

8 Chimneys Lagoon (#8)

Wetland Health Score:

56/ 100

N.B. - This number is an unweighted addition of the variables that make up the adjacent condition rose to give an assessment out of a possible 100 points. These variables represent the current condition and natural values recorded historically and during the current survey. Due to the different levels of survey undertaken at each site, this score should not be used as a comparative value between wetlands.

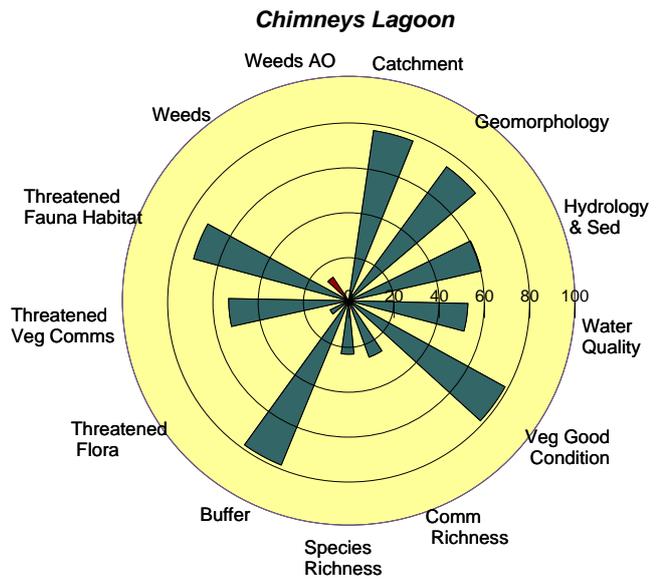
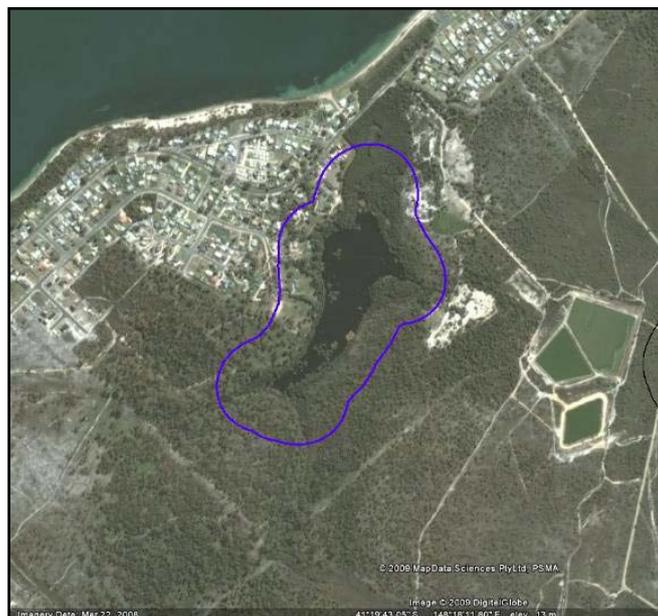


Photo 8.13. Chimneys Lagoon looking in to *Melaleuca ericifolia* swamp forest.



Photo 8.2. Google Earth aerial photo of Chimneys Lagoon study area.



8.1 Introduction

Chimneys Lagoon is comprised of one small lagoon which is 4.3ha in surface area. Including the 100m buffer around it, it equates to an area of approximately 23.6ha.

8.2 Geomorphology

8.2.1 Setting

Chimneys Lagoon is situated on the western side of the St Helens Peninsula, approximately 1 km west of the southern end of Windmill Lagoon. Unlike the coastal lagoons, Chimneys has a catchment area of approximately 2.5 km², with a well defined drainage system which enters the lagoon from the south. The catchment is bounded on the north and east by the rise which creates the western boundary of the Moriarty – Windmill lagoons and consists of non-marine Tertiary sediments. The southern side of the lagoon is created by granitic hills which outcrop as cliffs along St Helens Point Rd. The southern extent of the catchment extends to the Parkside Lagoon and Onion Creek catchments.

The mouth of Chimneys Lagoon has been modified by construction of St Helens Point Road and is now confined to small culverts. Based on aerial photos, the natural mouth of the lagoon appears to have occupied the adjacent beach area, and was probably intermittently connected to Georges Bay. It is plausible that the large vegetated swampy area between the road and the open water of the lagoon has been created since road construction due to through infilling. Restricted outflow from the lagoon now occurs via an under road culvert and overgrown channel. Water level in the lagoon is controlled by the level of the outlet, which probably leads to more stable water levels as compared to pre-road conditions.

