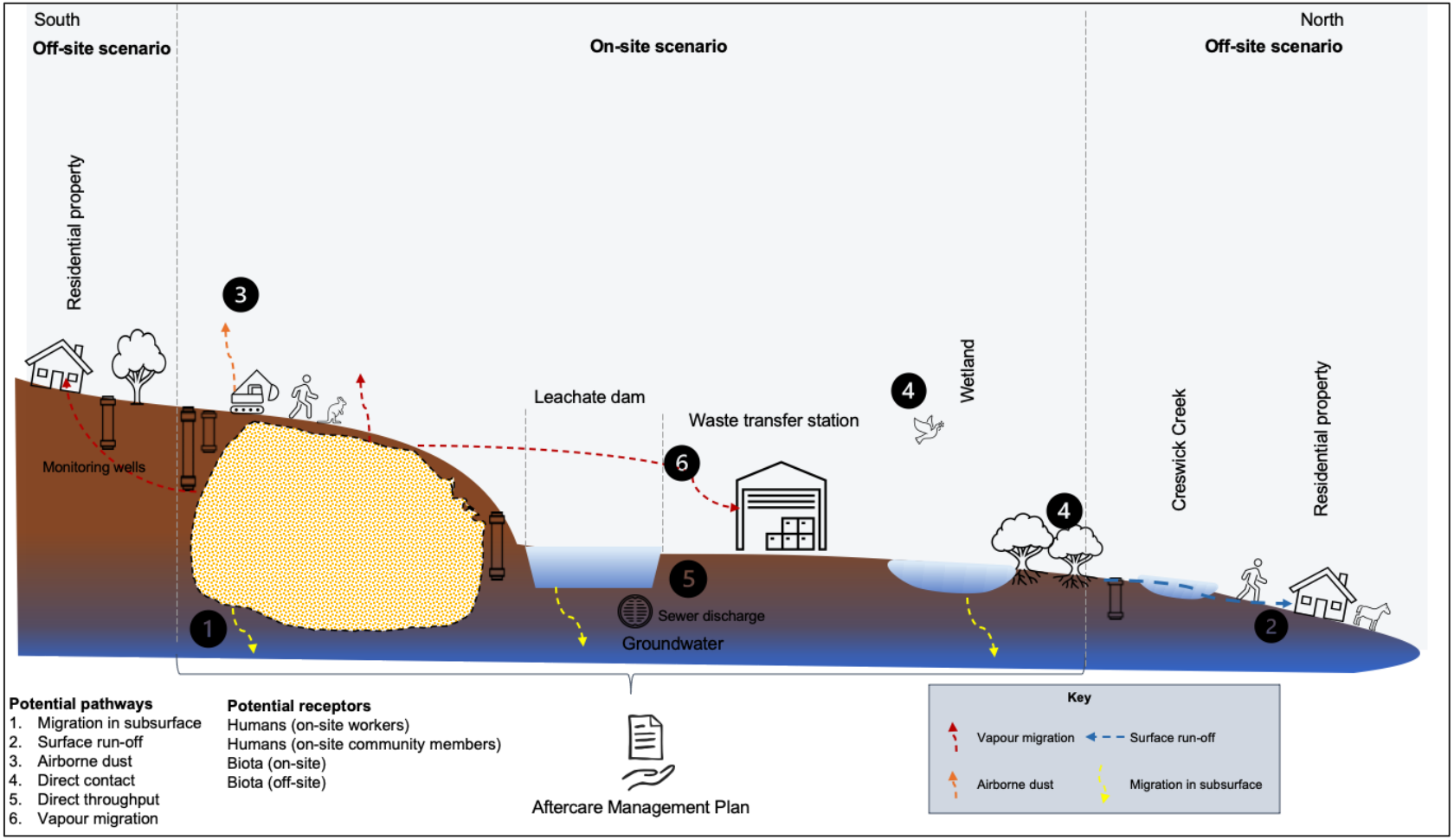


Figure 8.1: **Creswick waste transfer station preliminary CSM, note refer to Aftercare Management Plan (Mackenzie Environmental, 2015) for detailed hydrogeological CSMs**

9 Qualitative assessment

Information obtained through desktop reviews, preliminary CSMs, mapping of buffers, and surrounding land use for the Site (refer to Appendix B) fed into a qualitative assessment whereby the contamination, data gaps and uncertainties and planning context was considered. Assessment of contamination risk potential could not reasonably be inferred for the Site, due to key information gaps.

The qualitative assessment summary table in Appendix C captured the following details:

- Site features (e.g. site address, site name, existing and historical site activities)
- Assessment parameters, including:
  - Contamination potential
  - Site management practices (monitoring programs, management plans, audit)
  - Proximity to sensitive receptors (humans, environment heritage)
  - Separation distance envelope details based on separation distances adopted (number of properties within buffer zone, planning zones and corresponding areas)
- Recommended actions should a reduction in separation distances be further contemplated by Council.

Land use conflicts, pressure for redevelopment and rezoning potential were not included within the qualitative assessment and will be further considered separate to this assessment by HSC.

A full copy of the assessment is provided in Appendix C. A summary of the contamination potential and site management assessment is provided in Table 9.1 below.

Table 9.1: Summary of assessment

Site	Contamination Potential			Site Management				
	Information gaps and uncertainties			Monitoring programs			Active after care management	Third party management (audit)
	Groundwater	Surface water	Landfill gas	Ground water	Surface water	Landfill gas	Management plans	
Creswick WTS	No	No	No	Yes	Yes	Yes	Yes	Yes

10 Discussion and recommendations

In accordance with PPN92, discussed in Section 3.2.2, initial steps when determining the application of a BAO is to consider compliance and impacts of operations and the potential for off-site impacts. PPN92 notes that the 'use' must be compliant with existing regulations and standards relating to off-site impacts, or land use compatibility, including compliance obligations of EPA Permissions.

The following discussion is a summation of findings for the Site and recommended next steps. A summary table of recommendations is provided in Table 10.1.

10.1 Creswick waste transfer station

Creswick waste transfer station (and former landfill) currently operates under an EPA Registration for waste transfer activities and is subject to ongoing audits of the Aftercare Management Plan (Mackenzie Environmental, 2015) relating to a Post Closure PAN. Environmental monitoring occurs at the Site and compliance and impact aspects are overseen as part of the statutory EPA audit processes associated with the Post Closure PAN.

The most recent audit available was completed by Senversa in 2019, and the subsequent audit was due in March 2021. The March 2021 audit was not available either from HSC or from the EPA public register at the time of this assessment. As the 2019 audit contained recommended actions, including six high priority actions, the status of both the March 2021 audit and the completion of the 2019 audit actions should be confirmed.

The Site is zoned as Industrial Zone (INZ1) and is within proximity to sensitive receptors including residential dwellings and offsite surface water bodies within 100 m of the Site boundary. The GCWWRRG Planning Project (2017) assessed the existing and future risk level of encroachment of residential and sensitive use as high.

Compliance and impacts for the Site (step one of the PPN92) are understood at the Creswick waste transfer station site due to the ongoing statutory EPA audit program. As a result, planning controls, such as the BAO could be further investigated, given the Site is within proximity to sensitive receptors and step one of the PPN92 is likely satisfied.

Table 10.1: Summary of recommendations

Site	Recommendations
Creswick waste transfer station	▪ Review the status of both the March 2021 aftercare management audit and the completion of the 2019 audit actions. ▪ Planning controls, such as the BAO, could be further investigated and supported by an assessment of land use conflicts, pressure for redevelopment and rezoning potential.

11 Conclusions

Historic landfills and other potentially, or actually contaminated sites pose a challenge from a strategic planning perspective, with land use incompatibility and direct conflicts resulting where sensitive uses interface inappropriately. HSC, as a result of its historic landfill ownership, operational legacy and as the current operator of waste transfer stations, is required to identify, assess and regularly review Site risks in line with the requirements set out by EPA including the GED and the duty to manage contaminated land.

The recommended further actions in Table 9.1 should be progressed, however as the Site has limited information gaps and uncertainties relating to contamination potential, planning controls, such as the BAO, could now be further investigated.

12 References

Legislation

EP Act. *Environment Protection Act 2017*, Victorian Government, Act No. 15 of 2017.

PE Act. *Planning and Environment Act 1987,* Victorian Government, Act No. 45 of 1987.

ERS (2021) Environment Reference Standard, Victorian Government, No. S245.

General References

EPA Publication 1518 (2013) *Recommended Separation Distances for Industrial Residual Air Emissions – Guideline,* Environment Protection Authority Victoria, March 2013

EPA Publication 788.3 (2015) *Siting, design, operation and rehabilitation of landfills (Landfill BPEM),* Environment Protection Authority Victoria, August 2015

EPA Publication 1671 (2018) *Local council self-assessment tool for closed landfill environmental risk,* Environment Protection Authority Victoria, February 2018

EPA Publication 1825 (2021) *Waste and recycling – guide to preventing harm to people and the environment*, Environment Protection Authority Victoria, July 2021.

Grampian Central West Waste and Resource Recovery Group (2018), *Implementation Plan – Land Use Planning Project,* 2018

Grampian Central West Waste and Resource Recovery Group (2019), *Closed Landfill Assessment Report for Hepburn Shire Council,* Grampians Central West Waste & Resource Recovery Group [GCWWRRG], 2019

Ministerial Direction No. 20 *Major Hazard Facilities*, Victorian Government, October 2018

Ministerial Direction No. *1 Potentially Contaminated Land*, Victorian Government, August 2021

Planning Practice Note 92, *Managing buffers for land use compatibility*, Department of Environment, Land, Water and Planning (DELWP), March 2021

Planning Practice Note 30, *Potentially Contaminated Land,* Department of Environment, Land, Water and Planning, July 2021

Victoria Unearthed (2022), *Victoria Unearthed,* accessed November 2022.

VVG (2022b), *Visualising Victoria's Groundwater,* Visualising Victoria's Groundwater, accessed November 2022

Site Specific References – Creswick Waste Transfer Station

Jacobs (2014) *Landfill Cap and Hydrogeological Assessment*, Jacobs, November 2014

Mackenzie Environmental (2015) *Aftercare Management Plan Part 1: Inspection and Maintenance Plan,* June 2015

Mackenzie Environmental (2015b) *Aftercare Management Plan Part 2: Environmental Risk Assessment and Monitoring Program,* Mackenzie Environmental, June 2015

Senversa (2019) *Audit of Aftercare Management EPA CARM's No: 75350-1 (Service Order No. 8005541),* Senversa, December 2019

Ventia (2022) *2020/2021 Annual Monitoring Report – Creswick Landfill,* Ventia, March 2022

