

Appendix L. Impact Assessment

Impact Assessment Methodology

The process of assessing the potential impacts of the project encompassed the following four activities:

- Identification of potential impacts;
- Prediction of the nature, magnitude, extent and duration of potentially significant impacts;
- Identification of mitigation measures that could be implemented to reduce the severity or significance of the impacts of the activity; and
- Evaluation of the significance of the impact after the mitigation measures have been implemented, i.e. the significance of the residual impact.

The EAP prepared the impact assessment matrix (Table L1) with input from the specialist impact assessment reports (Appendix G of the basic assessment report).

Table L1 provides a summary of the criteria and the rating scales, which are used in this regard. The assignment of a rating was undertaken based on past experience of the, EIA team, the professional judgement of the specialists as well as through desktop research. Due to the small magnitude and extent of the maintenance measures, the majority of them were associated with low impact significance, and the impacts for the majority of estuaries were assessed as having the same significance. Impacts which were rated the same for multiple estuaries are only listed once in the impact assessment matrix. Where a rating for a particular estuary was different the impact has been repeated in the table.

Once the potential impacts were assessed in terms of the above criteria a significance rating was applied as per the convention in Table L1. The overall significance of the impacts was defined based on the result of a combination of the extent, magnitude and duration rating, as set out in Table L2.

Mitigation measures were then identified and considered for each impact and the assessment repeated in order to determine the significance of the residual impacts (the impact remaining after the mitigation measure has been implemented).

Table L1. Impact ratings for the interventions

Category	Rating levels	Explanation
Extent	Site:	Extending to <500 m reach of estuary or <10% of the area of the estuary
	Local (Loc.)	Extending up to < 3 km from site or up to 50% of the estuary
	Regional (Reg.)	Extending over a full estuary which is considered to have implications for biodiversity within the CCT Municipality
	National (Nat.)	Affecting a whole category of waterbodies, which is deemed to have implications for national biodiversity
Magnitude	Low (L)	Natural and/or social functions and/or processes are negligibly altered.
	Medium (M)	Natural and/or social functions and/or processes are notably altered.
	High (H)	Natural and/or social functions and/or processes are severely altered.
Duration	Temporary (Temp)	Once-off occurrence, implemented over a discrete period (e.g. weeks).
	Short term (ST)	Measure is repeated at some interval (e.g. annually), but the impact is considerably shorter-lived than the period required for recovery, such that the ecosystem remains in its pre- disturbance state >80% of the time
	Medium term (MT)	the impact of the management measure is shorter-lived than the period required for recovery, such that the ecosystem remains in its pre-disturbance state for > 40 - 80% of the time and in some partially-recovered state for some of the time
	Long term (LT)	the impact of the management measure persists >60% of the time between impacts, such that the ecosystem exists in its pre-disturbance state for <40% of the time and in some only partially-recovered state for the majority of the time
	Permanent (Perm)	the impact of the management measure is such that the ecosystem cannot recover between the implementation of maintenance measures, and persists in some modified form (depending on the magnitude of the impact)
Probability/frequency	Improbable (IMP)	Little or no chance of occurring (< 10% chance of occurring)
	Possible (POSS)	10 – 39 % chance of occurring
	Probable (PRO)	40 - 59% chance of occurring
	Highly probable (HPRO)	60 – 95% chance of occurring
	Definite (DEF)	>95% chance of occurring.
Status	POS Positive	A benefit.
	NEG Negative	A cost.
Impact significance with mitigation	No impact	A potential concern or impact, which upon evaluation is found to have no impact if the required mitigation is undertaken.
	Very low (VL)	<ul style="list-style-type: none"> ○ Temporary or Short-term impacts of low magnitude on site specific scale
	Low (L)	<ul style="list-style-type: none"> ○ Medium-term to permanent impacts, with low magnitude on a site-specific scale. ○ Temporary to permanent impacts, with low magnitude on a local scale. ○ Temporary to short-term impacts, with medium magnitude on a local to regional scale. ○ Medium-term impacts of medium magnitude on a local or smaller scale
	M – Medium	<ul style="list-style-type: none"> ○ Permanent impacts of medium or high magnitude on a site-specific scale. ○ Long-term impacts of medium magnitude on a local scale. ○ Medium-term impacts of medium magnitude on a regional scale ○ Medium-term impacts of high magnitude on local scale ○ Short-term impacts of high magnitude on regional to national scale
H – High	<ul style="list-style-type: none"> ○ Permanent impacts of medium or high magnitude, on a local to national scale, ○ Long-term impacts of medium or high magnitude, on a regional to national scale, ○ Medium-term impacts of medium magnitude on a national scale ○ Medium-term impacts of high magnitude on a regional to national scale 	