The coast of Georges Bay south of Chimney Lagoon has been significantly modified and is of low conservation value. The beach and coastal heath north of the mouth is less modified and of high conservation value. Recent catchment clearing has occurred in the Parnella Heights.

8.2.2 Local processes

Water and sediment inflow from the catchment and the internal production and retention of organic matter are the predominant geomorphic process occurring in Chimneys Lagoon. The restricted outflow from the lagoon prevents transport of these materials out of the lagoon, leading to infilling of the lagoon.

8.3 Hydrology and sediments

Hydrologically the lagoon is fed via surface water and ground water inflow, with direct precipitation a lesser source due to the relatively large size of the catchment compare to area of the lagoon. Clearing of the catchment associated with existing and future housing developments and other works has likely increased sediment loads to the water body.

Sediments entering the lagoon include sands from the catchment, runoff from the surrounding developed area and the internal production of organic matter. The organic input leads to soft organic rich sediments present in much of the lagoon.

All of this material is effectively trapped within Chimneys Lagoon due to the restricted and highly modified outlet.

8.4 Water quality

Water entering the lagoon is likely to vary in water quality, from high quality natural runoff from the creeks to poor quality runoff from the surrounding residential development and adjacent roads. The proximity of the sewage treatment pond also poses a risk of leachate or spills entering the lagoon. The lack of flushing of the lagoon combined with possibly nutrient rich inflows leads to stagnation and promotes algal growth, as was apparent in August 2009 following an extended period of rain.

Water in the lagoon is brown, organic rich with low turbidity. The water is acidic (pH 5.5 on day of investigation) and fresh, with a salinity of <0.2 ppt. Upon disturbance of the organic rich sediments in the bed of the lagoon, turbidity increases for an extended period due to the very fine-grained nature of the organic muck.

Rubbish and garden clippings were present within and along the margin of the lagoon which can also affect water quality.

8.5 Geomorphology, hydrology and water quality condition

The present condition of Chimney Lagoon is moderate however the water body is at high risk due to ongoing and potentially increased development in the catchment. The conditions rose shows lower scores than contained in CFEV due to the poor flushing, poor water quality and increased sedimentation occurring in the lagoon.



Photo 8.3. Left - Stagnant water near outlet of Chimney Lagoon showing algal growth

Photo 8.4. Right - Culvert at outflow of Chimney Lagoon.

8.6 Flora and Fauna

8.6.1 Overview

The Chimneys Lagoon study area covers approximately 23.6 hectares, with 83% of the vegetation communities being native. A total of four native vegetation communities were recorded, covering a low variety of habitats including forest woodland and swamp forest. All of the native vegetation communities were in very good condition.

The most abundant vegetation community in the Chimneys Lagoon is *Melaleuca ericifolia* swamp forest (NME), which covers almost one third of the study area. The wetland component of Chimneys Lagoon covers 4.3ha or almost 20% of the study area, and it is made up of Water, sea (OAQ). The wetland component was comprehensively inundated at the time of this survey.

Immediately surrounding the wetland area there is an ecotone between the lower lying wetland area, and the higher ground that rises out of the wetland. The ecotone is comprised of wetter soils than the higher ground, and is dominated by *Melaleuca ericifolia* swamp forest (NME). Beyond this zone on the higher ground the vegetation is dominated by drier forest and woodland communities, being dominated by *Eucalyptus amygdalina* coastal forest and woodland (DAC), Urban areas (FUR) and *Allocasuarina littoralis* forest (NAL). Smaller patches of other anthropogenic vegetation communities also occur in parts of the study area.

The study area incorporates a 100m buffer surrounding the wetland portion of Chimneys Lagoon. This buffer area occupies 19.2ha of which approximately 79% is native vegetation, with the remainder being urban areas and other urban infrastructure. This relatively high proportion of native vegetation within the buffer area assists in protecting the wetland vegetation and in filtering and maintaining the quality of the water that enters, although the urban development that is occurring and has occurred in the past has the potential to negatively impact on the water quality within Chimneys Lagoon.



Photo 8.3. Left - *Melaleuca ericifolia* swamp forest (NME).

Photo 8.4. Right - *Allocasuarina littoralis* forest (NAL).