Appendices

A Site photos

Photos from site inspection – Creswick Waste Transfer Station	
	
Drum muster cage and waste oil area	Green waste stockpile
	
Waste transfer shed	Waste oil area, drum of solvent store on bund edge

Drum muster cage

Drum muster cage and groundwater monitoring well

Looking east towards former landfill mound

Leachate dam

Looking north towards Creswick Creek

Top of former landfill mound

Groundwater monitoring well

Waste tyres near northern property fence

	
Groundwater monitoring well	Wetland area

B Site maps

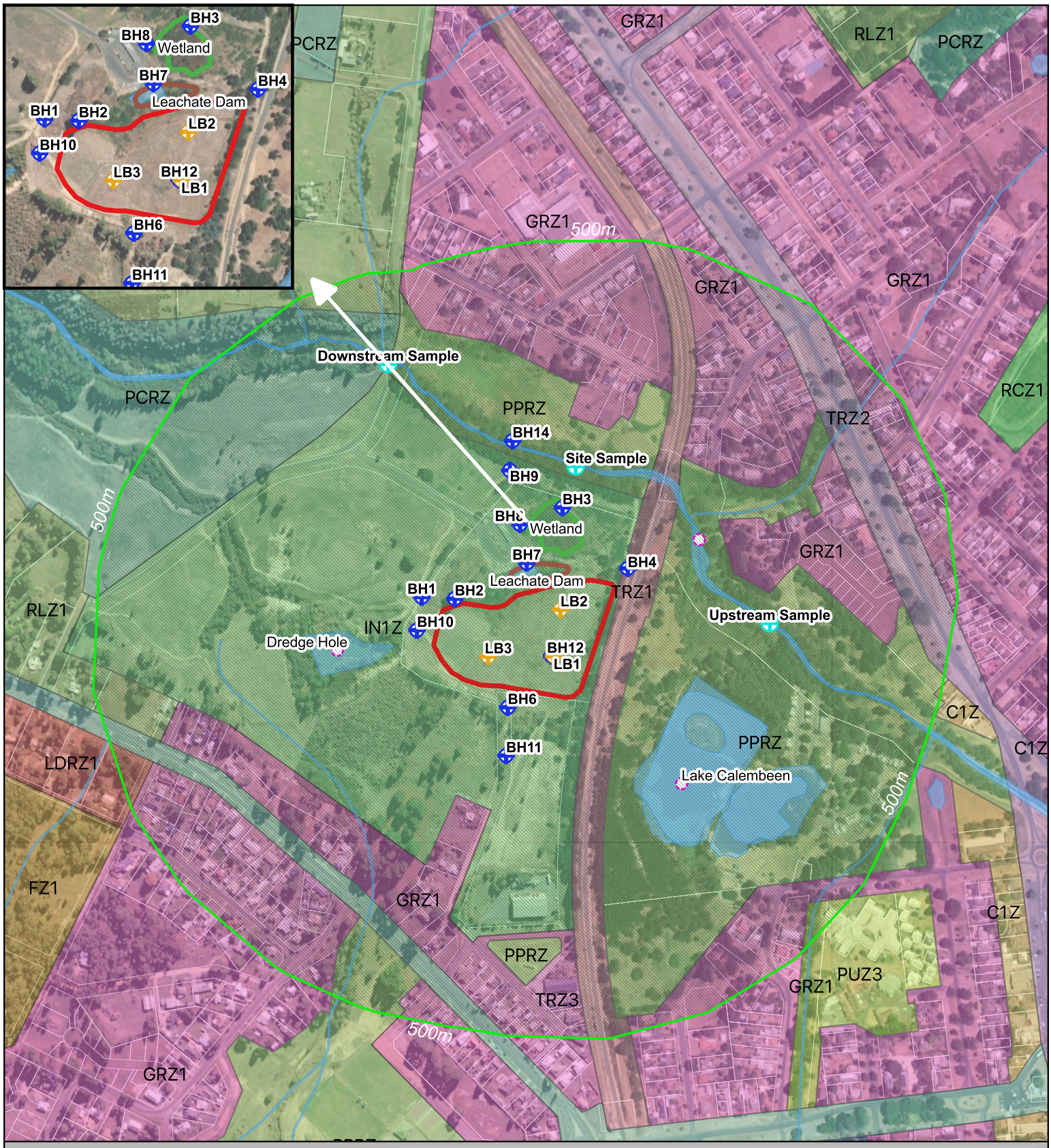


Figure 2 - Creswick Distance Assessment

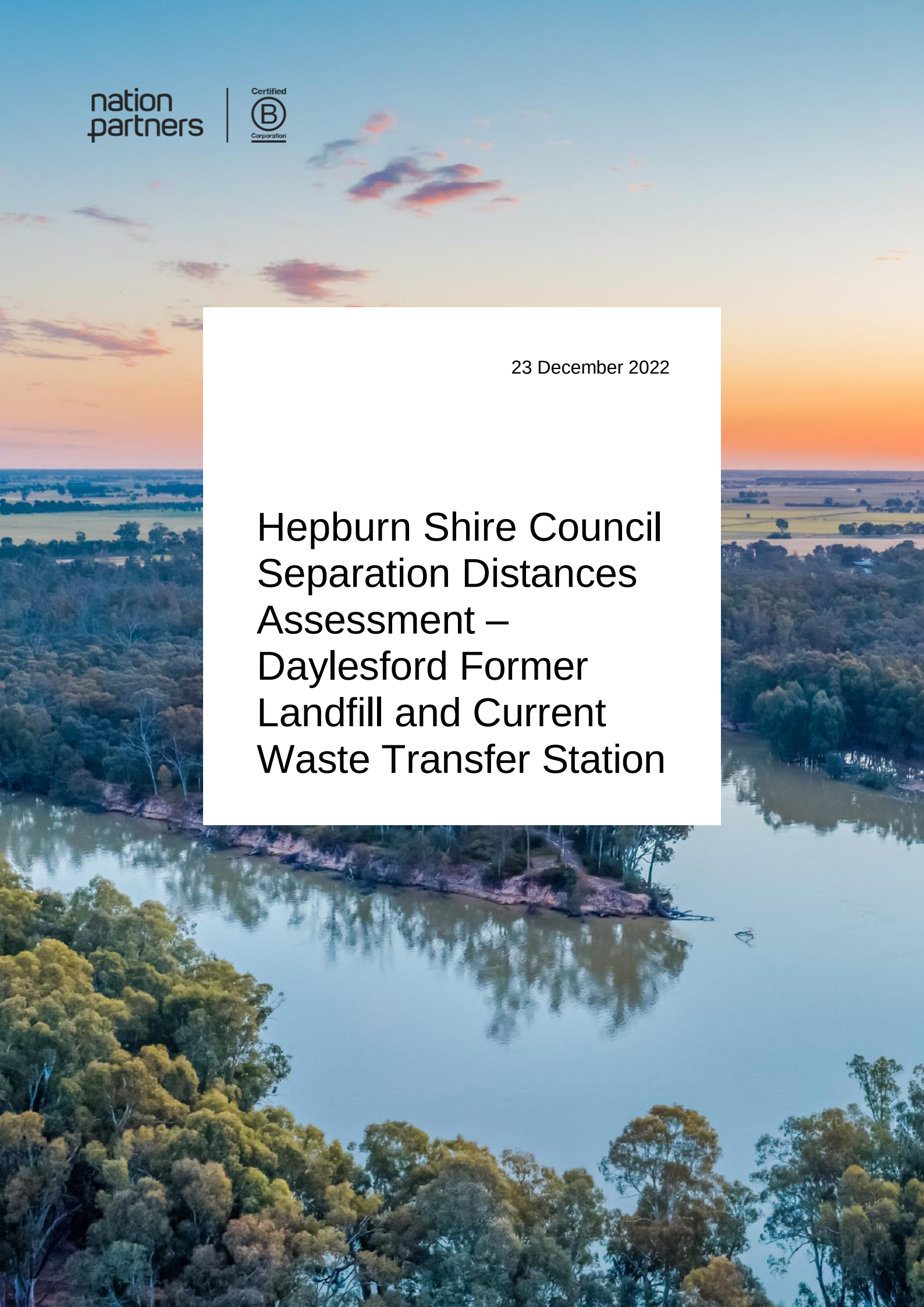
Hepburn Shire Council
Separation Distance Assessment

0 100 200 300 m

- Creswick Site Boundary
- Landfill BPEM (August 2015)
  PPN92 Hepburn Shire Council Planning Scheme(March 2021)
  (500m)
- Property Boundaries
- Bodies of Water
- Leachate Bores
- Boreholes/GW Monitoring Well
- Sample Locations
- Watercourse

C Qualitative assessment

Submitted electronically – Microsoft Excel file format



23 December 2022

Hepburn Shire Council Separation Distances Assessment – Daylesford Former Landfill and Current Waste Transfer Station

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We acknowledge the Traditional Custodians of the land on which we work and live, and recognise their continuing connection to land, water, and community. We pay our respects to Elders past, present and emerging.

Document title
Hepburn Shire Council Separation Distances Assessment – Daylesford Former Landfill and Current Waste Transfer Station

Version
1.1

Date
23 December 2022

Prepared by
Rhiannon Hossack

Approved by
Amy Gason

File name
NP21232 Separation Distances Assessment - Daylesford

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Executive Summary

Hepburn Shire Council (HSC) engaged Nation Partners Pty Ltd (Nation Partners) to undertake a review and qualitative assessment (the Assessment) of key former landfill sites, plus other potentially contaminated sites and sensitive land use interfaces within the Hepburn Shire. The assessment comprised four former landfills managed by HSC in Daylesford, Creswick, Clunes and Trentham. Three of which are active waste transfer stations (Daylesford, Creswick and Trentham). Two sites not managed by HSC were also part of the Assessment, including a Major Hazard Facility (MHF) and a former foundry in Trentham. Each HSC-managed site has a separate report with the site reported herein the: **Daylesford former landfill and current waste transfer station (the Site)**.

The Assessment was undertaken as an initial, qualitative step to support HSC in increasing and consolidating its understanding of the Sites regarding the associated environmental, amenity and societal risks, thereby informing options and next steps that would support the application of and/or “risk-based” refinement of potential planning controls.

A review of standard separation distances applicable to existing uses at the Site with reference to the requirements of applicable Victorian Environment Protection Authority (EPA) and Department of Environment, Land, Water and Planning (DELWP) guidelines was undertaken and mapped to support visualising the land use and surrounding context for the Site.

Current and historical activities, available records, previous reports and a site inspection informed the development of a Preliminary Conceptual Site Model (CSM) for the Site, which fed into a high-level qualitative assessment. Whilst an assessment of level of risk of potential for contamination was initially proposed, due to a number of information gaps relating to contamination risk at the Site, the level of risk could not be meaningfully assessed.

The Assessment of the Site found that:

- Information gaps and uncertainties pertaining to groundwater, surface water and landfill gas contamination potential were identified and further work is required to understand the status of previous assessments and monitoring programs;
- Environmental monitoring reportedly occurs at the Site, including groundwater and surface water, however a documented monitoring program was not available at the time of the Assessment;
- The Site does not appear to hold or implement a documented after care management plan; and
- Closing information gaps and resolving uncertainties with respect to compliance and impacts of current historical landfilling operations, including the potential for offsite impacts, should be undertaken concurrently with consideration of planning controls, such as implementing a Buffer Area Overlay (BAO) for the Site.

Details of the specific recommendations are included within the Discussion and Recommendations section of this report.

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1 Introduction

Nation Partners Pty Ltd (Nation Partners) was engaged by Hepburn Shire Council (HSC) to undertake a review and qualitative assessment (the Assessment) of key former landfill sites, plus other potentially contaminated sites (the Sites) and sensitive land use interfaces. The Assessment is intended to inform the implementation of appropriate planning controls to mitigate impacts to the environment and/or the local community from the Sites, within the Shire of Hepburn (the Shire). Each HSC-managed site has been reported on separately. The site reported herein is the **Daylesford former landfill and active waste transfer station (the Site)**.

1.1 Project objectives

The purpose of the Assessment was to:

- Contribute to establishment of the basis for application of relevant planning buffers for the Sites based on existing regulatory context and published guidance;
- Understand the current land use and planning context plus the strategic planning direction that interfaces with each of the Sites; and
- Provide recommendations for additional actions to consider reduction from “baseline” separation distances, should Council wish to consider site-specific controls.

This assessment is an initial, qualitative step to support HSC in increasing and consolidating its understanding of the Sites regarding the associated environmental, amenity and societal risks, thereby informing options and next steps that would support the application of and/or “risk-based” refinement of potential planning controls.

1.2 Project scope

The scope of works included review of available information of six (6) contaminated and potentially contaminated sites, namely: historic landfills; a major hazard facility; and a former foundry, within the Shire, and included the following:

- Desktop review of site information sources, including:
  - Previous studies and reports;
  - Documentation provided by HSC; and
  - Public information held by government and regulatory authorities.
- Site inspections at the historic landfill sites;
- A review of standard separation distances applicable to existing uses at the Sites with reference to the requirements of:
  - *Department of Environment, Land, Water and Planning (DELWP), Managing buffers for land use compatibility, Planning Practice Note* (March 2021)
  - *EPA Publication 788.3 Siting, design, operation and rehabilitation of landfills (Landfill BPEM)* (August 2015)
  - *EPA Publication 1518 Recommended separation distances for industrial residual air emissions (IRAEs)* (March 2013)
  - *Ministerial Direction No. 20 Major Hazard Facilities* (October 2018)
  - *Ministerial Direction No. 1 Potentially Contaminated Land* (August 2021)
- Assessment of data gaps and uncertainties in characterising potential contamination risks, and the corresponding potential risk to receptors;
- Development of preliminary conceptual site models (CSMs) for HSC-managed sites;

- Mapping of land use context, environmental context and separation distances; and
- Preparation of recommended next steps and further investigation, where warranted.

1.3 Limitations of this assessment

- This assessment is based solely on publicly available information, information provided by HSC and site visits conducted by Nation Partners in August 2022.
- No engagement was undertaken with broader stakeholders nor the Regulator(s) – EPA, WorkSafe and Department of Environment Land, Water and Planning (DELWP).
- Nation Partners produces technical and advisory documents in the course of providing its services, which includes this document.
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2 Background

2.1 The Site

The Site is located at 16 Ajax Road, Daylesford, Victoria and is managed by HSC. The Site's location within the Shire is shown in Figure 2.1. Further site identification details are summarised in Section 5.

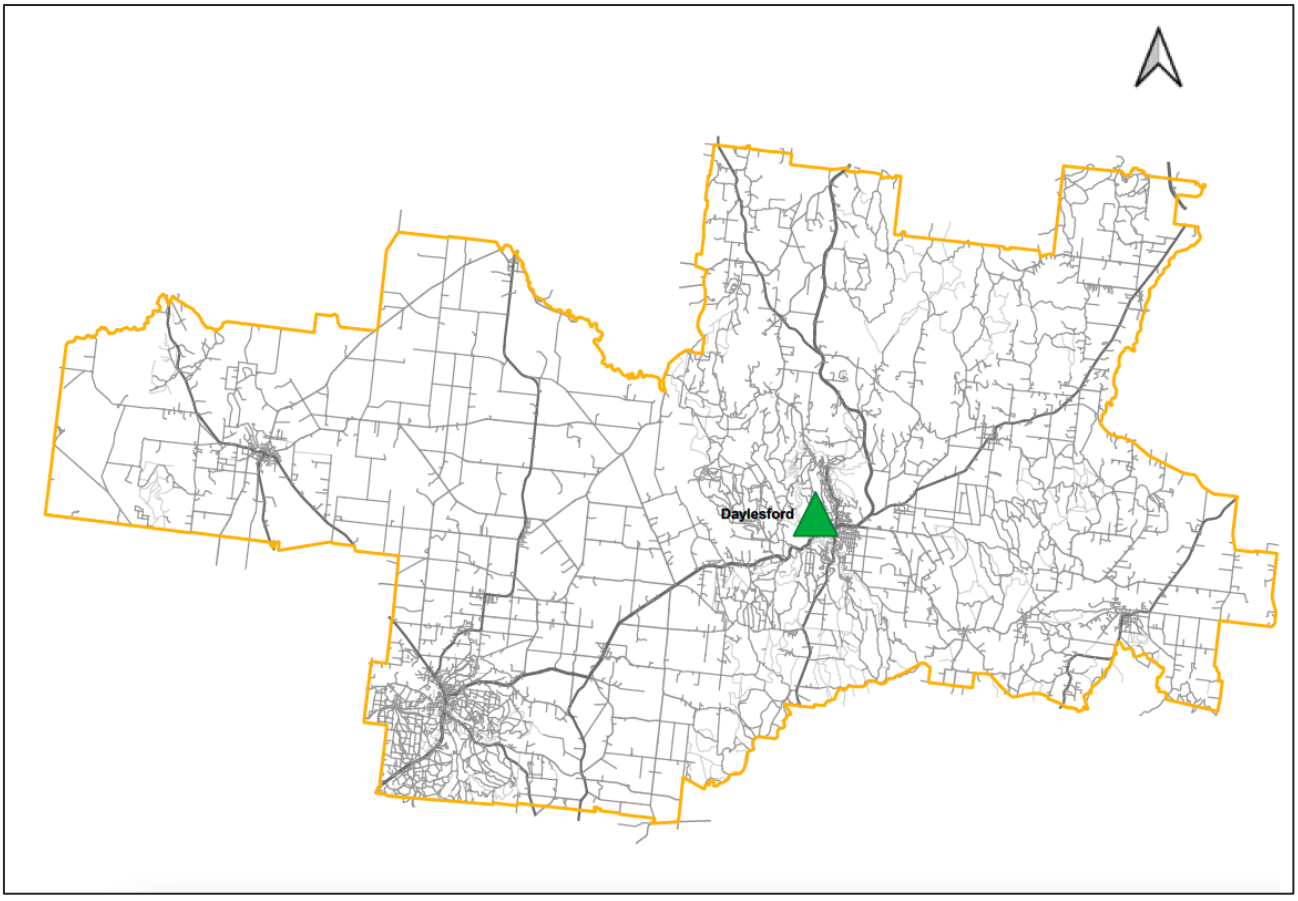


Figure 2.1: Location map of site

2.2 Previous assessments

An assessment of waste and resource recovery facilities in the planning schemes across the Grampians Central West Waste and Resource Recovery Group (GCWWRRG) region was completed in 2018 (*Grampian Central West Waste and Resource Recovery Implementation Plan – Land Use Planning Project,* 2018). The project provided an overview of the statutory and strategic planning framework applicable to resource recovery facilities in the region and provided assessment of risk of encroachment along with recommendations to improve the identification and protection of the facility in the relevant planning schemes. Daylesford waste transfer station was included within the assessment.

The report assessed 'risk of future encroachment' with a general assessment of the degree of risk having regard to zoning, size of allotments and potential for future dwellings or subdivision, pattern of surrounding development, potential for future urban expansion and growth rate of the municipality. The risk was assessed

as either low, medium or high. The report noted that the variation in such indicators was too great to develop specific quantitative criteria.

Assessment criteria used for assessing existing encroachment is described in Figure 2.2.

Risk	Criteria
Low	• No existing sensitive uses within 500 metres (excluding farmhouse or house on large lot in Farming Zone i.e >5ha); **and** • Low potential for sensitive uses within 500 metres or surrounded by Farming Zone; **and** • No other readily identifiable industrial or commercial use within 500 metres.
Medium	• Small lots in Farming Zone (i.e. <5ha), with or without dwellings **or** • Industrial or commercial buildings within 500 metres; **and** • Low potential for sensitive uses within 500 metres.
High	• Schools, aged care within 500 metres; **or** • Dwellings in an urban zone within 500 metres; **or** • High potential for additional residential uses within 500 metres

Source: Centrum Town Planning, 2017

Figure 2.2: Assessment criteria for assessing existing encroachment Source: *GCWWRRG, 2018*

Following the above assessment, a more targeted assessment of closed landfills within the Shire was completed in 2019 (*Closed Landfill Assessment Report for Hepburn Shire Council,* GCWWRRG, 2019) which included the HSC-managed sites. The assessment was preliminary and limited in nature and provided a qualitative assessment of risks posed by closed landfills in the region in line with EPA Publication 1671: *Local council self-assessment tool for closed landfill environmental risk* (EPA, 2018).

Whilst the assessment included additional risks not encompassed by EPA Publication 1671, several aspects listed in the self-assessment were not undertaken. EPA Publication 1671, and the assessment completed by GCWWRRG, also predate the current Victorian regulatory landscape and the promulgation of the *Environment Protection Act 2017* (The EP Act 2017) and *Environment Protection Regulations 2021* (The EP Regulations 2021) in particular, which articulate obligations relating to both Duty Holders, plus the comprehensive General Environmental Duty (GED); in addition to the introduction of *Managing buffers for land use compatibility Planning Practice Note 92*, authored by DELWP in 2021.