Table L2. Assessment and rating of environmental impacts identified for all stormwater management measures required (NOTE: Activities which are not applicable to estuaries such as channel enclosure have not been assessed).

No.	Stormwater management measure	Sub-measure	Estuary measure is applicable to	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
1. VEGETATION MANAGEMENT											
1	Aquatic Vegetation Management										
	1.1 Aquatic (submerged / floating) alien invasive vegetation management.	1.1.1 Manual removal, 1.1.2 Mechanical removal.	Diep Disa Eerste Lourens Sir Lowrys Pass Zandvlei	The ongoing eradication or control of aquatic alien vegetation has a positive impact on ecosystem function, through removing the stresses on water and habitat quality.	Reg.	M	long	HPR O	POS	H	5
				Selective and controlled harvesting of indigenous submerged aquatic vegetation (Potamogeton) may improve water quality.	Loc.	L-M	med	PRO	POS	L	5
				Damage to riparian vegetation through stockpiling of material too close or on the bank.	Loc.	L	short	PRO	NEG	L	5
				Damage to riparian vegetation from heavy machinery access points may leave banks bare, increasing erosion potential.	Loc.	M	short	PRO	NEG	L	5
				Disturbance of estuary bed sediments and resulting increased turbidity / smothering of or loss of habitat e.g. for fish, invertebrates, frogs.	Loc.	L	temp	DEF	NEG	L	5
		1.1.3 Biocontrol.	Diep Eerste Lourens Zandvlei	Biocontrol agents where they can be introduced are highly effective in reducing proliferation of alien vegetation. Ongoing control of alien vegetation can have a positive impact on ecosystem functioning through removing the stresses on water and habitat quality.	Reg.	M	long	HPR O	POS	H	5
		1.1.4 Chemical Control.	Diep Disa (may be required in the future) Eerste	The ongoing eradication or control of aquatic alien vegetation has a positive impact on ecosystem function, through removing the stresses on water and habitat quality.	Reg.	M	long	HPR O	POS	H	5
				Chemical sprays on floating plants enter the water column and depending on the chemical can be harmful to non-target species of plants and animals.	Loc.	M	short	PRO	NEG	L	5
				Dead material left rotting within the waterbody after chemical spraying will reduce water quality.	Loc.	M-H	temp	HPR O	NEG	L	5

No.	Stormwater management measure	Sub-measure	Estuary measure is applicable to	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
				Odour caused by smell of rotting plant matter piled along the banks as it dries out – this drying out period is a necessary step in the removal of the material.	Loc.	L	temp	DEF	NEG	L	5
	1.2 Reedbed and indigenous emergent vegetation management.	1.2.1 Mechanical removal, 1.2.2 Manual removal.	Diep Eerste Lourens Silvermine Sir Lowry's Pass Zandvlei	Water quality improvement of stormwater passing through filtration reedbeds and vegetated channels / swales (<i>Typha capensis</i> and <i>Phragmites australis</i>) is maximised by optimal reed management.	Loc. - Reg.	M	long	PRO	POS	M-H	5
Management of large reed bedss in estuaries improves floral biodiversity where it allows for re-establishment of a more diverse habitat and flora.				Loc. Reg.	L-M	long	PRO	POS	L-M	5	
Prevention of flooding and channel erosion associated with clogged channels.				Loc.	M	med	PRO	POS	L-M	5	
Indiscriminate and frequent clearing of conservation-worthy vegetated channels and reedbeds destroys habitat and biota.				Loc.	M	med	IMP	NEG	L-M	5	
The stockpiling of reeds and emergent plant material too close to or on the banks of estuaries causes damage to riparian vegetation.				Loc.	M	short	PRO	NEG	L	5	
Silvermine The stockpiling of reeds and emergent plant material too close to or on the banks of estuaries causes damage to riparian vegetation.				Loc.	H	short	HPR O	NEG	M	5	
Uncontrolled access - denuded banks destroys the riparian zones alongside reedbeds, with a loss of the buffering that these provide to instream water quality.				Loc.	M	med	PRO	NEG	L	5	
Localised reduction in water quality due to loss reeds beds which provide natural filtration.				Loc.	M	short	POS S	NEG	L	5	
Silvermine Localised reduction in water quality treatment capacity due to loss reeds beds which provide natural filtration.				Loc.	H	short	HPR O	NEG	M	5	
Clearing from both banks destroys the corridor that riparian vegetation provides.				Loc.	L	short	IMP	NEG	L	5	
Spillages of hydraulic fluids and or diesel from mechanical plant can pollute the estuary, killing resident organisms.				Loc.	L	temp	PRO	NEG	L	5	

