6 Terrestrial Factors – Operational Impacts

6.1 Background

Operation of the Southern Seawater Desalination Project will impact on the terrestrial environment. The following terrestrial matters are assessed in this chapter:

1. Wetlands and watercourses.
2. Stormwater.
3. Wastes

6.2 Wetlands and Watercourses

6.2.1 EPA Objective

The EPA's objective for wetlands and surface water are to:

- maintain the integrity, ecological functions and environmental values of wetlands; and
- maintain and protect the quantity of water so that existing and potential environmental values, including ecosystem maintenance (EPA 2004a).

6.2.2 Potential Impact

The proposed Harvey Summit Tanks Site (landowner negotations are occurring at the time of publication of this PER) includes a small degraded watercourse that will be used periodically for maintenance discharges of potable water. The operation of the buried pipelines and plant site will have no impact on wetlands or watercourses.

Operational Impacts – Maintenance discharge to degraded creek

The porposed Harvey Summit Tanks includes a maintenance sump of up to 5 ML capacity (initially constructed to 2ML capacity with potential upgrade to 5ML upgrade, if required). The site was selected in part due to its location adjacent to an existing unnamed creek. The creek will be used for the controlled discharge of surplus potable water following maintenance works.

The site and the creek are located within agricultural land. The creek is a steeply incised channel with approximately 500 m length within the agricultural land (Figure 6-1). The creek base consists of large granite boulders and is vegetated with agricultural pasture with no native flora remaining.

From the edge of the agricultural land the creek flows into a reserve vested with the Department for Planning and Infrastructure and managed by the Shire of Harvey for the purposes of recreation. This reserve is actively grazed by approximately 50-100 cows and consists of *Corymbia calophylla* (Marri), *Xanthorrea preseii* (Grasstree) and *Eucalyptus wandoo* (Wandoo) over pasture grasses. The creek within the reserve also has a rocky base, however the creek is not steeply incised throughout the reserve, possibly as a result of cattle movement. The water quality in the creek appears poor, with green algae indicating eutrophication from the livestock faeces. The creek discharges into the Harvey River west of the reserve (see Figure 6.1).

Figure 6.1: The degraded unnamed creek at the proposed Harvey Summit Tanks Site.

The proposed Harvey Summit Tanks Site is on the left hand side of the photograph. The DPI reserve is observable in the distance. (December 2007).

Maintenance of the storage tanks will be required approximately every five years. During maintenance the water from the bottom of the storage tanks will be discharged into the maintenance sump. The residual chlorine contained within the discharged water will naturally degrade within the maintenance sump over a period of days. Any suspended sediments contained in the discharged water will also settle out within the maintenance sump. The water from the maintenance sump, when the residual chlorine levels are 1 mg/L or less (consistent with drinking water chlorine levels), will be discharged through high chlorine demand organic matter (such as pasture grass or hay-bales) prior to being discharged into the degraded creek. This will consume the residual chlorine before discharge to the environment. The discharge will be designed such that any overflow does not cause significant erosion, with the granite boulder substrate of the creek assisting to minimise erosion and reduce water flow velocity.

It is expected that the maintenance discharge to the creek will have neutral to positive environmental impact. The creek is capable of receiving water flows and the additional water flow may assist to flush-out nutrients and other pollutants from within the creek and intermittently provide improved ecological flows.

6.2.3 Policy and Standards

- *Rights in Water and Irrigation* Act 1914 (WA) and Regulations 2000 (WA).
- *Environmental Protection* Act 1986 (WA).
- Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA).
- *Water Agencies (Powers)* Act 1984 (WA).

6.2.4 Management of Impacts

The management actions responsibilities, timing and auditable outcomes for the management of wetlands and watercourses are contained in the following management plans contained in the Construction Environmental Management Framework:

Discharge of Pipeline Pressure Test and Disinfection Waters Management Plan

In order to meet the EPA's objectives, the management actions identified in those plans for the protection of wetlands and watercourses include:

1. Discharging maintenance waters in accordance with the Water Corporation's standard operating procedures, including a reduction of the residual chlorine concentrations and the discharge occurring through high carbon content material to protect the receiving environment.

6.2.5 Predicted Outcome

The EPA objective can be met for this factor.

6.3 Stormwater

6.3.1 EPA Objective

The EPA's objective for water quality is to:

- ensure that the quality of water emissions does not adversely affect environment values or the health, welfare or amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2004a).

6.3.2 Potential Impact

The Seawater Desalination Plant Site and the Harvey Summit Tanks site will have large impermeable surfaces (buildings and roads) that will prevent natural infiltration of stormwater. Stormwater has the potential to be contaminated by on-site contaminants such as suspended sediments and trace levels of hydrocarbons. The stormwater collected on these sites will need to be discharged to the environment in a controlled manner.