Various environmental assessment and reports have been completed for the Site and include the following:

- Last Waltz Consulting (2006) *Environmental Improvement Plan,* Last Waltz Consulting, December 2006
- Philip Vawdrey Engineering Pty Ltd (2010) *Geotechnical Investigation Proposed Extension to the Waste Sorting Shed*, Philip Vawdrey Engineering Pty Ltd, October 2010
- SKM (1998) *Daylesford Municipal Landfill Site, Hydrogeological Assessment*, July 1998.
- Thiess (2014) *Daylesford Landfill Sampling,* Thiess, February 2014
- Thiess (2014a) *Daylesford Landfill Sampling,* Thiess, May 2014
- Thiess (2014b) *Daylesford Landfill Sampling,* Thiess, August 2014

Outcomes of these assessments are summarised further in Section 7.

2.3 Proposed planning scheme amendment C80

In 2020, HSC undertook a review of the Hepburn Planning Scheme which responded to the GCWWRRG assessment recommendations, and initially proposed a Design and Development Overlay (DDO) (100 m) around the Daylesford former landfill / current waste transfer station site. Following the exhibition of the proposed DDO, there was community concern for the proposed development control, and Council committed to further investigate whether separation distances could be varied beyond those proposed in the DDO.

Following this feedback, Council placed the proposed component of the Planning Scheme Amendment (PSA) relating to the Daylesford site on hold, pending further risk assessment and community consultation.

The Hepburn Planning Scheme Amendment C80hepb Panel Report (February 2021) noted that *"the future of buffers around the landfill facility are a live issue for many residents. Given the potential implications for future residents the Panel support Council's intention to resolve this matter in consultation with the EPA".*

3 Regulatory context

Legislation, policy and guidance relating to both the management of closed landfills and land use planning framework is extensive. The EP Act 2017 and the *Planning and Environment Act* 1987 are the primary legislation that underpins this guidance, with key elements and guiding documents and how they relate to this assessment summarised below.

3.1 Environment protection framework

The EP Act 2017 and the EP Regulations 2021 are the governing Victorian Environment Protection legislation, designed to prevent harm to human health and the environment from pollution and waste including from past activities and incidents. The general environmental duty (GED) is at the centre of the EP Act 2017 and is based on the concept of minimising risks of harm to human health and the environment, 'so far as reasonably practicable' (SFARP).

In addition to the GED, the EP Act 2017 establishes a range of duties that apply to those in control or management of contaminated land including the Duty to Manage Contaminated Land (DtM) and the Duty to Notify Contaminated Land (DtN). Where land may be suspected as contaminated, the first priority is to ascertain whether or not there is a duty to manage any risks of harm arising from that contamination to determine if other duties are applicable (such as the DtM and/or DtN). These new provisions may be relevant to former landfills and/or potentially contaminated sites where the requirements of notifiable contamination are met.

In addition to the GED, DtM and other requirements, operation of some sites require permissions from the EPA including sites that receive, store or process waste generated at another site for resource recovery of offsite transfer of disposal. The requirement for a permission and the permission type depends on the amount of waste received in any month or stored on the Site at any time.

To support the waste industry (including operators of transfer stations) in complying with their obligations, EPA released Publication 1825.1 *Waste and recycling – guide to preventing harm to people and the environment* in July 2021. This publication is a key guidance document for environmental management at waste transfer station sites as it provides information on how to meet the GED, DtM and other requirements, as well as assess the risk of harm to the environment and human health.

3.1.1 Environment Reference Standard 2021

The Environmental Reference Standard (ERS) 2021 is subordinate legislation made under the EP Act 2017. The ERS identifies environmental values for the segments of the environment and provides a way to assess those environmental values. The ERS comprises "reference standards" for four aspects of Victoria's environment, referred to as segments of the environment: ambient air, ambient sound, land and water (surface water and groundwater). Each reference standard identifies an environmental value. Most reference standards also have indicators and objectives. By comparing measured or predicted environmental levels of an indicator against its objective, an assessment can be made as to whether an environmental value is being achieved, maintained or threatened, and hence whether "harm" may occur (or be occurring) to that environmental value.

3.1.2 EPA Publication 1518 – Recommended separation distances for industrial residual air emissions (IRAEs)

EPA Publication 1518 identifies recommended minimum separation distances between odour- or dust-emitting industrial land uses and sensitive land uses to mitigate potential impacts of IRAEs on human health and wellbeing, local amenity and aesthetic enjoyment, in order to:

- Provide clear direction on which land uses require separation;

- Inform and support strategic land use planning decisions and the consideration of planning permit applications;
- Prevent new sensitive land uses from impacting on existing industrial land uses;
- Prevent new or expanded industrial land uses from impacting on existing sensitive land uses; and
- Identify compatible land uses that can be established within a separation distance area

Variations to the separation distances identified in EPA Publication 1518 can be sought for new use (either industrial or sensitive). In order for a variation to be approved, the new use ('agent of change') is required to provide evidence to the responsible authority that a variation is appropriate.

3.1.3 EPA Publication 788 – Siting, design, operation and rehabilitation of landfills (Landfill BPEM)

EPA Publication 788 sets out the best practice environmental measures (BPEM) for management of landfills and provides guidelines on how potential impacts of landfills can be mitigated, and the management of rehabilitation of landfills. The BPEM considers buffer distances between landfills and receptors including development around former landfills.

3.1.4 Draft separation distance and buffer EPA Publications

EPA has recently commenced public consultation on two draft guidelines that are relevant to the assessments:

- *Separation distance guideline – EPA Publication 1949 (Draft, December 2022)*
- *Landfill buffer guideline – EPA Publication 1950 (Draft, December 2022)*

These draft guidelines are proposed to support land use and development decisions that protect human health and amenity from the effects of pollution and waste associated with the operation of industry and landfills and to protect industry and landfills from inappropriate development nearby. Once finalised, the guidelines are proposed to be referenced in the Victoria Planning Provisions. The guidelines are predicted to be finalised by mid-2023 and should be considered in the context of the Site's ultimate management and planning context post finalisation.

3.2 Planning policy framework

The *Planning and Environment Act* 1987 provides a legislative basis for the Victoria Planning Provisions (VPP) and sets the legislative framework implementation of state and local planning policy. Key elements of the Planning Scheme support strategic and statutory planning decision making guided by consistency with Policy, Zones, Overlays, Particular Provisions, and General Provisions.

3.2.1 Ministerial Direction No. 1 Potential Contaminated Land

Ministerial Direction No.1 requires that potentially contaminated land is suitable under an amendment to a planning scheme for sensitive land use, agriculture or public open space. A Planning Authority must be satisfied that the environmental conditions of that land are, or will be suitable for the land use.

3.2.2 Planning Practice Note 92 Managing Buffers for Land Use Compatibility

Planning Practice Note 92 (PPN92) provides guidance on the requirements of planning provisions which relate to the management of buffers including Clause 53.10 Uses and activities with potential adverse impacts, and Clause 44.08 Buffer Area Overlay (BAO).

The BAO can be used to prevent incompatible use and development or to prevent future encroachment and intensification of incompatible use and development within buffer areas surrounding land uses with potential off-site impacts. The BAO also complements Clause 53.10 by ensuring that land use and development around existing industry is appropriate. Proponents must meet criteria and provide supporting information to apply the BAO.

In accordance with PPN92, there are key steps involved in application of the BAO process, for both operators of sites, Council and relevant authorities. For sites managed by HSC, responsibilities throughout the process are twofold as HSC is both the operator/proponent and the Relevant Authority. The ten steps involved are summarised below and in PPN92 as follows:

1. Consider compliance and impacts
2. Discuss with council and relevant authorities
3. Advise on compliance and potential off-site impacts
4. Prepare assessment
5. Advise on recommendations
6. Discuss implementation
7. Draft schedule(s) informed by evidence base
8. Submit application
9. Planning scheme amendment process
10. Periodic review of BAO application

3.2.3 Planning Practice Note 30 Potentially Contaminated Land

Planning Practice Note 30 (PPN30) provides guidance for planners and applicants on how to identity potentially contaminated land, appropriate level of assessment required depending on the circumstances, appropriate provisions within planning scheme amendments and conditions on planning permits. PPN30 includes a list of land uses that may have potential for contaminating land. Of note, Table 2 of PPN30 lists landfill sites/waste depots as all having high potential for contamination.

4 Methodology

The Assessment has included the following phases:

- **Existing land uses and site information:** Commencing with a desktop study and site inspection, key information was collected and reviewed to determine the existing land use context and develop preliminary CSMs to support the assessment. Information utilised included publicly available information, information contained in the GCWWRRG *Closed Landfill Assessment Report – Hepburn Shire* and records provided by HSC. During the site visit a photographic record and site observations were documented, included in Appendix A.
- **Separation distances:** Relevant EPA guidelines and the Hepburn Shire Council Planning Scheme were used to establish baseline separation distances between the Site and sensitive land uses. This included a review and consideration of the requirements of:
  - *Department of Environment, Land, Water and Planning (DELWP), Managing buffers for land use compatibility, Planning Practice Note* (March 2021)
  - *Department of Environment, Land, Water and Planning (DELWP), Potentially Contaminated Land, Planning Practice Note 30* (July 2021)
  - *EPA Publication 788.3 Siting, design, operation and rehabilitation of landfills (Landfill BPEM)* (August 2015)
  - *EPA Publication 1518 Recommended separation distances for industrial residual air emissions (IRAEs)* (March 2013)
  - *Environment Protection Regulations 2021*
  - *Ministerial Direction No. 20 Major Hazard Facilities* (October 2018)
  - *Ministerial Direction No. 1 Potentially Contaminated Land* (August 2021)
- **Mapping:** Aerial base maps were used to generate maps of the Site and separation distance analysis was undertaken to overlay baseline separation distances. Land use and environmental context analysis was also undertaken and presented in the maps for the Site.
- **Preliminary Conceptual Site Models:** A preliminary CSM was developed for the Site to support consideration of the potential for contamination and identification of possible contamination issues (sources) of relevance, possible exposure pathways and receptors using a source-pathway-receptor model.
- **Assessment of data gaps and uncertainties:** Information gaps relating to contamination risk at the Site, meant the level of risk was not quantitatively assessed. A summary table presenting a comparative description of remaining information gaps was produced relating to contamination potential and site management. Further discussion on this phase is described in Section 9.
- **Workshop:** Following the initial assessment, a workshop was held with HSC to present the work to date and to discuss and incorporate stakeholder feedback into the assessment and the report. HSC was also provided with a proforma to input assessment of redevelopment, rezoning potential and land use conflict to feed into the overall assessment.
- **Recommendations**: Identification of additional assessment and site management requirement, with consideration of the outcomes of the qualitative assessment and regulatory guidance.

5 Site summary

A site visit was undertaken by Nation Partners, accompanied by representatives of HSC, on 19 August 2022. Field notes and photos from the site visit are provided in Appendix A. Site observations of note and supporting information obtained through the desktop review are provided in Table 5.1 below.

5.1 Daylesford waste transfer station

Table 5.1: Summary of information – Daylesford waste transfer station

Item	Description
Crown Land	Yes
Current Occupier	Hepburn Shire Council
Site Address	16 Ajax Road, Daylesford
Standard Parcel Identifier	2001/PP5232
Site Area	Approximately 5.6 hectares
Zoning	PUZ6 – Public Use – Local Government
Overlay	ESO1- Special water supply catchment protection, ESO2 – Mineral springs and groundwater protection, BMO – Bushfire Management Overlay
Registered Aboriginal Party	Dja Dja Warrung
Land Use	Waste transfer station, former landfill
EPA Priority Sites Register	No
Groundwater Quality Restricted Use Zones (GQRUZ)	No
EPA Permissions	Hepburn Shire Council currently hold the following EPA Registrations for A13c (Waste and resource recovery – small): R000302226 R000302227 R000302228 From a review of the EPA permissions register, it is unclear which of the above is the Daylesford permission however it is noted that the conditions across all registrations are standard.
EPA Victoria List of Completed Environmental Audits	No
Victorian Landfill Register	Yes. The Site and surrounding land to the west is listed on the Victorian Landfill Register.
Nearby Sensitive Receptors	▪ Sailors Creek 100 m west ▪ Tipperary Springs Picnic area approx. 770 m SW of the former landfill property boundary ▪ Residential property approximately 70 m east of former landfill property boundary ▪ Boomerang Holiday Ranch directly west of the former landfill property boundary ▪ Area of Aboriginal Cultural Heritage Sensitivity approximately 180 m west of the former landfill property boundary
Groundwater Extraction Nearby - within 250 m	No domestic or stock watering bores registered within 250 m. WRK052496 domestic and stock watering bore approximately 500 m NNE of the former landfill property boundary.
Depth to Groundwater	4.5 – 27 m below top of casing (bTOC) (Thiess, August 2014 monitoring records)

Item	Description
Groundwater Segment (ERS, 2021)	B (TDS 1,201 – 3,100 mg/L)[1]
Historical waste type accepted	Putrescible municipal waste, anecdotal evidence car bodies buried
Depth of landfilling	Up to 12 m (anecdotal)
Former landfill type (Landfill BPEM 2015)	Type 2 (putrescible waste)
Former landfill operational window	~1988 - 2004
Former landfill lined?	No
Leachate dam lined?	Yes[2]
Monitoring?	Quarterly groundwater and leachate dam monitoring [3]
Aftercare management plan?	No

[1] Based on a review of TDS results in August 2014 groundwater monitoring results (Thiess 2014b)

[2] Inferred from correspondence reviewed from A.S James Geotechnical Engineers and Civil Design drawings of the leachate pond

[3] Current monitoring frequency, based on anecdotal evidence from HSC staff, however most recent records not made available

6 Separation distance requirements

The Site is subject to recommended default threshold and separation distance requirements under Clause 53.10 – *Uses and activities with potential adverse impacts*, of the Victorian Planning Provisions. These separation distances are mapped for the Site, included in Appendix B. A summary of the relevant guidelines and corresponding separation distance is provided in Table 6.1.

Table 6.1: Separation distance requirements

Guideline	Separation Distance	Notes
Planning Practice Note 92 / Hepburn Planning Scheme	500 m – Transfer station accepting organic waste	*In order to apply the BAO, the use must be compliant with relevant regulations and standards, such as those of the Environmental Protection Agency Victoria (EPA), WorkSafe and other regulatory authorities.*
Landfill BPEM	500 m – Type 2 former landfill (putrescible)	
Ministerial Direction 1 (PCL)	Not specified	*The application of an Environment Audit Overlay (EAO) should be considered for the Site to manage future development.*

7 Potential for contamination risk considerations

Based on review of the available information, data gaps and the potential for contamination caused by current and historical waste management activities was qualitatively assessed including identification of data gaps. Comments based on data review, data gaps and uncertainties, and their implications, are summarised in the following section.

7.1 Daylesford waste transfer station

Table 7.1: Potential for contamination risk considerations – Daylesford waste transfer station

Risk Aspect	Comments	Information Gaps and Uncertainties	Information Gap Implications of Assessment Outcomes
Ambient air – odour impacts	▪ Odour from transfer station operation and materials recycling facility possible. No odours observed during site inspection. ▪ HSC staff noted no recent odour complaints have been received by the Council.	▪ Extent of former landfill areas unknown. ▪ No aftercare management plan. ▪ No detail on engineering cap for former landfill however reasonable cover within the vicinity of the Waste Transfer Station (WTS). Some areas outside the WTS show evidence of waste material at surface level. ▪ No detail on cap maintenance program.	▪ The nature and extent of risk of odour, dust and particulate matter impacts is not well characterised.
Ambient air – dust / particulate matter impacts	▪ No visible dust generation observed during site inspection. ▪ Windblown litter observed throughout the Site, close to the WTS operations. ▪ HSC staff noted no recent dust complaints have been received by the Council.		
Surface water – impacts to surface water from runoff	▪ Surface water runoff likely to drain to earthen drainage lines adjacent to Ajax Road. ▪ Evidence of water exfiltration from western wall of landfill with water likely to drain to the leachate dam. ▪ Level pump at leachate dam, likely to reduce risk of surface run-off from the leachate dam however operational information unknown.	▪ Operation, management and maintenance of pump at leachate dam unknown. ▪ Drainage plan unknown.	▪ The nature and extent of risk of impacts from surface water runoff is not well characterised.
Groundwater – impacts to groundwater from leachate	▪ Former landfill is likely unlined. ▪ Anecdotal evidence landfilling depth could be up to 12 m and the “old landfill” extended to the southern portion of the Site, towards Ranch Road.	▪ Extent of former landfill areas unknown. ▪ Email records from groundwater and leachate dam monitoring conducted in 2018 however results were not available from email records provided. Most recent records available were from August 2014 (Thiess 2014b) ▪ Likely that a more recent hydrogeological assessment has been completed in 2004 by SKM as referenced within the	▪ The nature and extent of risk of impacts to groundwater from leachate is not well characterised.