8.6.2 Vegetation Condition

The majority of the vegetation communities within Chimneys Lagoon are in an excellent condition overall with 79% of them being at Condition Level 1. This condition level is characterised by no or very low levels of weed invasion, with the vegetation being structurally and floristically intact. Condition Level 2 and 3 were not recorded in the study area. Condition Level 4 comprised 21% of the study area, and is made up of urban areas and other urban infrastructure, where the native vegetation areas have been destroyed or the natural values have been grossly altered. See Table 8.1 below for details.

Table 8.1 – Vegetation Condition within the study area.

Condition	Condition Description	Area (ha)	% of study area
1	Vegetation structurally and floristically intact and weed invasion less than 1% cover	15.2	79.0
2	Vegetation structurally and floristically altered and/or weed invasion > 1% and < 10% cover	0	0
3	Vegetation structurally and floristically altered and weed invasion > 10% and < 50% cover	0	0
4	Grossly altered vegetation structure in otherwise weed infested vegetation (> 50% weeds cover)	4.0	21.0
Total		18.9	100.0

8.6.3 Vegetation Community Richness

Of the six vegetation communities recorded in the study area four are native, with the remaining two being anthropogenic communities. At Chimneys Lagoon the most common vegetation community is *Melaleuca ericifolia* swamp forest (NME), followed by *Eucalyptus amygdalina* coastal forest and woodland (DAC), Urban areas (FUR) and *Allocasuarina littoralis* forest (NAL).

Of the native vegetation communities recorded two are considered to be threatened under the Tasmanian *Nature Conservation Act 2002*. They are *Melaleuca ericifolia* swamp forest (NME) and *Allocasuarina littoralis* forest (NAL). Together they cover 53% of the vegetated area (excluding open water/sea (OAQ)). Full details of vegetation communities recorded, their threatened status and their condition is provided below in Table 8.2, and their distribution is shown in Figure 8. Full species lists for each vegetation community are provided in Appendix 14.

Table 8.2 – Vegetation Communities recorded in the study area, including their conservation priority, reservation status and condition.

Veg Code ⁴¹	Vegetation Community Description	Area (ha)	State-wide Conservation Priority and Reservation Status ^{42 43}	Bioregional Conservation Priority and Reservation Status ^{2 3}	Condition
DAC	Eucalyptus amygdalina coastal forest and woodland	5.0	Not threatened	Not threatened	1
FUM	Extra-urban miscellaneous	0.7	-	-	4
FUR	Urban areas	3.4	-	-	4
NAL	Allocasuarina littoralis forest	2.8	Threatened and inadequately reserved	Threatened and inadequately reserved	1
NME	Melaleuca ericifolia swamp forest	7.4	Threatened and inadequately reserved	Threatened and inadequately reserved	1
OAQ	Water, sea	4.3	-	-	1
	Total Area (ha)	23.6			

8.6.4 Flora Species Richness

A total of 44 flora species were recorded within the study area. Of these 40 were native, with the remaining four being weed species. A full species list for Chimneys Lagoon is included in Appendix 13.

⁴¹ As per Tasveg 2.0 Vegetation Classification System, DPIPW

⁴² Nature Conservation Act 2002

⁴³ FCF 2007. Note there is no recent analysis of reservation status of non forest communities

