

Information Sheet on Ramsar Wetlands

Categories approved by Recommendation 4.7 of the Conference of the contracting parties

NOTE: It is important that you read the accompanying Explanatory Note and Guidelines document before completing this form

1. Date this sheet was completed/updated:

.....28 April 2002.....

FOR OFFICE USE ONLY.

DDMMYY

--	--	--

Date

--	--	--	--	--	--

Site Reference Number

Designation

2. Country: Republic of Mauritius

3. Name of wetland: Rivulet Terre Rouge Estuary Bird Sanctuary (RTREBS)

4. Geographical coordinates: Longitude: 57°49' East Latitude: 20°14' South

5. Altitude: (average and/or max. & min.) Zero Metre **6. Area:** (in hectares) 26.4

7. Overview:

RTREBS is a natural wetland which is influenced by intertidal changes occurring all the year round. It is one of the most important sites for migratory birds which visit Mauritius in summer between October and April. Fourteen (14) species have been regularly visiting the site, while some vagrant species are also encountered. On the 27th August 1999, RTREBS was proclaimed as a Reserve under the Wildlife and National Parks Act 1993. This has given legal protection to the whole site.

8. Wetland Type

- | | | | | | | | | | | | |
|------------------------|---|---|----|----|---|----|----|----|----|----|----|
| marine-coastal: | A | B | C | D | E | F | G | H | I | J | |
| | K | | | | | | | | | | |
| inland: | L | M | N | O | P | Q | R | Sp | Ss | Tp | Ts |
| | | U | Va | Vt | W | Xf | Xp | Y | Zg | Zk | |
| man-made: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |

Please now rank these wetland types by listing them from the most to the least dominant:

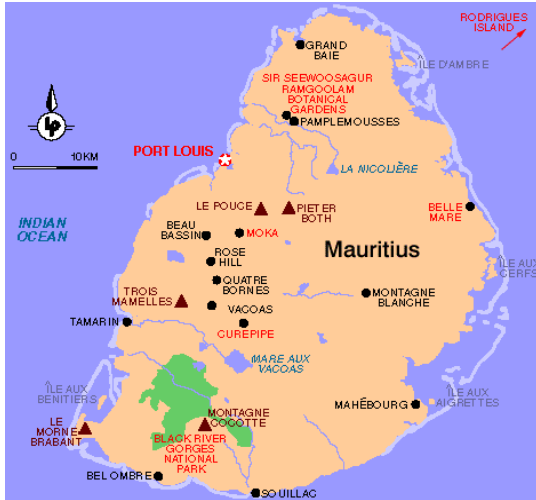
F A G

9. Ramsar Criteria:

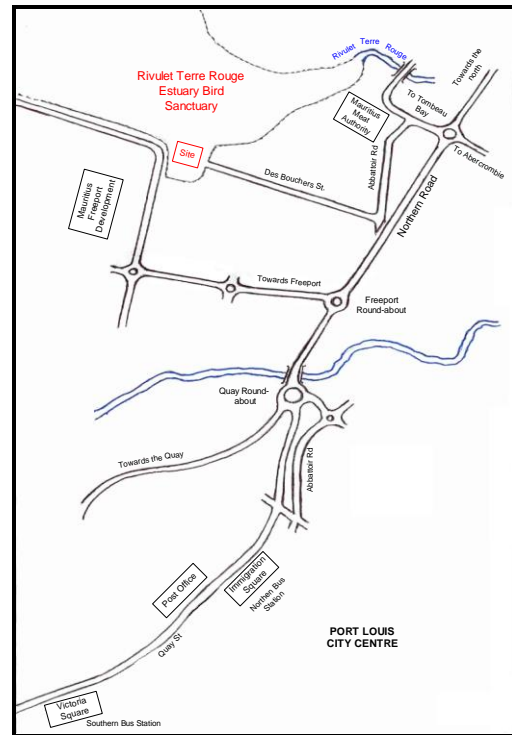
1a 1b 1c 1d | 2a 2b 2c 2d | 3b 4a 4b

Please specify the most significant criterion applicable to the site: 3b

10. Map of site included Please tick *yes*



Map showing Port Louis (North West)



Map showing location plan

11. Name and address of the compiler of this form:

1. Mr. Yousoof Mungroo
Director
National Parks & Conservation Service
2. Mr Manikchand Puttoo
Research and Development Officer
National Parks & Conservation Service

Ministry of Agriculture, Food, Technology, and Natural Resources
 Reduit, MAURITIUS
 Tel: 00 (230) 4642993 Fax:00 (230) 4651184
 Email:npcsagr@intnet.mu

12. Justification of the criteria

Rivulet Terre Rouge Estuary Bird Sanctuary is a natural wetland which formerly formed part of the Mer Rouge Wetland. A large extent of the westward neighbouring area has been reclaimed. It is in one of the most favourite. It is in one of the most favourite sites for migratory birds in Mauritius. It represents only 24 % of the Mer Rouge area.

12.1 Criteria For Representative Of Unique Wetlands

The biogeographical component of Rivulet Terre Rouge Estuary Birds Sanctuary (RTREBS) can be described as an estuary, a marshy land. Part of the area can be classified as tidal mudflats and a small part as shore.

12.2 General Criteria Based On Plants Or Animals

RTREBS presently supports three species of endemic plants as well as fourteen species of migratory birds. In view of creating a green belt and providing a buffer zone, a landscaping programme has already been set up whereby thirty-eight species of endemic plants, adaptable to coastal region have been selected.