Risk Aspect	Comments	Information Gaps and Uncertainties	Information Gap Implications of Assessment Outcomes
	▪ Historical documentation[4] suggests leachate dam is lined however records are not clear as to final design. ▪ There are four groundwater monitoring wells onsite which appear to be monitored on a quarterly basis along with the leachate dam based on HSC staff anecdotal evidence. ▪ Shallow groundwater in one well (BH03; 3.6 – 4.9 m bTOC) which may be immediately hydraulically downgradient of the former landfill however records are not clear on bore locations and construction. ▪ Hydrogeological assessment completed in 1998 (SKM) noted that a local perched water table would form within the landfill and largely discharge to the surface down slope of the landfill with minimal downward movement of groundwater from beneath the landfill to the regional water table. ▪ Preliminary review by Nation Partners of available groundwater quality laboratory reports from 2014 (Thiess 2014b) indicates detectable levels of arsenic, nickel and zinc, and nutrients. No detectable levels of halogenated and non-halogenated phenols.	EIP (Last Waltz Consulting 2006), post leachate dam construction, bore installation and monitoring however this was not available. ▪ Bore nomenclature corresponding to locations and construction details of bores unclear, likely the more recent hydrogeological assessment (SKM, 2004), would clarify these items. ▪ No aftercare management plan. ▪ No detail on cap maintenance program.	
Contamination and/or human health – impacts from offsite reuse of landfill leachate at Hepburn Springs Golf Club	▪ Anecdotal evidence leachate water was/is used for irrigation purposes at the Hepburn Springs Golf Course. Circa 2006 – 2007, an Environmental Improvement Plan (EIP) (Last Waltz Consulting 2006) was created for the purpose of re-use of the leachate water however no documented EPA approval or decision was available. Infrastructure was observed on site including a pump and pipeline from the leachate dam leading north towards the golf course.	▪ Leachate water reuse detail unknown.	▪ The status of leachate water reuse is unknown, meaning evaluation of risks to offsite sensitive receptors including site users at Hepburn Springs Golf Club cannot yet be undertaken.
Landfill gas	▪ There are no records available of landfill gas monitoring or risk assessment ▪ There is no evidence of a landfill gas collection system on site.	▪ No landfill gas risk assessment available. ▪ No aftercare management plan. ▪ No detail on cap maintenance program.	▪ The nature and extent of risk from landfill gas to sensitive receptors is unknown.
Exposure to waste	▪ The former landfill appears to have been covered however no detail on engineering cap was available. ▪ No signage indicating extent or area of former landfill. ▪ Fencing in moderate condition.	▪ Extent of former landfill areas unknown. ▪ No aftercare management plan ▪ Capping across entire extent of landfill unconfirmed ▪ No detail on cap maintenance program.	▪ The nature and extent of risk from exposure to waste is not well characterised.

[4] Inferred from correspondence reviewed from A.S James Geotechnical Engineers and Civil Design drawings of the leachate pond

Risk Aspect	Comments	Information Gaps and Uncertainties	Information Gap Implications of Assessment Outcomes
	▪ Some waste accumulation and spreading across the Site from WTS activities. ▪ EIP noted the Site was rehabilitated to an EPA approved rehabilitation plan following closure in 2004 however no record of the rehabilitation plan was provided.	▪ No WTS environmental management plan ▪ Rehabilitation plan likely developed based on the EIP (Last Waltz Consulting 2006) stating "*The Ajax Road site was rehabilitated to an EPA approved rehabilitation plan following its closure in 2004...*" however no record was provided.	
Fire risk	▪ Outside scope of works	▪ Fire risk assessment as guided by EPA Publication 1825.1.	
General Environmental Duty / regulatory compliance	▪ Pollution Abatement Notice issued 29 August 2018 relating to wind-blown litter beyond the boundary of the premises. PAN revoked on 26 July 2019. ▪ No aftercare management plan for the Site or current environmental management and monitoring plan for the operation of the WTS.	▪ No aftercare management plan. ▪ No WTS environmental management plan.	▪ The level of compliance with the current EPA Permission for the Site, General Environmental Duty and compliance with the BPEM is not well understood.

8 Preliminary conceptual site model

Based on the outcomes of the review of the available information and potential for contamination assessment, a preliminary conceptual site model (CSM) was developed for the Site. The CSM identified the potential contamination sources, transport and exposure pathways, and potential receptors to contamination. A typical cross section of the Site, illustrating potential pathways for contamination pathways and areas where gaps were identified was also developed. The CSM table and figure are presented in the following section.

8.1 Daylesford waste transfer station

Table 8.1 provides an overview of the preliminary CSM and Figure 8.1 provides an overview of an inferred cross section, east to west of the preliminary CSM. For corresponding data gaps, indicated by question marks on the figure, refer to Table 7.1.

Table 8.1: Preliminary conceptual site model – Daylesford waste transfer station

Source	Transport Pathway	Exposure Pathway	Receptors
Former landfill containing various chemicals and/or microbial contamination and current use of the Site as a Waste Transfer Station	Direct contact	▪ Dermal exposure ▪ Incidental ingestion ▪ Inhalation of dust ▪ Uptake by plants	▪ Workers ▪ Site users ▪ Trespassers ▪ Land dependent ecosystems ▪ Biota (including wildlife)
	Airborne dust	▪ Inhalation ▪ Ingestion following deposition on garden produce or pasture	▪ Downwind residents ▪ Workers ▪ Site users ▪ Biota (including wildlife)
	Surface run-off	▪ Ingestion following deposition on soil or in surface water used for food production or grazing ▪ Leaching to surface water and run-off discharging to waterways ▪ Accumulation in aquatic organisms	▪ Downgradient residents ▪ Land dependent ecosystems, including wildlife that obtain their food and water from the on-site leachate dam ▪ Biota (including wildlife)
	Vapour migration	▪ Inhalation of vapours from volatile chemicals that have migrated in the subsurface	▪ Workers ▪ Residents ▪ Site users
	Migration in subsurface - vertical migration through waste and landfill cap	▪ Leaching to groundwater ▪ Ingestion or dermal exposure following groundwater extraction	▪ Groundwater ▪ Groundwater users (including where groundwater is extracted for use on-site and/or livestock watering purposes) ▪ Groundwater dependent ecosystems ▪ Biota (including wildlife)
Leachate pond waters	Direct contact	▪ Direct contact and incidental ingestion	▪ Land dependent ecosystems, including wildlife that obtain their food and water from the on-site leachate dam
	Surface run-off	▪ Direct contact and incidental ingestion	▪ Downgradient residents

Source	Transport Pathway	Exposure Pathway	Receptors
		▪ Leaching to surface water and run-off discharging to waterways ▪ Accumulation in aquatic organisms	▪ Land dependent ecosystems ▪ Biota (including wildlife)
	Migration in subsurface	▪ Leaching to groundwater ▪ Ingestion or dermal exposure following groundwater extraction	▪ Groundwater ▪ Groundwater users (including where groundwater is extracted for use on-site and/or livestock watering purposes) ▪ Groundwater dependent ecosystems ▪ Biota (including wildlife)
	Direct throughput - Irrigation of Hepburn Springs Golf Course	▪ Direct contact and incidental ingestion ▪ Leaching to groundwater ▪ Leaching to surface water and run-off discharging to waterways ▪ Accumulation in aquatic organisms	▪ Users of Hepburn Springs Golf Course ▪ Biota (including wildlife) ▪ Groundwater ▪ Land dependent ecosystems, including wildlife that obtain their food and water from any runoff from Hepburn Springs Golf Course or on irrigated areas

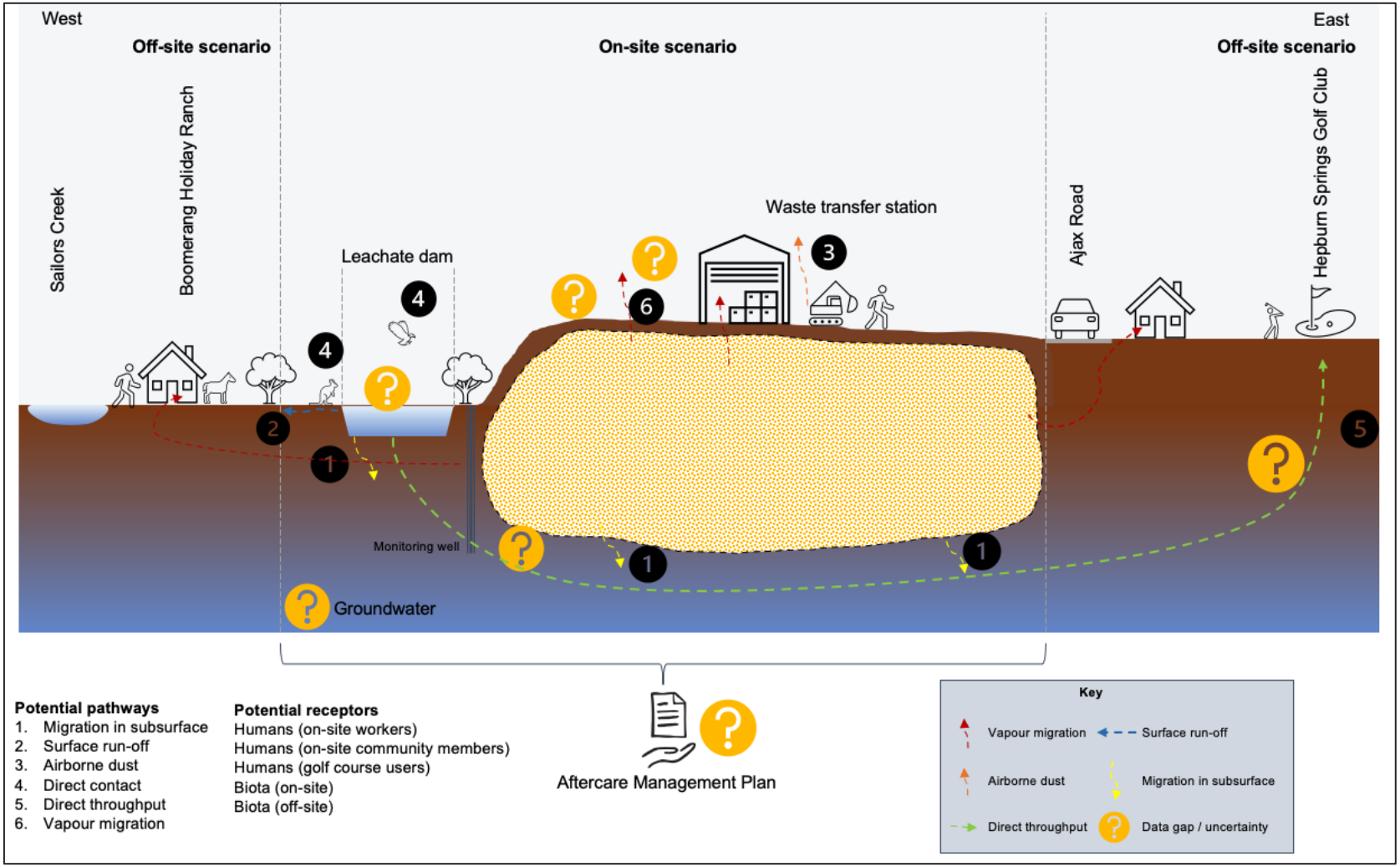


Figure 8.1: Daylesford waste transfer station preliminary CSM

9 Qualitative assessment

Information obtained through desktop reviews, preliminary CSMs, mapping of buffers, and surrounding land use for the Site (refer to Appendix B) fed into a qualitative assessment whereby the contamination, data gaps and uncertainties and planning context was considered. Assessment of contamination risk potential could not reasonably be inferred for the Site, due to key information gaps.

The qualitative assessment summary table in Appendix C captured the following details:

- Site features (e.g. site address, site name, existing and historical site activities)
- Assessment parameters, including:
  - Contamination potential
  - Site management practices (monitoring programs, management plans, audit)
  - Proximity to sensitive receptors (humans, environment heritage)
  - Separation distance envelope details based on separation distances adopted (number of properties within buffer zone, planning zones and corresponding areas)
- Recommended actions should a reduction in separation distances be further contemplated by Council.

Land use conflicts, pressure for redevelopment and rezoning potential were not included within the qualitative assessment and will be further considered separate to this assessment by HSC.

A full copy of the assessment is provided in Appendix C. A summary of the contamination potential and site management assessment is provided in Table 9.1 below.

Table 9.1: Summary of assessment

Site	Contamination Potential			Site Management				
	Information gaps and uncertainties			Monitoring programs			Active after care management	Third party management (audit)
	Groundwater	Surface water	Landfill gas	Ground water	Surface water	Landfill gas	Management plans	
Daylesford WTS	Yes	Yes	Yes	Yes	Yes	No	No	No

10 Discussion and recommendations

Initial steps when determining the application of a BAO are to consider compliance and impacts of operations and the potential for off-site impacts (discussed in Section 3.2.2). PPN92 notes that the 'use' must be compliant with existing regulations and standards relating to off-site impacts, or land use compatibility, including compliance obligations of EPA Permissions and the Landfill BPEM. Filling information gaps and resolving uncertainties with respect to site management practices, should therefore be prioritised before any alternative to published separation distances is considered via the planning process.

Additionally, once the level of information gap is reduced, risk assessment criteria and a risk matrix to reflect HSC's risk appetite and corporate risk profile should be considered. Alternatively, the risk exposure matrix for application of BAO (PPN92) can also be considered which uses consequence criteria based on amenity, human health and safety impacts and is based on the intensity, duration and character of unintended offsite impacts such as odour, dust, noise and landfill gas.

The following discussion is a summation of findings for the Site and recommended next steps. A summary table of recommendations is provided in Table 10.1.

10.1 Daylesford waste transfer station

Daylesford waste transfer station (and former landfill) currently operates under an EPA Registration for waste transfer activities. Documentation was not provided to describe site management practices at Daylesford waste transfer station, for either the current waste transfer operations, or aftercare management of the former landfill. Whilst an Environmental Improvement Plan (EIP) (Last Waltz Consulting, 2006) was developed for the Site, it appears to be drafted for the purpose of reuse of leachate water offsite at the Hepburn Springs Golf Club. The EIP noted that the Site was rehabilitated to an EPA approved rehabilitation plan following closure in 2004, however no record of this rehabilitation plan was available.

Environmental monitoring reportedly occurs at the Site including monitoring of groundwater from four wells located on site, and water quality within the leachate dam, however a documented monitoring program or recent results were not available.

The Site is zoned Public Use – Local Government (PUZ6) and is within proximity to sensitive receptors including residential dwellings and offsite surface water bodies within 100 m of the Site boundary. The GCWWRRG Planning Project (2017) assessed the existing and future risk level of encroachment of residential and sensitive use as high.