No.	Stormwater management measure	Sub-measure	Estuary measure is applicable to	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
				Damage to estuarine functional zone (habitat loss) from placement of fill over estuary area to construct access roads – either as a permanent feature or exacerbated further by excavation of estuary during removal of temporary fill.	Site	L-M	med	IMP	NEG	L	5
				Disturbance of biota and mortality of biota with limited mobility (juvenile birds, amphibians, reptiles and inveterbrates).	Loc.	M	short	PRO	NEG	L	5
				Silvermine Disturbance of biota and mortality of biota with limited mobility (juvenile birds, amphibians, reptiles and inveterbrates) from large scale reed removal.	Loc.	H	short	HPR O	NEG	M	5
		1.2.3 Chemical Control.	Diep Disa (unlikely to be required)	Management of reeds like <i>Typha capensis</i> in estuaries improves floral biodiversity in instances where it allows for re-establishment of a more diverse habitat and flora.	Loc.	M	long	HPR O	POS	M	5
				Chemical sprays near estuaries may enter the water column and depending on the chemical can be harmful to non-target species of plants and to animals.	Loc.	M	short	PRO	NEG	L	5
	1.3) Riparian/marginal vegetation management.	1.3.1 Mechanical removal, 1.3.2 Manual removal.	Diep Disa Eerste Lourens Silvermine Sir Lowry's Pass Zandvlei	Improvement in dry-season baseflows in channels because of the high water use by alien woody species, and/or increased moisture levels in subsurface soils and longer hydroperiod.	Reg.	M	long	HPR O	POS	M-H	5
				Improved biodiversity value.	Reg.	M	long	HPR O	POS	M-H	5
				Lateral erosion / bank instability as a result of felled woody debris not being removed from the channel, and / or bank erosion as a result of slope clearing without replanting or stabilization.	Site.	M	short	IMP	NEG	L	5
				Short-medium term increase in in-stream sediment transport as accumulated sediments exposed to the natural flow.	Loc.	M	short-med	POS S	NEG	L	5
				Disturbance as a result of access roads or paths and camps.	Site.	M	short	POS S	NEG	L	5
				Improvement in moisture levels in estuaries invaded by terrestrial species because of the high water use by alien woody species.	Loc.	M	long	HPR O	POS	M	5