Management of stormwater does not apply to the Water Transfer Pipeline given the small collection area, and that the only hardstand areas are roads with existing road drainage.

6.3.3 Seawater Desalination Plant site

The Seawater Desalination Plant site will occupy an area of approximately 20ha, which will mostly be covered by roofed buildings and roadways. Stormwater will be collected on the roofs of the buildings and on the roadways. The stormwater has the potential to be contaminated by trace levels of hydrocarbons deposited on the roads by vehicles, dust landing on the roads and roofs, and any soil particles on the roadways.

The low level contaminants that will be in stormwater from the Seawater Desalination Plant site will be similar to that of roadways and buildings in a residential or commercial development area. Existing residential or commercial development areas in Western Australia discharge stormwater on-site through drainage systems to a combination of sumps, culverts and/or soak wells where that stormwater is infiltrated and/or evaporated back to the environment. Similar stormwater management will be undertaken for the Seawater Desalination Plant Site to

contain and infiltrate/evaporate stormwater on-site. The design will include measures to minimise exposure of construction and operational staff to potentially contaminated stormwater.

6.3.4 Harvey Summit Tanks site

The proposed Harvey Summit Tanks site will occupy an area of approximately 5 ha, which will include up to four 32 ML roofed tanks, a 2ML maintenance sump (with potential upgrade to 5 ML), roadways and earth batters. The stormwater has the potential to be contaminated by dust landing on the roads and roofs, and any soil particles on the roadways and earth batters. Trace levels of hydrocarbons are unlikely to be detectable as the Harvey Summit Tanks site will only have periodic and irregular vehicle attendance.

The low level contaminants that will be contained in stormwater on the Harvey Summit Tanks site will be similar to that of roadways and buildings in a residential or commercial development area. Existing residential or commercial development areas in Western Australia discharge stormwater through drainage systems to a combination of sumps, culverts, soak wells and/or discharge to natural waterways.

The site will include a maintenance sump for the controlled discharge of water from the storage tanks during maintenance periods. The purpose of the maintenance sump will be to contain water from the bottom of the storage tanks during maintenance of the tanks.

This maintenance sump will also be suitable for the containment of stormwater given the large volume capability of the maintenance sump. Suspended sediments contained in the stormwater will settle out within the maintenance sump, with the stormwater infiltrating or evaporating within the maintenance sump, or overflowing from the maintenance sump into the adjacent creek following the settling of suspended solids (depending on volume).

6.3.5 Policy and Standards

- Stormwater Management Manual for Western Australia.

6.3.6 Management of Impacts

The management actions for stormwater quality for the Seawater Desalination Plant Site and the Harvey Summit Tanks are design considerations (i.e. not part of the Construction Environmental Management Framework)

In order to meet the EPA's objectives, the design of the Seawater Desalination Plant Site and the Harvey Summit Tanks will include:

- collecting and infiltrating/evaporating stormwater at the Seawater Desalination Plant Site on-site using a combination of sumps, culverts and/or soak wells; and
- collecting and infiltrating/evaporating stormwater at the Harvey Summit Tanks and/or discharging the stormwater to the natural drainage creek following settlement of suspended solids.

6.3.7 Predicted Outcome

The EPA objective can be met for this factor.

6.4 Wastes

6.4.1 EPA Objective

The EPA's objectives for waste management are:

- to maintain the integrity, ecological function and values of the environment; and
- to ensure that emissions do not adversely affect the health, welfare or amenity of people and land uses (EPA 2005).

6.4.2 Potential Impact

Operation of the Southern Seawater Desalination Project will generate a limited range of solid waste products, including general (single use) wastes, recyclables, and sludge (filter backwash cake). These wastes must be disposed of in accordance with state waste disposal laws and in a manner that does not cause a detrimental impact on the terrestrial environment.

General Wastes

General wastes, such as packaging and waste food, are not recyclable and must be disposed of to landfill. General wastes will be disposed of offsite to the nearest landfill classified for Class 2 wastes in accordance with the *Landfill Waste Classification and Waste Definitions 1996* (DEC 2005) and licensed under the *Environmental Protection Regulations 1987* (WA).

Recyclable Wastes

Recyclable wastes, such as paper and glass and plastics, will be collected and disposed of offsite to the nearest recycling facility (where a recycling facility exists within 50km).

Where a suitable recycling facility does not exist, the putrescible components of the recyclable wastes (such as paper) will be disposed of to a landfill classified for Class 2 wastes in accordance with the *Landfill Waste Classification and Waste Definitions 1996* (DEC 2005) and licensed under the *Environmental Protection Regulations 1987* (WA). The inert components of the recyclable wastes (such as glass and plastics) will be disposed to a landfill classified for Class 1 or Class 2 wastes in accordance with the *Landfill Waste Classification and Waste Definitions 1996* (DEC 2005) and licensed under the *Environmental Protection Regulations 1987* (WA).