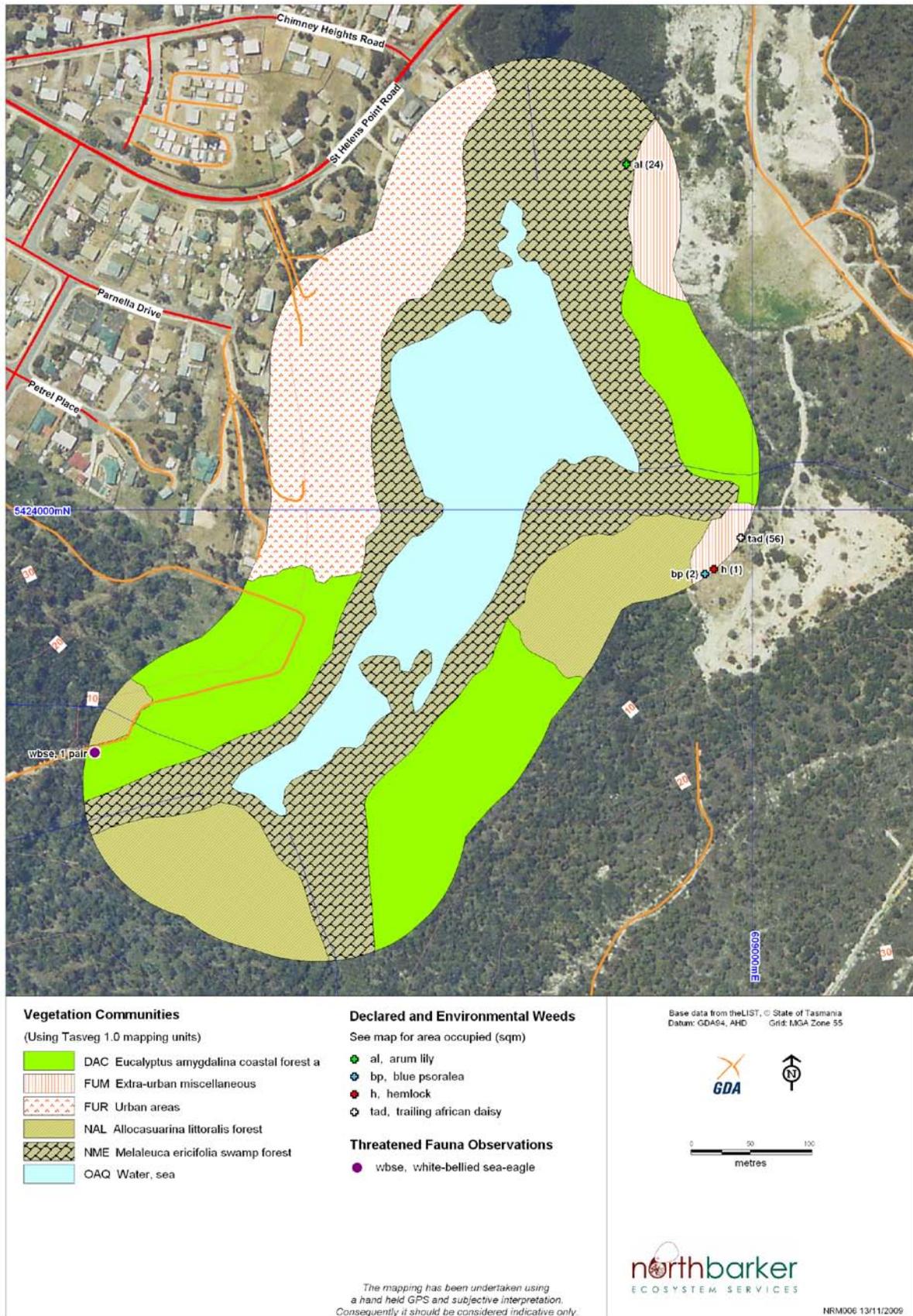


Figure 8 – Vegetation Communities, Weeds and Threatened Fauna for Chimneys Lagoon

8.6.5 Threatened Flora

One flora species listed under either the Tasmanian *Threatened Species Protection Act 1995* (TSPA) or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) has been recorded within the study area. The one flora species was previously recorded within the study area⁴⁴, with no additional species being recorded during the current survey. All species of conservation significance recorded within the study area are listed in Table 8.3.

Table 8.3 – Flora species of conservation significance within the study area. Records are historical records from the Natural Values Atlas and records found during this survey.

Species	Status ⁴⁵ TSPA/EPBCA	Recorded this survey ⁴⁶
<i>Pterostylis grandiflora</i> (superb greenhood)	r/-	-

8.6.6 Threatened Fauna

One fauna species listed under either the Tasmanian *Threatened Species Protection Act 1995* (TSPA) or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) has been recorded within the study area. No fauna species were previously recorded within the study area¹⁴. One threatened fauna species, the White-bellied Sea-Eagle (*Haliaeetus leucogaster*) was recorded during the current survey. A pair of these birds were seen flying overhead and also perched at the top of a large, old *Eucalyptus globulus* (Tasmanian Blue Gum) tree. See figure 8 for the location of this sighting. The presence of this species indicates that the land/ water in the area is probably productive in terms of hunting prey species. All species of conservation significance recorded within the study area are listed in Table 8.4.



Photo 8.5. White-bellied Sea-Eagle (*Haliaeetus leucogaster*) in *Eucalyptus globulus* tree.

⁴⁴ Natural Values Atlas, DPIPW

⁴⁵ TSPA - Tasmanian *Threatened Species Protection Act 1995*; EPBCA - Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

⁴⁶ Threatened species that were not recorded during the current survey are likely to still be present at this site. Seasonal and survey limitations are likely to be responsible for some threatened species not being recorded during the current survey.