The preliminary CSM for the Site, illustrated information gaps and uncertainties relating to the following compliance and impact aspects:

- Extent of former landfill
- Impacts from offsite reuse of landfill leachate
- Impacts to surface water
- Impacts to groundwater from landfill leachate
- Impacts from landfill gas
- Exposure to waste (i.e., rehabilitation and capping)
- Impacts to ambient air (dust, odour)

If the above data gaps and uncertainties are not able to be addressed by locating additional assessments, reports and/or management plans, the development and implementation of a documented aftercare / environmental management plan is recommended. Site-specific actions that could be incorporated into the aftercare / environmental management plan include:

- Maintenance of landfill cap to prevent control erosion, restore depressions and seal and monitor cracks
- Maintain and operate the leachate collection system

- Environmental monitoring and assess impacts to/from:
  - Leachate water
  - Groundwater
  - Surface water
  - Landfill gas
- Ongoing maintenance requirements (e.g. weeds, vermin, surficial waste) for the waste transfer station activities including any specific requirements of the EPA Registration for the Site.

Additionally, the practice of offsite irrigation to the Hepburn Shire Golf Club should be investigated to determine if this is still occurring and if any management controls and/or practices are in place and if this would satisfy applicable EPA guidelines and requirements including the GED.

Determination of compliance and impacts for the Site (step one of the PPN92) should be undertaken concurrently with consideration of planning controls, such as the BAO. As the Site is within proximity to sensitive receptors and existing planning controls may not preclude additional sensitive development at surrounding properties, once compliance and impacts are further understood, a BAO could be progressed.

Table 10.1: Summary of recommendations

Site	Recommendations
Daylesford waste transfer station	▪ Fill data gaps and uncertainties relating to: – Extent of former landfill – Potential impacts from offsite reuse of landfill leachate (at Hepburn Springs Golf Course) – Potential impacts to surface water – Potential impacts to groundwater from landfill leachate – Potential impacts from landfill gas – Potential exposure to waste (i.e. rehabilitation and capping) – Potential impacts to ambient air (dust, odour) ▪ Develop and implement documented aftercare / environmental management plan which should consider and propose management measures where needed to address: – Maintenance of landfill cap to prevent control erosion, restore depressions and seal and monitor cracks – Maintenance and operation of the leachate collection system – Environmental monitoring and assessment of impacts to/from: ◦ Leachate water ◦ Groundwater ◦ Surface water ◦ Landfill Gas – Ongoing maintenance requirements (e.g. weeds, vermin, surficial waste) – Include any specific requirements of the EPA Registration for the Site ▪ Above should be undertaken concurrently with consideration of planning controls, such as the BAO. This should also be supported by an assessment of land use conflicts, pressure for redevelopment and rezoning potential.

11 Conclusions

Historic landfills pose a challenge from a strategic planning perspective, with land use incompatibility and direct conflicts resulting where sensitive uses interface inappropriately. HSC, as a result of its historic landfill ownership and operational legacy and as the current operator of waste transfer stations, is required to identify, assess and regularly review the Site risks in line with the requirements set out by EPA including the GED and the duty to manage contaminated land.

To close out existing data gaps and provide sufficient basis for implementation of planning controls, further actions have been recommended, discussed in Section 10.

Following the review of current and historical activities, available records, previous reports and site inspections an assessment of level of risk of potential for contamination whilst initially proposed, was unable to be conducted due to a number of information gaps. During this assessment, qualitative risks could not be meaningfully assessed, however undertaking the recommended actions to fill information gaps and apply additional management controls, would support subsequent risk assessment activities.

12 References

Legislation

EP Act. *Environment Protection Act 2017*, Victorian Government, Act No. 15 of 2017.

PE Act. *Planning and Environment Act 1987,* Victorian Government, Act No. 45 of 1987.

ERS (2021) Environment Reference Standard, Victorian Government, No. S245.

General References

EPA Publication 1518 (2013) *Recommended Separation Distances for Industrial Residual Air Emissions – Guideline,* Environment Protection Authority Victoria, March 2013

EPA Publication 788.3 (2015) *Siting, design, operation and rehabilitation of landfills (Landfill BPEM),* Environment Protection Authority Victoria, August 2015

EPA Publication 1671 (2018) *Local council self-assessment tool for closed landfill environmental risk,* Environment Protection Authority Victoria, February 2018

EPA Publication 1825 (2021) *Waste and recycling – guide to preventing harm to people and the environment*, Environment Protection Authority Victoria, July 2021.

Grampian Central West Waste and Resource Recovery Group (2018), *Implementation Plan – Land Use Planning Project,* 2018

Grampian Central West Waste and Resource Recovery Group (2019), *Closed Landfill Assessment Report for Hepburn Shire Council,* Grampians Central West Waste & Resource Recovery Group [GCWWRRG], 2019

Ministerial Direction No. 20 *Major Hazard Facilities*, Victorian Government, October 2018

Ministerial Direction No. *1 Potentially Contaminated Land*, Victorian Government, August 2021

Planning Panels Victoria (2021), *Hepburn Planning Scheme Amendment C80hepb Panel Report,* Planning Panels Victoria, February 2021

Planning Practice Note 92, *Managing buffers for land use compatibility*, Department of Environment, Land, Water and Planning (DELWP), March 2021

Planning Practice Note 30, *Potentially Contaminated Land,* Department of Environment, Land, Water and Planning, July 2021

Victoria Unearthed (2022), *Victoria Unearthed,* accessed November 2022.

VVG (2022b), *Visualising Victoria's Groundwater,* Visualising Victoria's Groundwater, accessed November 2022

Site Specific References – Daylesford Waste Transfer Station

Last Waltz Consulting (2006) *Environmental Improvement Plan,* Last Waltz Consulting, December 2006.

Philip Vawdrey Engineering Pty Ltd (2010) *Geotechnical Investigation Proposed Extension to the Waste Sorting Shed*, Philip Vawdrey Engineering Pty Ltd, October 2010

SKM (1998) *Daylesford Municipal Landfill Site, Hydrogeological Assessment*, July 1998.

Thiess (2014) *Daylesford Landfill Sampling,* Thiess, February 2014

Thiess (2014a) *Daylesford Landfill Sampling,* Thiess, May 2014

Thiess (2014b) *Daylesford Landfill Sampling,* Thiess, August 2014

Appendices

A Site photos

Photos from site inspection – Daylesford Waste Transfer Station

Western face of the former landfill, facing south

Western face of former landfill, facing north

Gutter below western face of former landfill	Gutter below western face of former landfill
	
Drain on North Eastern site boundary border, after a period of heavy rain	Eastern fenced site boundary, adjacent to Ajax Road with rubbish evident

Northern area of the former landfill, water pooling after rain

Northern area of the former landfill

Waste Transfer Sheds

Waste Transfer area

B Site map

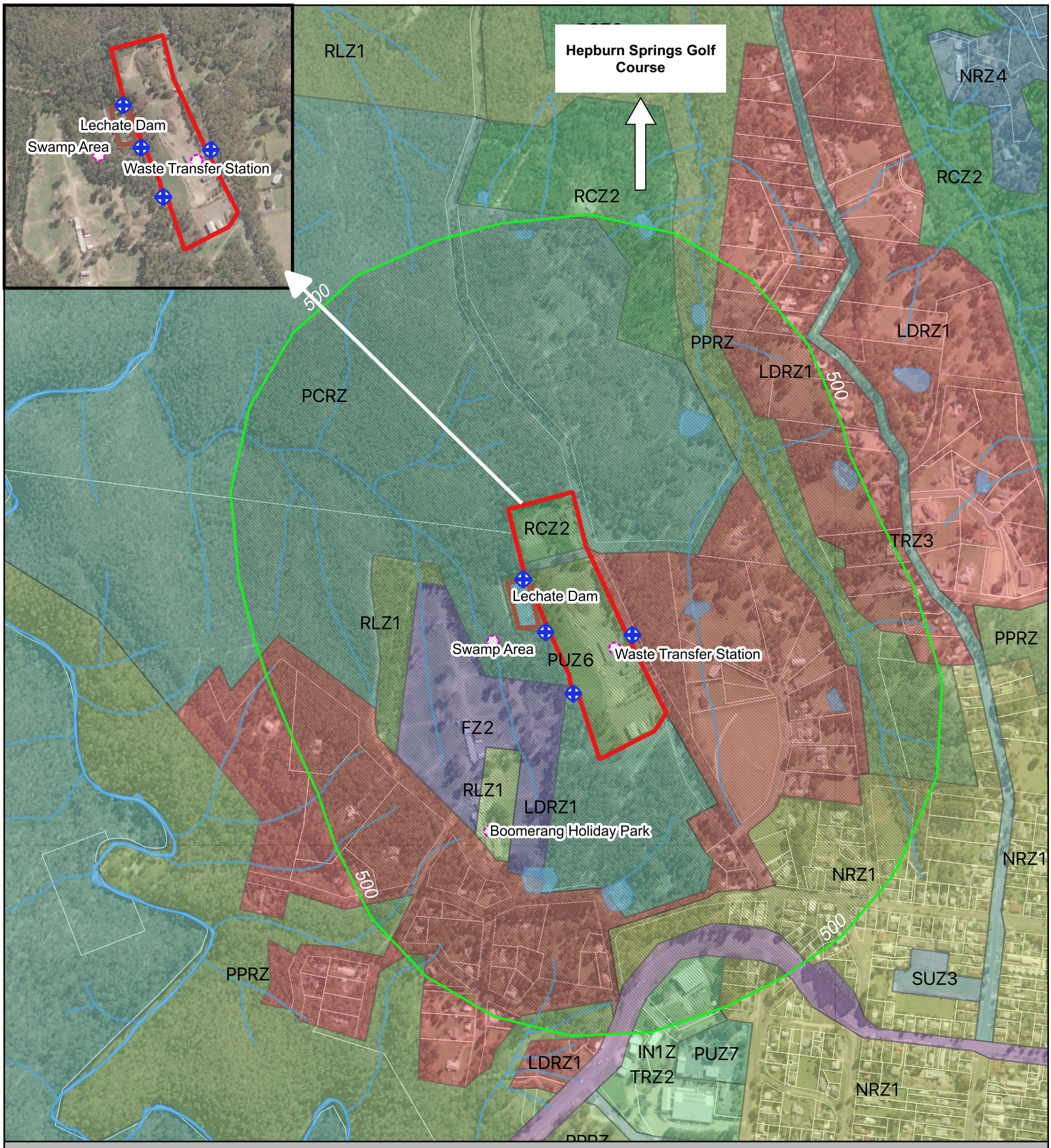


Figure 1 - Daylesford Distance Assessment

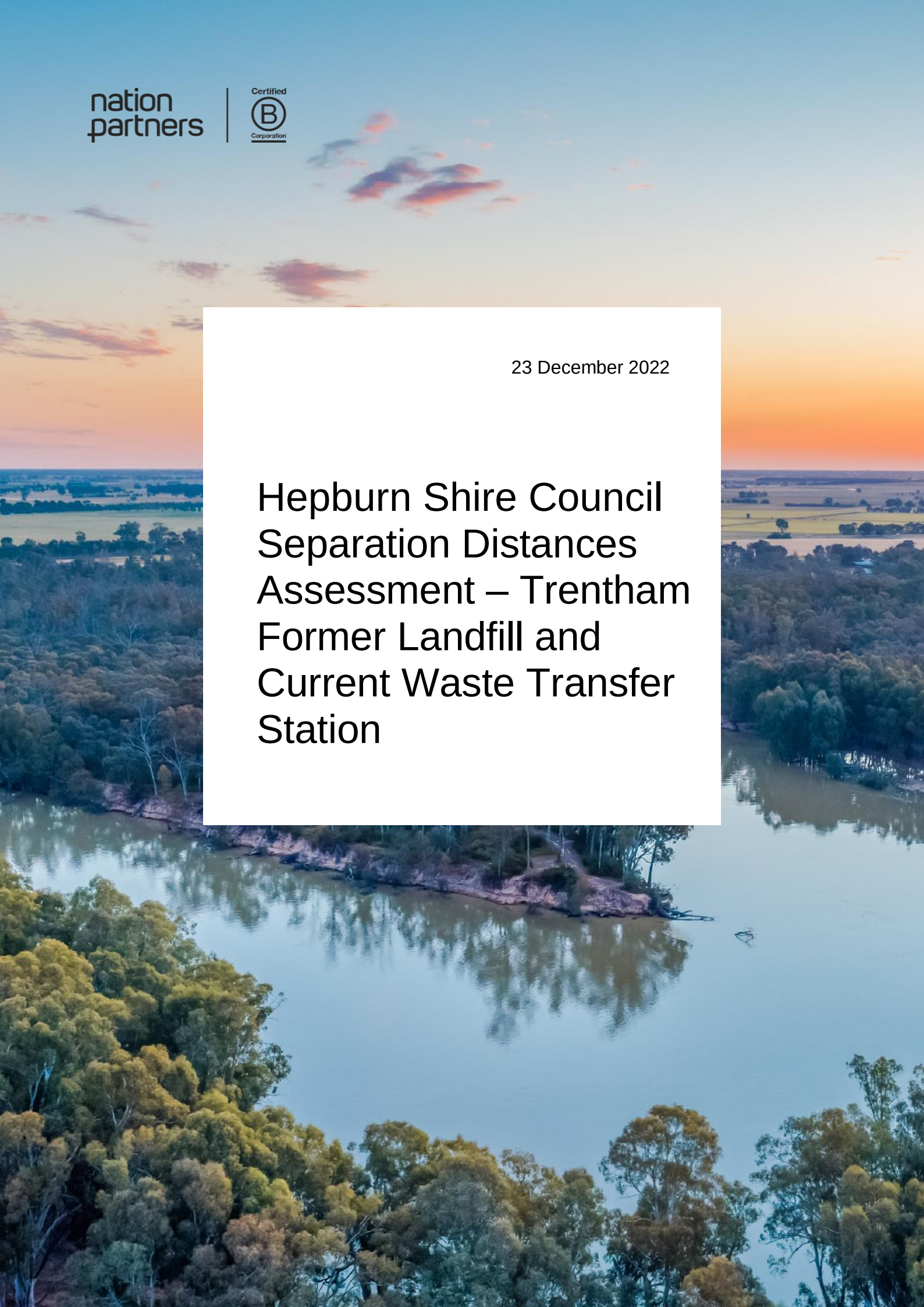
Hepburn Shire Council
Separation Distance Assessment

0 100 200 300 m

- Daylesford Site Boundary
- Landfill BPEM (August 2015) PPN92 Hepburn Shire Council Planning Scheme (March 2021) (500m)
- Property Boundaries
- Bodies of Water
- Boreholes/GW Monitoring Well
- Watercourse

C Qualitative assessment

Submitted electronically – Microsoft Excel file format



23 December 2022

Hepburn Shire Council Separation Distances Assessment – Trentham Former Landfill and Current Waste Transfer Station

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We acknowledge the Traditional Custodians of the land on which we work and live, and recognise their continuing connection to land, water, and community. We pay our respects to Elders past, present and emerging.

Document title
Hepburn Shire Council Separation Distances Assessment – Trentham Former Landfill and Current Waste Transfer Station

Version
1.1

Date
23 December 2022

Prepared by
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Approved by
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File name
NP21232 Separation Distances Assessment - Trentham

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Executive Summary

Hepburn Shire Council (HSC) engaged Nation Partners Pty Ltd (Nation Partners) to undertake a review and qualitative assessment (the Assessment) of key former landfill sites, plus other potentially contaminated sites and sensitive land use interfaces within the Hepburn Shire. The assessment comprised four former landfills managed by HSC in Daylesford, Creswick, Clunes and Trentham. Three of which are active waste transfer stations (Daylesford, Creswick and Trentham). Two sites not managed by HSC were also part in the Assessment, including a Major Hazard Facility (MHF) and a former foundry in Trentham. Each HSC-managed site has a separate report with the site reported herein the: **Trentham former landfill and current waste transfer station (the Site)**.

The Assessment was undertaken as an initial, qualitative step to support HSC in increasing and consolidating its understanding of the Site regarding the associated environmental, amenity and societal risks, thereby informing options and next steps that would support the application of and/or “risk-based” refinement of potential planning controls.