Sludge (Filter Backwash Cake)

The Seawater Desalination Plant at full production will produce approximately 30 tonnes per day (approximately 25 cubic metres) of sludge (solid filter backwash cake). The sludge is a solid brown waste produced from backwashing (cleaning) the dual media filters. The sludge is produced in order to prevent the red-coloured filter backwash water from being discharged to the marine environment where it can affect the visual appearance of the marine waters and beach sands (noting that such discharges occur at many seawater desalination plants around the world). The red colouration comes from the iron salts added during the coagulation process.

The dual media filters at the Seawater Desalination Plant are used to filter solid materials (such as marine algae and silts) from the intake seawater prior to the water being desalinated. The intake seawater is dosed with ferric sulphate (an iron

based coagulant), a coagulant aid and sulphuric acid prior to entry to the dual media filters to assist with trapping solids within the dual media filters.

The dual media filters are backwashed with seawater to remove the solid wastes collected by the filters as part of routine maintenance to keep the filters clean and operational. Following backwashing of the dual media filters, the backwashing water containing the solid wastes from the dual media filters is treated with additional ferric sulphate and polymers to bind together the solid wastes of the backwash water. The backwashing water is then centrifuged to separate the liquid from solid portions, with the solid waste portion collected, and the liquid portion discharged to the marine environment with the seawater brine from the desalination process.

If a process other than that described above is used, and does not require the addition of iron salts, the resulting product will be recombined with the brine stream and disposed of via the ocean diffuser. This will not result in discolouration or additional impacts as there would be no additional materials in the discharge other than those described and assessed in chapter 8.2.8.

As identified by Table 6-1, the sludge predominantly comprises of naturally occurring marine components (water, salt, calcium carbonate, silts and sands), with the iron hydroxide component from the ferric sulphate coagulant. The sludge is not classified as a hazardous substance or a dangerous good.

Table 6-1. General Composition of sludge. The values quoted are for the sludge from the Perth Seawater Desalination Plant (Source: Perth Reverse Osmosis Alliance 2008).

Component	Proportion
Water	70-80%
Iron Hydroxide	1-10%
Calcium carbonate	1-10%
Sodium chloride (salt)	1-2%
Other minor ingredients deemed not to be hazardous (such as silts, sands, algae and other salts)	5-10%

If a coagulating process is used and iron salts are added, the sludge will be collected within the Seawater Desalination Plant site in solid waste containers and then disposed of offsite to the nearest landfill classified for Class 3 wastes in accordance with the *Landfill Waste Classification and Waste Definitions 1996* (DEC 2005) and licensed under the *Environmental Protection Regulations 1987* (WA).

Other Wastes

Any other wastes generated that do not fall within one of the above categories will be disposed of to a landfill of a suitable Class in accordance with the *Landfill Waste Classification and Waste Definitions 1996* (DEC 2005) and licensed under the *Environmental Protection Regulations 1987* (WA).

6.4.3 Policy and Standards

- Environmental Protection Regulations 1987 (WA)

- Environmental Protection (Controlled Waste) Regulations 2004 (WA)
- Landfill Waste Classification and Waste Definitions 1996.

6.4.4 Management of Impacts

The management actions responsibilities, timing and auditable outcomes for the management of wastes are contained in the following management plans contained in the Operational Environmental Management Framework:

Waste Management Plan.

In order to meet the EPA's objectives, the management actions identified in the waste management plan include:

- collecting recyclables (glass, paper, plastics) and disposing of them to the nearest recycling facility (where one exists within 50km, or otherwise disposed of to a to the nearest landfill classified for Class 1 or 2 wastes in accordance with the Landfill Waste Classification and Waste Definitions 1996 (DEC 2005) and licensed under the Environmental Protection Regulations 1987 (WA);
- disposing of general wastes (including inert and putrescibles wastes) to the nearest landfill classified for Class 2 wastes in accordance with the Landfill Waste Classification and Waste Definitions 1996 (DEC 2005) and licensed under the Environmental Protection Regulations 1987 (WA); and
- disposing of sludge wastes to the nearest landfill classified for Class 3 wastes in accordance with the Landfill Waste Classification and Waste Definitions 1996 (DEC 2005) and licensed under the Environmental Protection Regulations 1987 (WA), if a coagulant process is used requiring the addition of ferric salts. Otherwise the resulting product will be recombined with the brine stream and disposed of via the ocean diffuser. This will not result in any additional impacts as there would be no additional materials in the discharge other than those described and assessed in chapter 8.2.8.

6.4.5 Predicted Outcome

The EPA objective can be met for this factor.