Table 8.4 – Fauna species of conservation significance within the study area. Records are historical records from the Natural Values Atlas and records found during this survey.

Species	Status ⁴⁷ TSPA/EPBCA	Recorded this survey ⁴⁸
White-bellied Sea-Eagle (<i>Haliaeetus leucogaster</i>)	(v/-)	-

8.6.7 Fauna Habitat Value

The vegetation of the study area provides a range of habitat opportunities for fauna species. A small variety of habitats are present including forest, woodland and swamp forest. Approximately 79% of the study area was in an excellent condition (Condition Level 1), with the remainder being urban areas or affected by other human activities. The area is still considered to provide high quality foraging and nesting habitat for many fauna species. A variety of species are likely to be present including small mammals, reptiles, birds, amphibians and invertebrates.

At the time of the survey the aquatic habitat was in good condition, following good rains, and water levels were very high. Calls of the brown froglet (*Crinia signifera*) were relatively common on the edges of the lagoon. More prominent fauna sightings included a Lowland Copperhead Snake (*Austrelaps superbus*).

8.6.8 Threatened Fauna Habitat

Approximately 71% of the study area is habitat that is potentially suitable for threatened fauna. Eight threatened fauna species are known to use the habitat types that are present within the study area. No species listed under the JAMBA and CAMBA⁴⁹ migratory bird agreements have potential habitat within the study area. Details of the species of threatened fauna and migratory birds that may occur at Chimneys Lagoon and their preferred habitats are in Appendix 1. The habitats within the study area that are preferred by at least one threatened fauna species include;

- *Eucalyptus amygdalina* coastal forest and woodland (DAC)
- *Melaleuca ericifolia* swamp forest (NME)
- Water, sea (OAQ)

8.7 Weeds

A total of four weed species were recorded within the study area, with none being a “declared” weed species listed on the schedules of the *Tasmanian Weed Management Act 1999* (see Table 8.5 below). All four weed species recorded are considered to be

⁴⁷ TSPA - Tasmanian Threatened Species Protection Act 1995; EPBCA - Commonwealth Environment Protection and Biodiversity Conservation Act 1999

⁴⁸ Natural Values Atlas, DPIPW

⁴⁹ Japan Australia Migratory Bird Agreement (1974) and China Australia Migratory Bird Agreement (1986)

environmental weeds. The species are - arum lily (*Zantedeschia aethiopica*), blue psoralea (*Psoralea pinnata*), hemlock (*Conium maculatum*) and trailing african daisy (*Osteospermum fruticosum*). All four species recorded occurred in disturbed Extra-urban miscellaneous (FUM) areas or on the edges of the native vegetation areas, and are likely to have established from dumped garden waste in these areas. The current levels of infestation within the study area are low, and should be controlled now before these species are allowed to spread. Further larger infestations of hemlock and trailing african daisy occur immediately outside of the study area. See figure 8 for weed location and infestation details.

Table 8.5 – Declared or environmental weed species recorded within the study area.

Weed Species	Declared ⁵⁰ / Environmental
arum lily (<i>Zantedeschia aethiopica</i>)	Environmental
blue psoralea (<i>Psoralea pinnata</i>)	Environmental
hemlock (<i>Conium maculatum</i>)	Environmental
trailing african daisy (<i>Osteospermum fruticosum</i>)	Environmental



Photo 8.6. Left - Extensive hemlock (*Conium maculatum*) infestation just outside of the study area in degraded land.

Photo 8.7. Right - Arum lily (*Zantedeschia aethiopica*) infestation.

8.8 Landholder Survey

Five responses to the survey were received from landholders for Chimneys Lagoon. The main concerns raised by the respondents were;

- rubbish - rubbish is being dumped into and adjacent to the wetland. Dumping of garden waste brings in weed seeds/ propagules.
- urban development - concerns about the level of development in the area ruining the area.

⁵⁰ Declared under the Tasmanian *Weed Management Act 1999*

- drainage into wetland - solid waste, rubbish and chemical effluent is washed down drains (stormwater) which flow directly into the lagoon. Runoff from road culverts is also affecting water quality. Septic and sewer systems leaking and leaching nutrients into the lagoon.
- adjacent former rubbish dump - possibility of seepage into the lagoon affecting water quality.
- maintenance - lack of maintenance effort by council to remove rubbish, control mosquitoes, and keep out motorbikes.
- off-road vehicles - motorbikes access the wetland around the edge when water levels are low. 4WD access is also causing damage on tracks around the lagoon.
- hunting - local residents shoot swans and other water birds.
- water quality - changes in the water quality from fresh to brackish has affected fauna species. Eels, bream and trout no longer occur in the lagoon.
- land zoning - some of the area is zoned residential, which is inappropriate for this area because of habitat values and presence of threatened species.