A review of standard separation distances applicable to existing uses at the Site with reference to the requirements of applicable Victorian Environment Protection Authority (EPA) and Department of Environment, Land, Water and Planning (DELWP) guidelines was undertaken and mapped to support visualising the land use and surrounding context for the Site.

Current and historical activities, available records, previous reports and site inspections informed the development of a Preliminary Conceptual Site Model (CSM) for the Site which fed into a high-level qualitative assessment. Whilst an assessment of level of risk of potential for contamination was initially proposed, due to a number of information gaps relating to contamination risk at the Site, the level of risk could not be meaningfully assessed.

The Assessment of the Site found that:

- Information gaps and uncertainties pertaining to contamination potential to groundwater, surface water and from landfill gas were identified and further work is required to understand the status of previous assessments and monitoring programs;
- The Site does not appear to hold or implement a documented aftercare management plan; and
- Closing information gaps and resolving uncertainties with respect to compliance and impacts of current historical landfilling operations, including the potential for offsite impacts, should be undertaken concurrently with consideration of planning controls, such implementing a Buffer Area Overlay (BAO) for the Site.

Details of the specific recommendations are included within the Discussion and Recommendations section of this report.

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1 Introduction

Nation Partners Pty Ltd (Nation Partners) was engaged by Hepburn Shire Council (HSC) to undertake a review and qualitative assessment (the Assessment) of key former landfill sites, plus other potentially contaminated sites (the Sites) and sensitive land use interfaces. The Assessment is intended to inform the implementation of appropriate planning controls to mitigate impacts to the environment and/or the local community from the Sites, within the Shire of Hepburn (the Shire). Each HSC managed site has been reported on separately. The site reported herein is the **Trentham former landfill and active waste transfer station (the Site)**.

1.1 Project objectives

The purpose of the assessment was to:

- Contribute to establishment of the basis for application of relevant planning buffers for the Sites based on existing regulatory context and published guidance;
- Understand the current land use and planning context plus the strategic planning direction that interfaces with each of the Sites; and
- Provide recommendations for additional actions to consider reduction from “baseline” separation distances, should Council wish to consider site-specific controls.

This assessment is an initial, qualitative step to support HSC in increasing and consolidating its understanding of the Sites regarding the associated environmental, amenity and societal risks, thereby informing options and next steps that would support the application of and/or “risk-based” refinement of potential planning controls.

1.2 Project scope

The scope of works included review of available information of six (6) contaminated and potentially contaminated sites, namely: historic landfills; a major hazard facility; and a former foundry, within the Shire, and included the following:

- Desktop review of site information sources, including:
  - Previous studies and reports;
  - Documentation provided by HSC; and
  - Public information held by government and regulatory authorities.
- Site inspections at the historic landfill sites;
- A review of standard separation distances applicable to existing uses at the Sites with reference to the requirements of:
  - *Department of Environment, Land, Water and Planning (DELWP), Managing buffers for land use compatibility, Planning Practice Note* (March 2021)
  - *EPA Publication 788.3 Siting, design, operation and rehabilitation of landfills (Landfill BPEM)* (August 2015)
  - *EPA Publication 1518 Recommended separation distances for industrial residual air emissions (IRAEs)* (March 2013)
  - *Ministerial Direction No. 20 Major Hazard Facilities* (October 2018)
  - *Ministerial Direction No. 1 Potentially Contaminated Land* (August 2021)
- Assessment of data gaps and uncertainties in characterising potential contamination risks, and the corresponding potential risk to receptors;
- Development of preliminary conceptual site models (CSMs) for HSC-managed sites;

- Mapping of land use context, environmental context and separation distances; and
- Preparation of recommended next steps and further investigation, where warranted.

1.3 Limitations of this assessment

- This assessment is based solely on publicly available information, information provided by HSC and site visits conducted by Nation Partners in August 2022.
- No engagement was undertaken with broader stakeholders nor the Regulator(s) – EPA, WorkSafe and Department of Environment Land, Water and Planning (DELWP).
- Nation Partners produces technical and advisory documents in the course of providing its services, which includes this document.
- The contents of this document and any related findings reflect industry practice based on information available to Nation Partners at the time of creation and the scope of services, methodologies, and resources to which this document relates. Nation Partners has also relied upon information provided by the recipient and, except as expressly provided, has not carried out any separate verification of such information provided.
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2 Background

2.1 The Site

The Site is located at 145 Blackwood Road, Trentham, Victoria and is managed by HSC. The Site's location within the Shire is shown in Figure 2.1. Further site identification details are summarised in Section 5.

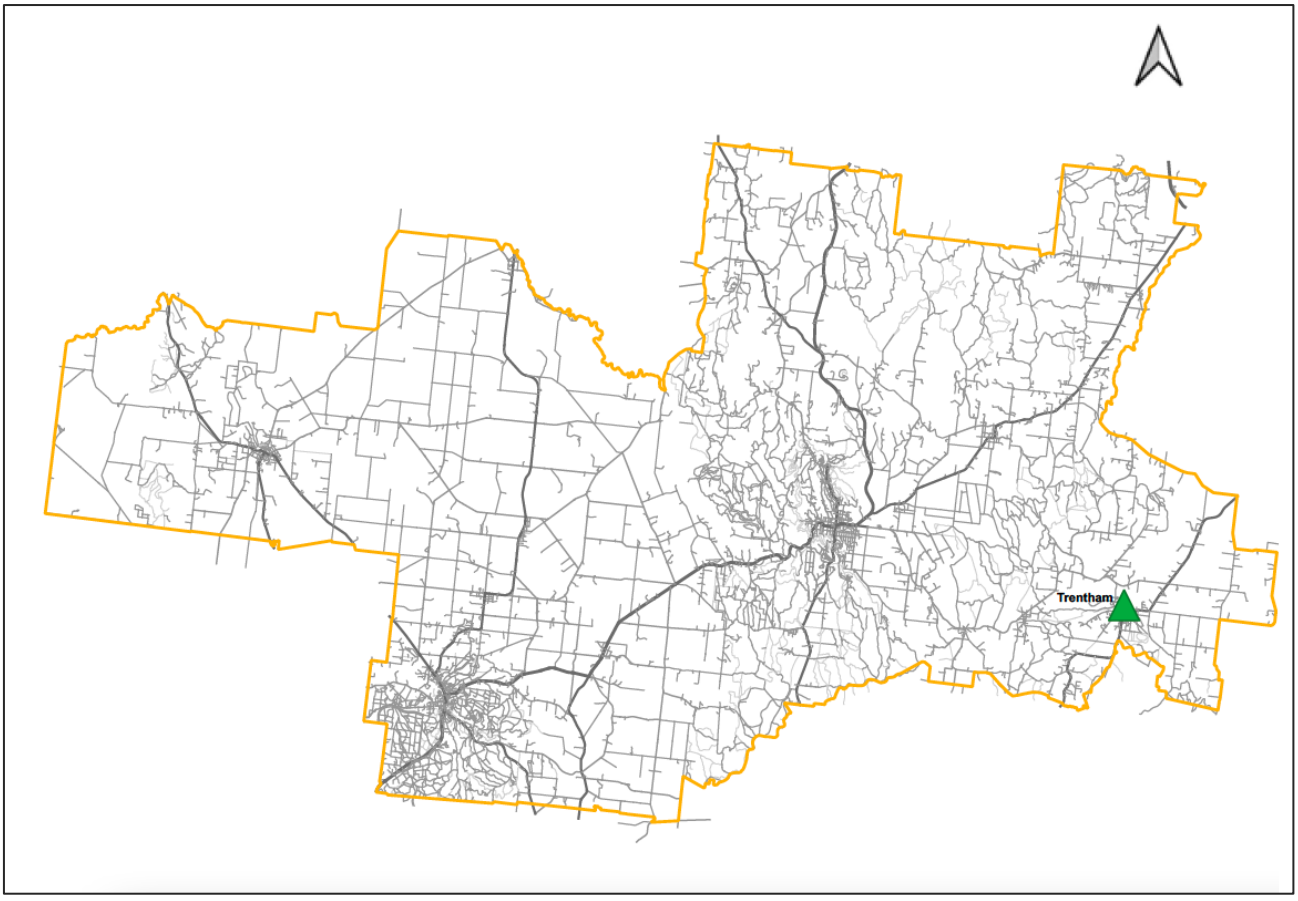

Figure 2.1: Location map of site

2.2 Previous assessments

An assessment of waste and resource recovery facilities in the planning schemes across the Grampians Central West Waste and Resource Recovery Group (GCWWRRG) region was completed in 2018 (*Grampian Central West Waste and Resource Recovery Implementation Plan – Land Use Planning Project,* 2018). The project provided an overview of the statutory and strategic planning framework applicable to resource recovery facilities in the region and provided assessment of risk of encroachment along with recommendations to improve the identification and protection of the facilities in the relevant planning schemes. Trentham waste transfer station was included within the assessment.

The report assessed 'risk of future encroachment' with a general assessment of the degree of risk having regard to zoning, size of allotments and potential for future dwellings or subdivision, pattern of surrounding development, potential for future urban expansion and growth rate of the municipality. The risk was assessed

as either low, medium or high. The report noted that the variation in such indicators was too variable to develop specific quantitative criteria.

Assessment criteria used for assessing existing encroachment is described in Figure 2.2.

Risk	Criteria
Low	• No existing sensitive uses within 500 metres (excluding farmhouse or house on large lot in Farming Zone i.e >5ha); **and** • Low potential for sensitive uses within 500 metres or surrounded by Farming Zone; **and** • No other readily identifiable industrial or commercial use within 500 metres.
Medium	• Small lots in Farming Zone (i.e. <5ha), with or without dwellings **or** • Industrial or commercial buildings within 500 metres; **and** • Low potential for sensitive uses within 500 metres.
High	• Schools, aged care within 500 metres; **or** • Dwellings in an urban zone within 500 metres; **or** • High potential for additional residential uses within 500 metres

Source: Centrum Town Planning, 2017

Figure 2.2: Assessment criteria for assessing existing encroachment Source: *GCWWRRG, 2018*

Following the above assessment, a more targeted assessment of closed landfills within the Shire was completed in 2019 (*Closed Landfill Assessment Report for Hepburn Shire Council,* GCWWRRG, 2019) which included the HSC-managed sites. The assessment was preliminary and limited in nature and provided a qualitative assessment of risks posed by closed landfills in the region in line with EPA Publication 1671: *Local council self-assessment tool for closed landfill environmental risk* (EPA, 2018).

Whilst the assessment included additional risks not encompassed by EPA Publication 1671, several aspects listed in the self-assessment were not undertaken. EPA Publication 1671, and the assessment completed by GCWWRRG, also predate the current Victorian regulatory landscape and the promulgation of the *Environment Protection Act 2017* (EP Act 2017) and *Environment Protection Regulations 2021* (EP Regulations 2021) in particular, which articulate obligations relating to both Duty Holders, plus the comprehensive General Environmental Duty (GED); in addition to the introduction of *Managing buffers for land use compatibility Planning Practice Note 92*, authored by DELWP in 2021.

Some environmental assessment and reports have been completed for the Site and include the following:

- A.S James Pty Ltd (2008) Facsimile No: Density Testing Trentham Landfill, April 2008
- SKM (2006), Trentham Landfill Monitoring Bore Installation, SKM, January 2006.

The above are summarised further in Section 7.

3 Regulatory context

Legislation, policy and guidance relating to both the management of closed landfills and land use planning framework is extensive. The EP Act 2017 and the *Planning and Environment Act* 1987 are the primary legislation that underpins this guidance, with key elements and guiding documents and how they relate to this assessment summarised below.

3.1 Environment protection framework

The EP Act 2017 and the EP Regulations 2021 are the governing Victorian Environment Protection legislation, designed to prevent harm to human health and the environment from pollution and waste including from past activities and incidents. The general environment duty (GED) is at the centre of the EP Act 2017 and is based on the concept of minimising risks of harm to human health and the environment, 'so far as reasonably practicable' (SFARP).

In addition to the GED, the EP Act 2017 establishes a range of duties that apply to those in control or management of contaminated land including the Duty to Manage Contaminated Land (DtM) and the Duty to Notify Contaminated Land (DtN). Where land may be suspected as contaminated, the first priority is to ascertain whether or not there is a duty to manage any risks of harm arising from that contamination to determine if other duties are applicable (such as the DtM and/or DtN). These new provisions may be relevant to former landfills and/or potentially contaminated sites where the requirements of notifiable contamination are met.

In addition to the GED, DtM and other requirements, operation of some sites require permissions from the EPA including sites that receive, store or process waste generated at another site for resource recovery of offsite transfer of disposal. The requirement for a permission and the permission type depends on the amount of waste received in any month or stored on the Site at any time.

To support the waste industry (including operators of transfer stations) in complying with their obligations, EPA released Publication 1825.1 *Waste and recycling – guide to preventing harm to people and the environment* in July 2021. This publication is a key guidance document for environmental management at waste transfer station sites as it provides information on how to meet the GED, DtM and other requirements, as well as assess the risk of harm to the environment and human health.

3.1.1 Environment Reference Standard 2021

The Environmental Reference Standard (ERS) 2021 is subordinate legislation made under the EP Act 2017. The ERS identifies environmental values for the segments of the environment and provides a way to assess those environmental values. The ERS comprises "reference standards" for four aspects of Victoria's environment, referred to as segments of the environment: ambient air, ambient sound, land and water (surface water and groundwater). Each reference standard identifies an environmental value. Most reference standards also have indicators and objectives. By comparing measured or predicted environmental levels of an indicator against its objective, an assessment can be made as to whether an environmental value is being achieved, maintained or threatened, and hence whether "harm" may occur (or be occurring) to that environmental value.

3.1.2 EPA Publication 1518 – Recommended separation distances for industrial residual air emissions (IRAEs)

EPA Publication 1518 identifies recommended minimum separation distances between odour- or dust-emitting industrial land uses and sensitive land uses to mitigate potential impacts of IRAEs on human health wellbeing, local amenity and aesthetic enjoyment, in order to:

- Provide clear direction on which land uses require separation;

- Inform and support strategic land use planning decisions and the consideration of planning permit applications;
- Prevent new sensitive land uses from impacting on existing industrial land uses;
- Prevent new or expanded industrial land uses from impacting on existing sensitive land uses; and
- Identify compatible land uses that can be established within a separation distance area

Variations to the separation distances identified in EPA Publication 1518 can be sought for new use (either industrial or sensitive). In order for a variation to be approved, the new use ('agent of change') is required to provide evidence to the responsible authority that a variation is appropriate.

3.1.3 EPA Publication 788 – Siting, design, operation and rehabilitation of landfills (Landfill BPEM)

EPA Publication 788 sets out the best practice environmental measures (BPEM) for management of landfills, and provides guidelines on how potential impacts of landfills can be mitigated, and the management of rehabilitation of landfills. The BPEM considers buffer distances between landfills and receptors including development around former landfills.

3.1.4 Draft separation distance and buffer EPA Publications

EPA has recently commenced public consultation on two draft guidelines that are relevant to the assessments:

- *Separation distance guideline – EPA Publication 1949 (Draft, December 2022)*
- *Landfill buffer guideline – EPA Publication 1950 (Draft, December 2022)*

These draft guidelines are proposed to support land use and development decisions that protect human health and amenity from the effects of pollution and waste associated with the operation of industry and landfills and to protect industry and landfills from inappropriate development nearby. Once finalised, the guidelines are proposed to be referenced in the Victoria Planning Provisions. The guidelines are predicted to be finalised by mid-2023 and should be considered in the context of the Site's ultimate management and planning context post finalisation.