No.	Stormwater management measure	Sub-measure	Estuary measure is applicable to	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
				Loss of habitat where felled vegetation is simply stockpiled within the estuarine functional zone.	Loc.	L-M	med	IMP	NEG	L	5
				Disturbance as a result of access roads or paths and camps, especially in densely vegetated estuaries where alien species are interspersed among natural plants.	Loc.	M	med	IMP	NEG	M	5
		1.3.3 Biocontrol.	Disa Diep	Reduction in alien vegetation through use of biocontrol agents.	Reg.	M	long	HPR O	POS	M-H	5
				Increased habitat variation through removal of dominant alien vegetation.	Loc.	M	long	HRP O	POS	M	5
		1.3.4 Chemical control.	Diep Disa Eerste	Improvement in moisture levels in estuaries invd by terrestrial species because of the high water use by alien woody species.	Loc.	M	long	HPR O	POS	M	5
			Lourens Silvermine Sir Lowry's Pass Zandvlei	Chemical sprays in estuaries may enter the water column and depending on the chemical can be harmful to non-target species of plants and to animals.	Site.	M	med	POS S	NEG	L	5
2. EROSION CONTROL											
2	Erosion Control.	2.1 Estuary bank profile enhancement.	Diep Lourens Silvermine Zandvlei	Essentially rehabilitation of natural functioning to address erosion. Multiple positive impacts include biodiversity enhancement, improved function, and increased lateral connectivity.	Reg.	H	long	DEF	POS	H	6
				Short- term increase in in-stream sediment transport or deposition (depending on the ecosystem, position within the estuary.), as the system adjusts to a new equilibrium.	Loc.	L	short	PRO	NEG	L	6
				Disturbance of biota and mortality of biota with limited mobility (juvenile birds, amphibians, reptiles and inveterbrates).	Loc.	M	Temp	DEF	NEG	L	6
				Lateral erosion to banks.	Loc.	M	Temp	DEF	NEG	L	6
				Increased turbidity of estuary due to suspended sediments.	Loc.	M	Temp	DEF	NEG	L	6

No.	Stormwater management measure	Sub-measure	Estuary measure is applicable to	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
		2.2 Erosion control structures.	Diep Disa Eerste Lourens Silvermine Sir Lowry's Pass Zandvlei	Where no other options are available due to space constraints, these measures assist in preventing the spread of erosion from localised nick-points and consequent loss of habitat and downstream siltation. (Assumption: for any structure chosen, from soft options to engineered, the positive impacts associated with the prevention of erosion outweigh the negatives).	Loc. - Reg.	M	perm	PRO	POS	M	6
				Loss of ecological function: instream / riparian / littoral vegetation through loss of habitat.	Site	L	perm	DEF	NEG	L	6
				Construction-related impacts, such as water quality impacts associated with cement works or washing of construction tools / vehicles; disturbance of sediments and downstream sedimentation.	Site.	M	temp	DEF	NEG	L	6
				Disturbance of biota and mortality of biota with limited mobility (juvenile birds, amphibians, reptiles and inveterbrates).	Site	M	Temp	DEF	NEG	L	6
3. SEDIMENT MANAGEMENT											
3	Sediment Management.	3.1 Construction/ expansion of sediment traps/ retention areas.	Silvermine	Short-term negative impacts of the installation of "constructed" sediment traps- disturbance of bed sediment and pollution from construction materials.	Site.	L	temp	DEF	NEG	VL	7
				More long-lived impacts associated with access to the site e.g. damage to riparian zones / estuarine functional zone, diversion of natural flow, compaction and dredging.	Reg.	L-M	perm	IMP	NEG	M	7
		3.2 Manual/ mechanical sediment removal from sediment traps/ retention areas.	Diep Disa Silvermine Sir Lowry's Pass Zandvlei	Sediment traps situated in an appropriate position along a channel in developed catchments minimize the negative impact of anthropogenically-increased sediment loads being deposited in the estuary. NOTE: designated sedimentation areas may include the limited area around inlet and outlets of culverts, pipes, points where rivers or canals enter estuaries etc. Also deposited sediments are also often removed with associated reeds or other vegetation.	Reg.	M	long	HPR O	POS	M-H	7