8.9 Threats

The overall condition of Chimneys Lagoon is very good, indicating that the pressures and threats that it faces are currently low, or the system is resilient enough to withstand the current level of threatening processes. However, this does not mean that this will continue into the future, as several threats were identified during the current survey. The key threats include the following;

- **Urban development – High Threat.** The existing residential development and potential future developments within the catchment pose threats to water quality due to increased sediment and nutrient runoff into the lagoon. Pressure from urban development is at moderate levels, with the housing along St Helens Point occurring within the 100m buffer zone of the lagoon. It is understood that more areas around the lagoon are zoned residential, which if allowed to go ahead would put further pressure on the lagoon. Restrictions on what type and scale of future development should be put in place within a buffer around Chimneys Lagoon, to help protect the remaining habitat, the water quality and other natural values of the area.
- **Lagoon flushing - High Threat.** The lack of flushing within the lagoon traps nutrients and promotes algal growth in the stagnant waters.
- **Adjacent land use – Moderate Threat.** Adjacent sewerage ponds and a former rubbish dump may be leaching nutrients and toxic substances into the lagoon.
- **Rubbish dumping – Moderate Threat.** Garden waste was noted as being dumped in disturbed areas just outside of the study area. It appears to be a minor problem at the moment, however it is a good way to introduce weeds to a site, attract other rubbish dumpers and obviously impacts on the visual amenity of the site. Restricting vehicle

access to out of the way tracks could reduce this problem particularly those that run closer to the wetland.

- **Weeds – Low Threat.** Arum lily, blue psoralea, hemlock and trailing african daisy occur in disturbed areas around the lagoon. The current levels of infestation within the study area are low, and should be controlled now before these species are allowed to spread. Further larger infestations of hemlock and trailing african daisy occur immediately outside of the study area, and will act as a source of recurring infestation.
- **Tracks/Roads – Low Threat.** Only one vehicle track cuts through the buffer area of this wetland, with no tracks accessing the wetland area itself. The tracks in their current state do not appear to be having negative impacts. High water levels may have hidden motorcycle tracks through or adjacent to the wetland. Runoff from St Helens Point Road may impact on water quality within the lagoon.
- **Rabbits – Low Threat.** Rabbit dung was observed in several locations. Damage to vegetation was not obvious indicating that rabbits are probably present in low numbers and currently pose a minor threat. This will need to be monitored however, and a control program put in place if numbers and consequent vegetation damage or erosion problems start to occur.

8.10 First Aid

Several actions could be undertaken to reduce the threats that are currently facing Chimneys Lagoon, including:

1. Encourage planning laws which restrict further development within a defined buffer zone around Chimneys Lagoon.
2. Improved flushing of the lagoon would increase its resilience to catchment pressures. This could be accomplished to various degrees by clearing vegetation from the existing culverts to increasing the connection of the lagoon to Georges Bay through modification of the road.
3. Water quality could be improved by establishing healthy vegetation buffers between the houses, road and lagoon to act as storm water filters, reduce nutrient and sediment input and divert stormwater away from the lagoon.
4. Immediate weed control program, including several years of follow up work, targeting Arum lily, blue psoralea, hemlock and trailing african daisy.
5. Remove dumped rubbish from around and within the lagoon. Use trash racks over storm water drains to stop large particles of rubbish from entering the lagoon.
6. Install educational signs highlighting the ecological values of the area and discouraging damaging activities.
7. Undertake educational activities (eg a field site visit and walk) with the local landholders highlighting the ecological values and sensitivity of the area, highlighting threats such as rubbish dumping and encouraging local stewardship.

8. Prevent access to all vehicles and eliminate current vehicular access to out of the way tracks particularly those that run closer to the wetland.
9. Set up a water quality monitoring program to ensure adjacent land uses are not impacting adversely on the water quality within the lagoon.
10. Monitor rabbit numbers and their impacts, and implement a control program if unacceptable levels of damage are occurring.
11. Revegetation of the old tip site.