3.2 Planning policy framework

The *Planning and Environment Act* 1987 provides a legislative basis for the Victoria Planning Provisions (VPP) and sets the legislative framework implementation of state and local planning policy. Key elements of the Planning Scheme support strategic and statutory planning decision making guided by consistency with Policy, Zones, Overlays, Particular Provisions, and General Provisions.

3.2.1 Ministerial Direction No. 1 Potential Contaminated Land

Ministerial Direction No.1 requires that potentially contaminated land is suitable under an amendment to a planning scheme for sensitive land use, agriculture or public open space. A Planning Authority must be satisfied that the environmental conditions of that land are, or will be suitable for the land use.

3.2.2 Ministerial Direction No. 20 Major Hazard Facilities

Ministerial Direction No.20 requires Planning Authorities to seek, and have regard to, the views of WorkSafe Victoria and the Minister for Economic Development when preparing a planning scheme amendment which is within the threshold distance of a MHF. Ministerial Direction No.20 aims to minimise potential human and property exposure from the risk of incidents that may occur at a MHF.

3.2.3 Planning Practice Note 92 Managing Buffers for Land Use Compatibility

Planning Practice Note 92 (PPN92) provides guidance on the requirements of planning provisions which relate to the management of buffers including Clause 53.10 Uses and activities with potential adverse impacts, and Clause 44.08 Buffer Area Overlay (BAO).

The BAO can be used to prevent incompatible use and development or to prevent future encroachment and intensification of incompatible use and development within buffer areas surrounding land uses with potential off-site impacts. The BAO also complements Clause 53.10 by ensuring that land use and development around existing industry is appropriate. Proponents must meet criteria and provide supporting information to apply the BAO.

In accordance with PPN92, there are key steps involved in application of the BAO process, for both operators of sites, Council and relevant authorities. For sites managed by HSC, responsibilities throughout the process are twofold as HSC is both the operator/proponent and the Relevant Authority. The ten steps involved are summarised below and in PPN92 as follows:

1. Consider compliance and impacts
2. Discuss with council and relevant authorities
3. Advise on compliance and potential off-site impacts
4. Prepare assessment
5. Advise on recommendations
6. Discuss implementation
7. Draft schedule(s) informed by evidence base
8. Submit application
9. Planning scheme amendment process
10. Periodic review of BAO application

3.2.4 Planning Practice Note 30 Potentially Contaminated Land

Planning Practice Note 30 (PPN30) provides guidance for planners and applicants on how to identity potentially contaminated land, appropriate level of assessment required depending on the circumstances, appropriate provisions within planning scheme amendments and conditions on planning permits. PPN30 includes a list of land uses that may have potential for contaminating land, of note, Table 2 of PPN30 lists Chemical manufacturing/storage/blending, foundry and landfill sies/waste depots as all having high potential for contamination.

4 Methodology

The Assessment has included the following phases:

- **Existing land uses and site information:** Commencing with a desktop study and site inspection at the Site, key information was collected and reviewed to determine the existing land use context and develop preliminary Conceptual Site Model (CSM) to support the assessment. Information utilised included publicly available information, information contained in the GCWWRRG *Closed Landfill Assessment Report – Hepburn Shire* and records provided by HSC. During the site visit a photographic record and site observations were documented, included in Appendix A.
- **Separation distances:** Relevant EPA guidelines and the Hepburn Planning Scheme were used to establish baseline separation distances between the Site and sensitive land uses. This included a review and consideration of the requirements of:
  - *Department of Environment, Land, Water and Planning (DELWP), Managing buffers for land use compatibility, Planning Practice Note* (March 2021)
  - *Department of Environment, Land, Water and Planning (DELWP), Potentially Contaminated Land, Planning Practice Note 30* (July 2021)
  - *EPA Publication 788.3 Siting, design, operation and rehabilitation of landfills (Landfill BPEM)* (August 2015)
  - *EPA Publication 1518 Recommended separation distances for industrial residual air emissions (IRAEs)* (March 2013)
  - *Environment Protection Regulations 2021*
  - *Ministerial Direction No. 20 Major Hazard Facilities* (October 2018)
  - *Ministerial Direction No. 1 Potentially Contaminated Land* (August 2021)
- **Mapping:** Aerial base maps were used to generate clear maps of the Site and separation distance analysis was undertaken to overlay baseline separation distances. Land use and environmental context analysis was also undertaken and presented in the maps for the Site.
- **Preliminary Conceptual Site Models:** A preliminary CSM was developed for the Site to support consideration of the potential for contamination and identification of possible contamination issues (sources) of relevance, possible exposure pathways and receptors using a source-pathway-receptor model.
- **Assessment of data gaps and uncertainties:** Information gaps relating to contamination risk at the Site, meant the level of risk was not quantitatively assessed. A summary table presenting a comparative description of remaining information gaps was produced relating to contamination potential and site management. Further discussion on this phase is described in Section 9.
- **Workshop:** Following the initial assessment, a workshop was held with HSC to present the work to date and to discuss and incorporate stakeholder feedback into the assessment and the report. HSC was also provided with a proforma to input assessment of redevelopment, rezoning potential and land use conflict to feed into the overall assessment.
- **Recommendations**: Identification of additional assessment and site management requirement, with consideration of the outcomes of the qualitative assessment and regulatory guidance.

5 Site summary

A site visit was undertaken by Nation Partners, accompanied by representatives of HSC, on 19 August 2022. Field notes and photos from the site visit are provided in Appendix A. Site specific observations of note and supporting information obtained through the desktop review are provided in Table 5.1 below.

5.1 Trentham waste transfer station

Table 5.1: Summary of information – Trentham waste transfer station

Item	Description
Crown Land	Yes
Current Occupier	Hepburn Shire Council
Site Address	145 Blackwood Road, Trentham
Standard Parcel Identifier	19~12\PP3649
Site Area	Approximately 2 hectares
Zoning	Public Conservation and Resource
Overlay	ESO1 - Special waters supply catchment protection, BMO – Bushfire Management Overlay
Registered Aboriginal Party	Dja Dja Warrung
Land Use	Waste transfer station, vacant land
EPA Priority Sites Register	No
Groundwater Quality Restricted Use Zones (GQRUZ)	No
EPA Permissions	Hepburn Shire Council currently hold the following EPA Registrations for A13c (Waste and resource recovery – small): R000302226 R000302227 R000302228 From a review of the EPA permissions register, it is unclear which of the above is the Trentham permission however it is noted that the conditions across all registrations are standard.
EPA Victoria List of Completed Environmental Audits	No
Victorian Landfill Register	Yes. The Site is listed on the Victorian Landfill Register.
Nearby Sensitive Receptors	▪ Intermittent creeks, drainage lines within topography commence at southern end of landfill site ▪ Residence approximately 150 m south east of the property boundary ▪ Dam approximately 500 m south east of the property boundary ▪ Dam approximately 300 m north of the property boundary
Groundwater Use Nearby - 250 m	None registered.
Depth to Groundwater	~3 - 12 m Standing Water Level (SWL) (VVG, 2022)
Groundwater Segment (ERS, 2021)	A2 (VVG, 2022)
Historical waste type accepted	Variable including putrescible
Former landfill type (Landfill BPEM 2015)	Type 2 (putrescible waste)
Former landfill operational window	~1964 - 2006
Former landfill lined?	No
Leachate dam lined?	No
Monitoring?	Unknown - no groundwater monitoring records available
Aftercare management plan?	No

6 Separation distance requirements

The Site is subject to recommended default threshold and separation distance requirements under Clause 53.10 – *Uses and activities with potential adverse impacts*, of the Victorian Planning Provisions. These separation distances are mapped for the Site, included in Appendix B. A summary of the relevant guidelines and corresponding separation distance is provided in Table 6.1.

Table 6.1: Separation distance requirements for the Site

Guideline	Separation Distance	Notes
Planning Practice Note 92 / Hepburn Planning Scheme	500 m – Transfer station accepting organic waste	*In order to apply the BAO, the use must be compliant with relevant regulations and standards, such as those of the Environmental Protection Agency Victoria (EPA), WorkSafe and other regulatory authorities.*
Landfill BPEM	500 m – Type 2 former landfill (putrescible)	
Ministerial Direction 1 (PCL)	Not specified	*The application of an Environment Audit Overlay (EAO) should be considered for the Site to manage future development.*

7 Potential for contamination risk considerations

Based on review of the available information, data gaps and the potential for contamination caused by current and historical waste management activities was qualitatively assessed including identification of data gaps. Comments based on data review, data gaps and uncertainties, and their implications, are summarised in the following section.

7.1 Trentham waste transfer station

Table 7.1: Potential for contamination risk considerations – Trentham waste transfer station

Risk Aspect	Comments	Information Gaps and Uncertainties	Information Gap Implications of Assessment Outcomes
Ambient air – odour impacts	▪ No odours observed during site inspection. ▪ HSC staff noted no recent odour complaints have been received by the Council.	▪ Extent of former landfill areas unknown. ▪ No aftercare management plan. ▪ No detail on engineering cap for former landfill. ▪ No detail on cap maintenance program.	▪ The nature and extent of risk of odour, dust and particulate matter impacts is not well characterised.
Ambient air – dust / particulate matter impacts	▪ No dust events observed during site inspection. ▪ Windblown litter observed throughout the Site, close to the WTS operations. ▪ Some areas show evidence of waste material at surface level with evidence of animal burrowing exposing waste material. ▪ Capping soil reportedly sourced locally. ▪ HSC staff noted no recent dust complaints have been received by the Council.		
Surface water – impacts to surface water from runoff	▪ Surface water runoff likely to drain off the former landfill mound towards all boundaries of the Site, with most water likely to drain towards the leachate dam to the east of the Site. ▪ SKM Monitoring Bore Installation Report (2006) noted that leachate collected in the dam is irrigated over the landfill in summer periods. Unknown if this practice still occurs.	▪ Leachate dam level management unknown. ▪ Drainage plan unknown.	▪ The nature and extent of risk of impacts from surface water runoff is not well characterised.
Groundwater – impacts to groundwater from leachate	▪ Former landfill is likely unlined. ▪ No evidence of lining of dam. ▪ Density tests from 2008 (A.S James Pty Ltd) of area surrounding former landfill available however final report not available.	▪ Extent of former landfill areas unknown. ▪ Groundwater monitoring and groundwater quality unknown. ▪ Status of lining of dam unknown. ▪ No aftercare management plan.	▪ The nature and extent of risk of impacts to groundwater from leachate is unknown.

Risk Aspect	Comments	Information Gaps and Uncertainties	Information Gap Implications of Assessment Outcomes
	▪ There are two groundwater monitoring wells onsite (only one sighted during inspection). ▪ Groundwater monitoring frequency unknown and no monitoring records available.		
Landfill gas	▪ There are no records available of landfill gas monitoring or risk assessment ▪ There is no evidence of a landfill gas collection system on site.	▪ No landfill gas risk assessment available. ▪ No aftercare management plan.	▪ The nature and extent of risk from landfill gas to sensitive receptors is unknown.
Exposure to waste	▪ Some areas show evidence of waste material at surface level with evidence of animal burrowing exposing waste material. ▪ No signage indicating extent or area of former landfill. ▪ Fencing in moderate condition. ▪ Some waste accumulation and spreading across the Site from WTS activities.	▪ Extent of former landfill area unknown. ▪ Capping across entire extent of landfill unknown ▪ No aftercare management plan ▪ No WTS environmental management plan	▪ The nature and extent of risk from exposure to waste is not well characterised.
Fire risk	▪ Outside scope of work. (Site within a Bushfire Management Overlay (BMO))	▪ Fire risk assessment as guided by EPA Publication 1825.1.	
General Environmental Duty / regulatory compliance	▪ Waste oil tank not stored within a bunded area ▪ Leachate dam contains waste drums, tyres ▪ Drum of solvent observed to be stored on bare ground near waste oil tank ▪ Some waste accumulation and spreading across the Site from WTS activities. ▪ No aftercare management plan for the Site or current environmental management and monitoring plan for the operation of the WTS.	▪ No aftercare management plan. ▪ No WTS environmental management plan.	▪ The level of compliance with the General Environmental Duty and compliance with the BPEM is not well understood.

8 Preliminary conceptual site models

Based on the outcomes of the on review of the available information and potential for contamination assessment, a preliminary conceptual site model (CSM) was developed for the Site. The CSM identified the potential contamination sources, transport and exposure pathways, and potential receptors to contamination. A typical cross section of the Site, illustrating potential pathways for contamination pathways and areas where gaps were identified was also developed. The CSM table and figure are presented in the following section.

8.1 Trentham waste transfer station

Table 8.1 provides an overview of the preliminary CSM and Figure 8.1 provides an overview of an inferred cross section, east to west of the preliminary CSM. For corresponding data gaps, indicated by question marks on the figure, refer to Table 5.1.

Table 8.1: Preliminary conceptual site model – Trentham waste transfer station

Source	Transport Pathway	Exposure Pathway	Receptors
Former landfill containing various chemicals and/or microbial contamination and current use of the Site as a Waste Transfer Station	Direct contact	▪ Dermal exposure ▪ Incidental ingestion ▪ Inhalation of dust ▪ Uptake by plants	▪ Workers ▪ Site users ▪ Trespassers ▪ Land dependent ecosystems
	Airborne dust	▪ Inhalation ▪ Ingestion following deposition on garden produce or pasture	▪ Downwind residents ▪ Workers ▪ Site users ▪ Biota (including wildlife)
	Surface run-off	▪ Ingestion following deposition on soil or in surface water used for food production or grazing ▪ Leaching to surface water and run-off discharging to waterways ▪ Accumulation in aquatic organisms	▪ Downgradient residents ▪ Land dependent ecosystems ▪ Biota (including wildlife)
	Vapour migration	▪ Inhalation of vapours from volatile chemicals that have migrated in the subsurface	▪ Workers ▪ Residents ▪ Site users
	Migration in subsurface - vertical migration through waste and landfill cap	▪ Leaching to groundwater ▪ Ingestion or dermal exposure following groundwater extraction	▪ Groundwater ▪ Groundwater users (including where groundwater is extracted for use on-site and/or livestock watering purposes) ▪ Groundwater dependent ecosystems ▪ Biota (including wildlife)
Leachate pond	Direct contact	▪ Direct contact and incidental ingestion	▪ Land dependent ecosystems, including wildlife that obtain their food and water from the on-site leachate dam

Source	Transport Pathway	Exposure Pathway	Receptors
	Surface run-off	▪ Direct contact and incidental ingestion ▪ Leaching to surface water and run-off discharging to waterways ▪ Accumulation in aquatic organisms	▪ Downgradient residents ▪ Land dependent ecosystems ▪ Biota (including wildlife)
	Migration in subsurface	▪ Leaching to groundwater ▪ Ingestion or dermal exposure following groundwater extraction	▪ Groundwater ▪ Groundwater users (including where groundwater is extracted for use on-site and/or livestock watering purposes) ▪ Groundwater dependent ecosystems ▪ Biota (including wildlife)