No.	Stormwater management measure	Sub-measure	Estuary measure is applicable to	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
				Removal of sediments that are contaminated or heavily enriched with nutrients can contribute to eutrophication of estuaries, especially in shallow lakes and vleis. Under these conditions, removal of sediment can improve water quality.	Loc. - Reg.	L-M	med	HPR O	POS	L-M	7
				Impacts associated with access to and around the site (as above).	Site.	M	short	DEF	NEG	L	7
				Disturbed / resuspended sediments and associated nutrient / organic loads (and plants) can be transported to downstream reaches during excavation of sediment traps, smothering habitat and animals and reducing light penetration and oxygen availability.	Loc	M	short	DEF	NEG	L	7
				Eutrophication of estuary from mobilisation of organic sediments	Site	M	short	DEF	NEG	L	7
		3.3 Manual/mechanical removal from canals, channels and waterbodies	Diep Disa Eerste Lourens Silvermine Sir Lowry's Pass Zandvlei	Temporary loss of all habitat and biota, albeit in low importance systems - through physical disturbance, smothering of substrata, loss of instream plant diversity and structural elements.	Site	M	short	DEF	NEG	L	7
5. LITTER AND DEBRIS MANAGEMENT											
5	Removal of litter and debris.	5.1 Litter and debris removal using either mechanical or manual methods.	Diep Disa Eerste Lourens Silvermine Sir Lowry's Pass Zandvlei	Removal of litter represents a positive ecological impact on the affected watercourses through the removal of pollutants.	Loc.	L-M	short	DEF	POS	L	9
				Damage to bankside vegetation / banks at the site where litter is removed from the estuary and stockpiled.	Site.	L	temp	DEF	NEG	VL	9
				Wind spread of trapped litter during clearing of litter traps, transporting litter in the estuary.	Site.	L	temp	DEF	NEG	VL	9

No.	Stormwater management measure	Sub-measure	Estuary measure is applicable to	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
		5.2 Removal of structures to reduce water obstruction.	Silvermine	Removal of an erosion threat or a structure that is causing erosion in downstream reaches will improve ecological integrity.	Loc.	M	perm	DEF	POS	M-H	9
				Elevated suspended sediments are possible during removal of the obstruction.	Site	M	temp	DEF	NEG	L	9
				Disturbance of biota.	Site	M	temp	DEF	NEG	L	9
				Decreased water quality due to mobilisation of sediment.	Site	M	temp	DEF	NEG	L	9
		5.3 Construction/ expansion of litter management infrastructure.	Diep Disa Zandvlei	Improves performance of litter removal, reduces impacts of people along length of channel.	Loc.	M	long	DEF	POS	M	9& 10
				Water quality, sediment impacts associated with construction.	Site.	L	temp	DEF	NEG	L	9& 10
			Lourens Silvermine	Improves performance of litter removal, reduces impacts of people along length of channel.	Loc.	M	long	DEF	POS	M	9 & 10
				Water quality, sediment impacts associated with construction.	Site.	L	temp	DEF	NEG	VL	9 & 10
6. CONSTRUCTION, MAINTENANCE AND EXPANSION OF MINOR STORMWATER INFRASTRUCTURE											
6	Construction and maintenance of minor stormwater infrastructure.	6.1 Stormwater outlets, dam scour valves, headwalls and culverts.	Diep Disa Eerste Lourens Silvermine Sir Lowry's Pass Zandvlei	Properly functioning stormwater system reduces erosion and deposition in natural waterbodies downstream.	Loc.	M	short	HPR O	POS	L-M	10
				Water quality, sediment impacts associated with construction.	Site.	L	short	DEF	NEG	L	10
				Disturbance of biota and mortality of biota with limited mobility (juvenile birds, amphibians, reptiles and inveterbrates).	Site	L	short	DEF	NEG	VL	10
				Localised loss of marginal habitat during the construction of new stormwater infrastructure	Site	L	perm	DEF	NEG	VL	10

No.	Stormwater management measure	Sub-measure	Estuary measure is applicable to	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
				Decline in estuary water and sediment quality if new outlets drain a polluted area.	Site	L	perm	DEF	NEG	VL	10
				Water quality, sediment impacts associated with maintenance activities (e.g. concrete work).	Site	L	Short	DEF	NEG	VL	10
7. MAINTENANCE OF ATTENUATION INFRASTRUCTURE											
7	Maintenance of attenuation infrastructure.	7.1 Weirs, 7.2 Retention/detention ponds and dams, 7.3 Floor protection embankments/berms, 7.4 SUDS facilities, 7.5 Other dams/ponds.	Diep (7.1 & 7.3) Lourens (7.3) Zandvlei (7.1)	Properly functioning stormwater system reduces erosion and deposition in natural waterbodies downstream.	Loc.	L-M	short	HPR O	POS	L	10 & 11
				Water quality, sediment impacts associated with maintenance work, e.g. earthworks on embankments.	Site.	M	short	DEF	NEG	L	10 & 11
				Localised loss of marginal habitat during the construction of new stormwater infrastructure.	Site	L	perm	DEF	NEG	L	10 & 11
8. RECREATIONAL ACCESS											
8	Recreational Access.	8.1 Construction and maintenance of footbridges, boardwalks or bird hides.	Diep Eerste Lourens Silvermine Sir Lowry's Pass Zandvlei	Infrastructure, such as pathways, directs pedestrian and light traffic to formalised crossings, controlling damage to bed and banks.	Loc.	L	perm	DEF	POS	L	10 & 12
				The footprint of the recreational feature represents an, albeit highly localised, loss of habitat for riparian and instream biota.	Loc.	L	perm	DEF	NEG	L	10 & 12
				Zandvlei and Diep The footprint of the recreational feature represents an, albeit highly localised, loss of habitat for riparian and instream biota.	Loc.	L	perm	DEF	NEG	VL	10 & 12
				Short-term construction impacts include possible pollution from washing vehicles and equipment.	Loc.	L	temp	DEF	NEG	L	10 & 12