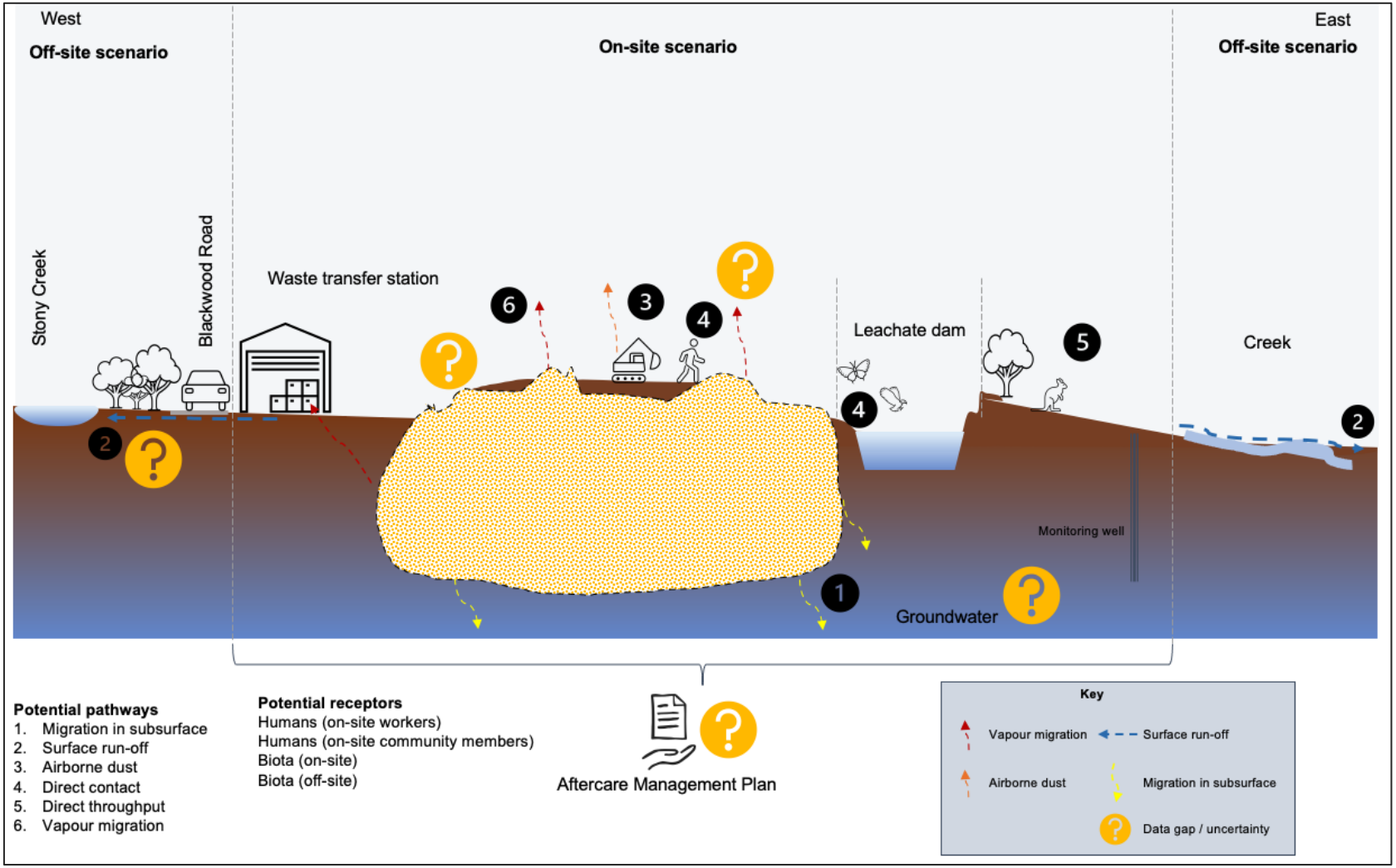

Figure 8.1: Trentham waste transfer station preliminary CSM

9 Qualitative assessment

Information obtained through desktop reviews, preliminary CSMs, mapping of buffers, and surrounding land use for the Site (refer to Appendix B) fed into a qualitative assessment whereby the contamination, data gaps and uncertainties and planning context was considered. Assessment of contamination risk potential could not reasonably be inferred for the Site, due to key information gaps.

The qualitative assessment summary table in Appendix C captured the following details:

- Site features (e.g. site address, site name, existing and historical site activities)
- Assessment parameters, including:
  - Contamination potential
  - Site management practices (monitoring programs, management plans, audit)
  - Proximity to sensitive receptors (humans, environment heritage)
  - Separation distance envelope details based on separation distances adopted (number of properties within buffer zone, planning zones and corresponding areas)
- Recommended actions should a reduction in separation distances be further contemplated by Council.

Land use conflicts, pressure for redevelopment and rezoning potential were not included within the qualitative assessment and will be further considered separate to this assessment by HSC.

A full copy of the assessment is provided in Appendix C. A summary of the contamination potential and site management assessment is provided in Table 9.1 below.

Table 9.1: Summary of assessment

Site	Contamination Potential			Site Management				
	Information gaps and uncertainties			Monitoring programs			Active aftercare management	Third party management (audit)
	Groundwater	Surface water	Landfill gas	Ground water	Surface water	Landfill gas	Management plans	
Trentham WTS	Yes	Yes	Yes	No	No	No	No	No

10 Discussion and recommendations

Initial steps when determining the application of a BAO are to consider compliance and impacts of operations and the potential for off-site impacts (discussed in Section 3.2.3). PPN92 notes that the 'use' must be compliant with existing regulations and standards relating to off-site impacts, or land use compatibility, including compliance obligations of EPA Permissions and the Landfill BPEM. Filling information gaps and resolving uncertainties with respect to site management practices, should therefore be prioritised before any alternative to published separation distances is considered via the planning process.

Additionally, once the level of information gap is reduced, risk assessment criteria and a risk matrix to reflect HSC's risk appetite and corporate risk profile should be considered. Alternatively, the risk exposure matrix for application of BAO (PPN92) can also be considered which uses consequence criteria based on amenity, human health and safety impacts and is based on the intensity, duration and character of unintended offsite impacts such as odour, dust, noise and landfill gas.

The following discussion is a summation of findings for the Site and recommended next steps. A summary table of recommendations is provided in Table 10.1.

10.1 Trentham waste transfer station

Trentham waste transfer station (and former landfill) currently operates under an EPA Registration for waste transfer activities. Documentation was not provided to describe site management practices, for either current waste transfer practices or aftercare management of the former landfill.

Whilst there are reportedly two groundwater monitoring wells onsite (one was visible at the time of the inspection), it is not clear if these are monitored and if any hydrogeological assessments have been undertaken for the Site.

The Site is zoned as Public Conservation and Resource (PCR) and is within proximity to offsite water bodies, however there are no existing dwellings within 100 m of the Site. The GCWWRRG Planning Project assessed the level of existing and future encroachment as low.

The preliminary CSM for the Site, illustrated a number of information gaps and uncertainties relating to the following compliance and impact aspects:

- Extent of former landfill
- Impacts from reuse of landfill leachate (onsite)
- Impacts to surface water
- Impacts to groundwater from landfill leachate
- Impacts from landfill gas
- Exposure to waste (i.e., rehabilitation and capping)
- Impacts to ambient air (dust, odour)

If the above data gaps and uncertainties are not able to be addressed by locating additional assessments, reports and/or management plans, the development and implementation of a documented aftercare / environmental management plan is recommended. Site-specific actions that could be incorporated into the aftercare / environmental management plan include:

- Maintenance of landfill cap to prevent control erosion, restore depressions and seal and monitor cracks
- Maintain and operate the leachate collection system
- Environmental monitoring and assessment impacts to/from:
  - Leachate water
  - Groundwater
  - Surface water

  - Landfill gas
- Ongoing maintenance requirements (e.g. weed, vermin, surficial waste) for the waste transfer station activities including any specific requirements of the EPA Registration for the Site.

Determination of compliance and impacts for the Site (step one of the PPN92) should be undertaken concurrently with consideration of planning controls, such as the BAO.

Table 10.1: Summary of recommendations

Site	Recommendations
Trentham waste transfer station	• Fill data gaps and uncertainties relating to: – Extent of former landfill – Potential impacts from reuse of landfill leachate (onsite) – Potential impacts to surface water – Potential impacts to groundwater from landfill leachate – Potential impacts from landfill gas – Potential exposure to waste (.e. rehabilitation and capping) – Potential impacts to ambient air (dust, odour) • Develop and implement documented aftercare / environmental management plan which should consider and propose management measures where needed to address: – Maintenance of landfill cap to prevent and control erosion, restore depressions and seal and monitor cracks – Maintenance and operation of the leachate collection system – Environmental monitoring and assessment of impacts to/from: ◦ Leachate water ◦ Groundwater ◦ Surface water ◦ Landfill gas • Above should be undertaken concurrently with consideration of planning controls, such as the BAO. This should also be supported by an assessment of land use conflicts, pressure for redevelopment and rezoning potential.

11 Conclusions

Historic landfills and other potentially, or actually contaminated sites pose a challenge from a strategic planning perspective, with land use incompatibility and direct conflicts resulting where sensitive uses interface inappropriately. HSC as a result of its historic landfill ownership and operational legacy and as the current operator of waste transfer stations is required to identify, assess and regularly review Site risks in line with the requirements set out by EPA including the GED and the duty to manage contaminated land.

To close out existing data gaps and provide sufficient basis for implementation of planning controls, further actions have been recommended, discussed in Section 10.

Following the review of current and historical activities, available records, previous reports and site inspections an assessment of level of risk of potential for contamination whilst initially proposed, was unable to be conducted due to a number of information gaps. During this assessment, qualitative risks could not be meaningfully assessed, however undertaking the recommended actions to fill information gaps and apply additional management controls, would support subsequent risk assessment activities.

12 References

Legislation

EP Act. *Environment Protection Act 2017*, Victorian Government, Act No. 15 of 2017.

PE Act. *Planning and Environment Act 1987,* Victorian Government, Act No. 45 of 1987.

ERS (2021) Environment Reference Standard, Victorian Government, No. S245.

General References

EPA Publication 1518 (2013) *Recommended Separation Distances for Industrial Residual Air Emissions – Guideline,* Environment Protection Authority Victoria, March 2013

EPA Publication 788.3 (2015) *Siting, design, operation and rehabilitation of landfills (Landfill BPEM),* Environment Protection Authority Victoria, August 2015

EPA Publication 1671 (2018) *Local council self-assessment tool for closed landfill environmental risk,* Environment Protection Authority Victoria, February 2018

EPA Publication 1825 (2021) *Waste and recycling – guide to preventing harm to people and the environment*, Environment Protection Authority Victoria, July 2021.

Grampian Central West Waste and Resource Recovery Group (2018), *Implementation Plan – Land Use Planning Project,* 2018

Grampian Central West Waste and Resource Recovery Group (2019), *Closed Landfill Assessment Report for Hepburn Shire Council,* Grampians Central West Waste & Resource Recovery Group [GCWWRRG], 2019

Ministerial Direction No. 20 *Major Hazard Facilities*, Victorian Government, October 2018

Ministerial Direction No. *1 Potentially Contaminated Land*, Victorian Government, August 2021

Planning Panels Victoria (2021), *Hepburn Planning Scheme Amendment C80hepb Panel Report,* Planning Panels Victoria, February 2021

Planning Practice Note 92, *Managing buffers for land use compatibility*, Department of Environment, Land, Water and Planning (DELWP), March 2021

Planning Practice Note 30, *Potentially Contaminated Land,* Department of Environment, Land, Water and Planning, July 2021

Victoria Unearthed (2022), *Victoria Unearthed,* accessed November 2022.

VVG (2022b), *Visualising Victoria's Groundwater,* Visualising Victoria's Groundwater, accessed November 2022

Site Specific References – Trentham Waste Transfer Station

A.S James Pty Ltd (2008) *Facsimile No: Density Testing Trentham Landfill,* April 2008

SKM (2006), *Trentham Landfill Monitoring Bore Installation,* SKM, January 2006

Appendices

A Site photos

Photos of site inspection – Trentham Waste Transfer Station

Looking north east towards the former landfill

Looking south towards the waste transfer station

Looking north east towards the former landfill

Waste transfer shed

Water pooling near rainwater tank

Waste oil area (un bunded)

Eastern boundary with rubbish material

Leachate dam

Waste within leachate dam

Evidence of animal burrowing within landfill cap

Western fence boundary with evidence of water pooling after heavy rain

Western fence boundary with rubbish

Northern face of former landfill mound

Evidence of animal burrowing under site boundary fence

Former landfill area

North east boundary

B Site maps

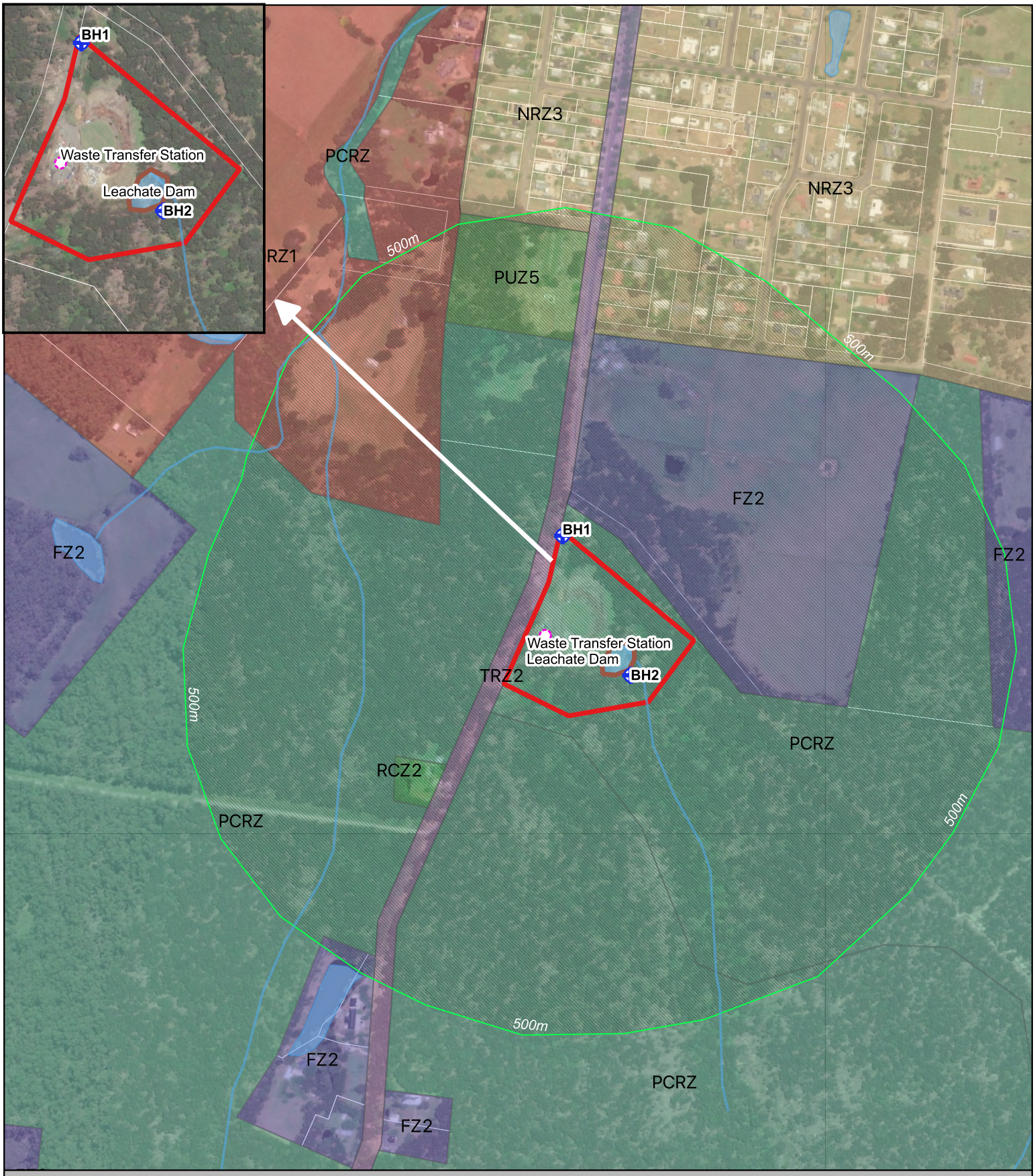

Figure 4 - Trentham Distance Assessment

Hepburn Shire Council
Separation Distance Assessment

0 100 200 300 m

- Trentham Site Boundary
- Landfill BPEM (August 2015)
  PPN92 Hepburn Shire Council Planning Scheme (March 2021)
  (500m)
- Bodies of Water
- Property Boundaries
- Boreholes/GW Monitoring Well
- Watercourse

C Qualitative assessment

Submitted electronically – Microsoft Excel file format