Impacts of Management of River/ Estuary Mouth

The impact of the majority of maintenance and management measures (7 measures as presented above) will be the same or similar for most of the listed estuaries due to extent of the activities and the low magnitude of the impacts.

The impact of maintenance measure 9 (management of river/ estuary mouths) varies considerably between estuaries. The impact assessment matrix for this activitymanagement of estuary mouths has therefore been presented on a site by site basis. The tables below presents the impact assessment for each of the applicable estuaries.

Table L3. Assessment and rating of environmental impacts of the management of Disa estuary mouth.

No.	Stormwater management measure	Sub-measure	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
9	Management of river/ estuary mouths.	9.1 Breaching: removal of sand bars deposited in mouth.	Prevention of health risk from pollution event in the estuary being contained during the estuary closed mouth phase.	Loc-Reg	M	short	POS S	POS	M	13
			Prevention of flooding and/or damage to upstream areas.	Loc-Reg	M	short	POS S	POS	M	13
			Low oxygen conditons in the estuary resulting from breaching at low water levels and concentrating biota and rotting organic material in a reduce volume of water.	Loc.	H	short	DEF	NEG	M	13
			Impacts may be associated with heavy machinery traversing sensitive dune areas, but are relatively short-lived.	Loc.	M	short	DEF	NEG	L	13
		9.2 Straightening: redirecting meandering mouth across the shortest route directly towards the sea.	Prevention of loss of landscape features such as buffer or back-dune systems.	Loc. - Reg.	M	short	PRO	POS	L-M	13
			Disturbance and possible short term loss of intertidal organisms from movement of beach sediments	Loc.	M	temp	DEF	NEG	L	13
			Impacts may be associated with heavy machinery traversing sensitive dune areas, but are relatively short-lived.	Loc.	L	short	PRO	NEG	L	13

Table L4. Assessment and rating of environmental impacts of the management of Eerste estuary mouth.

No.	Stormwater management measure	Sub-measure	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
9	Management of river/ estuary mouths.	9.1 Breaching: removal of sand bars deposited in mouth.	Prevention of flooding of Macassar WWTW	Reg.	M - H	short	IMP	POS	M	13
			Poor saline intrusion and limited scour resulting from breaching at insufficient estuary water height or during an unfavourable tidal state. This may result in poor water quality.	Loc.	M	short	DEF	NEG	L	13
			Impacts may be associated with heavy machinery traversing sensitive dune areas, but are relatively short-lived.	Loc.	L	temp	PRO	NEG	L	13
		9.2 Straightening: redirecting meandering mouth across the shortest route directly towards the sea.	Disturbance and possible loss of intertidal organisms from movement of beach sediments	Loc.	M	temp	DEF	NEG	L	13
			Damage to sensitive dune areas from heavy machinery access points.	Loc.	L	temp	PRO	NEG	L	13

Table L5. Assessment and rating of environmental impacts of the management of Lourens estuary mouth.

No.	Stormwater management measure	Sub-measure	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
9	Management of river/ estuary mouths.	9.1 Breaching: removal of sand bars deposited in mouth.	Prevention of health risk from pollution event in the estuary being contained during the estuary closed mouth phase.	Loc-Reg	M	short	POS S	POS	M	13
			Poor saline intrusion and limited scour resulting from breaching at insufficient estuary water height or during an unfavourable tidal state. This may result in poor water quality.	Loc.	M	short	DEF	NEG	L	13
			Impacts may be associated with heavy machinery traversing sensitive dune areas, but are relatively short-lived.	Loc.	L	temp	PRO	NEG	L	13

Table L6. Assessment and rating of environmental impacts of the management of Silvermine estuary mouth.

No.	Stormwater management measure	Sub-measure	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
9	Management of river/ estuary mouths.	9.1 Breaching: removal of sand bars deposited in mouth.	Prevention of health risk from pollution event in the estuary being contained during the estuary closed mouth phase.	Loc-Reg	M	short	POS S	POS	M	13
			Prevention of flooding and damage to infrastructure upstream.	Loc-Reg	M	short	POS S	POS	M	13
			Poor saline intrusion and limited scour resulting from breaching at insufficient estuary water height or during an unfavourable tidal state. This may result in poor water quality.	Loc.	H	short	DEF	NEG	M	13
			Impacts may be associated with heavy machinery traversing sensitive dune areas, but are relatively short-lived.	Loc.	L	short	PRO	NEG	L	13
		9.2 Straightening: redirecting meandering mouth across the shortest route directly towards the sea.	Protection of infrastructure (housing development and railway line) and dunes from meandering mouth.	Loc-Reg	M	short	PRO	POS	M	13
			Disturbance and possible loss of intertidal organisms from movement of beach sediments	Site.	L	temp	DEF	NEG	VL	13
			Damage to sensitive dune areas from heavy machinery access points.	Site.	L	temp	PRO	NEG	L	13

Table L7. Assessment and rating of environmental impacts of the management of Sir Lowry's Pass estuary mouth.

No.	Stormwater management measure	Sub-measure	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
9	Management of river/ estuary mouths.	9.1 Breaching: removal of sand bars deposited in mouth.	Prevention of health risk from pollution event in the estuary being contained during the estuary closed mouth phase.	Loc-Reg	M	short	POS S	POS	M	13
			Poor saline intrusion and limited scour resulting from breaching at insufficient estuary water height or during an unfavourable tidal state. This may result in poor water quality.	Site	M	short	DEF	NEG	L	13

No.	Stormwater management measure	Sub-measure	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
			Impacts may be associated with heavy machinery traversing sensitive dune areas, but are relatively short-lived.	Loc.	L	short	PRO	NEG	L	13
			Disturbance and possible loss of intertidal organisms from movement of beach sediments	Loc.	M	short	DEF	NEG	L	13
		9.2 Straightening: redirecting meandering mouth across the shortest route directly towards the sea.	Protection of infrastructure (municipal resort) from meandering mouth.	Loc-Reg	M	short	PRO	POS	M	13
			Disturbance and possible loss of intertidal organisms from movement of beach sediments	Site.	L	temp	DEF	NEG	VL	13
			Damage to sensitive dune areas from heavy machinery access points.	Site.	L	temp	DEF	NEG	VL	13

Table L8. Assessment and rating of environmental impacts of the management of Zandvlei estuary mouth.

No.	Stormwater management measure	Sub-measure	Environmental Impact	Extent	Magnitude	Duration	Probability / Frequency	Status	Impact Significance with mitigation	Mitigation (EMPr section)
9	Management of river/ estuary mouths.	9.1 Breaching: removal of sand bars deposited in mouth.	Prevention of health risk from pollution event in the estuary being contained during the estuary closed mouth phase.	Loc-Reg	M	short	POS	POS	M	13
			Prevention of upstream flooding of infrastructure and properties	Loc - Reg	M	short	POS	POS	M	13
			Improvement in water quality (salinity) and facilitation of fish recruitment through compliance with MMP and Estuary Management Plan.	Loc	M	MT	HPR	POS	VL	13
			Poor saline intrusion and limited scour resulting from breaching at insufficient estuary water height or during an unfavourable tidal state. This may result in poor water quality.	Site	M	short	IMP	NEG	VL	13
			Impacts may be associated with heavy machinery traversing sensitive dune areas, but are relatively short-lived.	Loc.	L	short	PRO	NEG	L	13