12.3 Specific Criteria Based On Waterfowl

The site is known to harbour fourteen known species of migratory birds and five species of sea birds. A comprehensive bird count survey was effected in 1996/97 season from November to March by the comprehensive Technical staff of NPCS and the main findings were as follows. It was noted that a maximum population of 1200 migratory birds was observed at one time at the site and based on the overall figures an average of 650 migratory birds/day were recorded at this period. Bird counts have been carried sporadically in 2000/2001 and an average figure of 500 migratory birds/day was reported.

12.4 Specific Criteria Based On Fish

The mouth of RTREBS estuary ends at a fish landing station and many of the local people living around the reserve are fishermen. There are about 50 fishermen living in the vicinity and who rely partly on the mudflats to collect their fishing baits .

13. General location:

RTREBS is situated in the North West of the Island and is located in the district of Port Louis capital city of Mauritius at about 2 - 3 km from main city centre. The vicinity of this site witnesses many socio-economic activities namely:

- FreePort Authority and activities
- Port related activities (stockage, warehouses)
- Local population whose activities are mostly related to fishing and pig rearing
- Solid Waste Transfer Station activities
- Sewerage pumping station

14. Physical features

14.1 Geology / Geomorphology And Soil Type

The geology of the region consists of intermediate or early volcanic series lava. These are characterized by highly vesicular and fractured basaltic lavas. The upper weathered basalt horizons are generally composed of silts, sand and gravel sized materials..Beneath the site the solid geology consists of basalts which vary in depth and location from highly fractured free grained basalts to very hard moderately vesicular basalts. Some layers were found to be completely weathered to a residual soft rock in the form of sand, gravel and cobbles.

14.2 Origins

It is a natural estuary with a large mudflat, however as mentioned earlier a major part of the area in the vicinity has been reclaimed for development in the port area.

14.3 Hydrology

Surface water and Hydrology

The site lies within the St. Louis/Tombeau Bay catchment or river basin area, which receives approximately 1200 mm of rainfall per annum. Regionally the surface waterflow is to the Northwest via a series of rivulet and artificial drainage channels constructed as development has taken place. Most incipient rainfall in the area are drained towards the lagoon.

14.4 Water Quality

Water quality analysis is carried out at regular intervals at the different sites by the Ministry of Environment, and also by Waste Water Authority, Ministry of Public Utilities for the following parameters: Temperature, Conductivity, Total Dissolved Solid, Turbidity, Dissolved Oxygen, Chemical Oxygen Demand, Sulphate, Nitrates, Phosphates, Chlorides and pH.

The analysis results have shown some degree of pollution caused probably by activities like Pig farming, solid waste dumping and others. However it is encouraging to note that some polluting causing activities are being phased out from this area and consequently this will help to minimize the effect of pollution.

14.5 Climate

The main climatic parameters reported are as follows:

Mean temperature variation between 22.3 °C to 27.7 °C

Daily sunshine 7.3 to 8.6 hours

Mean relative humidity 67-75 %

Mean rainfall 29 – 201 mm

Table 1. Some climate data below (mean reading for the last ten years):-

Months	Mean Temp: (°C)	Daily Sunshine Normals (hrs)	Mean Relative Humidity %	Mean Rainfall (mm)
January	27.7	8.3	72	195
February	27.5	7.9	75	201
March	27.5	7.5	73	146
April	26.5	7.4	71	127
May	24.6	7.6	72	55
June	22.8	7.3	69	54
July	22.3	7.6	67	48
August	22.4	7.6	69	44
September	23.2	7.4	68	29
October	24.5	8.1	69	29
November	25.8	8.6	68	42
December	26.9	7.8	68	148

14.6 Tidal Variations

Monthly calendar of time of high tides is regularly obtained from Mauritius Port Authority.

14.7 Depth, Fluctuations And Permanence Of Water

The estuary was observed to be in presence of water all the year round. Regarding the depth of water in the estuary it would vary from less than a metre to about half a metre at high tide. The water fluctuates as per tide variation.

15. Hydrological values:

Groundwater recharge

The site is located in the northern plain aquifer. The aquifer was formed during the latest volcanic activities and is characterized by vesicular and fractured lava which have created subsurface layer of varying hydraulic properties. The regional ground water flow is to the north west and is regulated by the hydraulic gradient of the northern plain.

Flood control and Shoreline stabilisation

The ground water is likely to be in hydraulic continuity with the lagoon area to the west.

Sediment trapping

The lagoon deposits generally consists of layers of coral fragments in the form of gravel and cobbles, loose shattered oval and basalt fragment in the form of sand and soft faintly laminated slightly organic silt. The base of these deposits was not recorded but they are expected to overlie similar solid strata to that identified above.

No study has been carried out yet.

16. Ecological features:

Habitats and vegetation types are described in their respective sections.:

17. Noteworthy flora:

Out of 69 species identified at the site, about 10 species are either endemic to Mauritius or indigenous to the Mascarene. However, *Sesuvium ayresii* (Family Aizoaceae) which is found only in Mauritius and Rodrigues is considered to be a unique species. A good, sizeable population has been surveyed at Rivulet Terre Rouge Estuary Bird Sanctuary and it is being closely monitored.

A list of plants identified is given in Table 1 and which takes into account the introduced species also.

Table 2: A list of plants from RTREBS:

FAMILY	SPECIES
Amaranthaceae	<i>Achyranthes aspera</i> L. <i>Alternanthera pangens</i> Kunth <i>A. philoxeroides</i> (Mart.) Griseb <i>Amaranthus dubius</i> Mart. ex Thell.
Aizoaceae	<i>Sesuvium ayresii</i> Marais
Boraginaceae	<i>Heliotropium amplexicaule</i> Vahl. <i>Trichodesma</i>
Chenopodiaceae	<i>Artriplex halimus</i> L.
Commelinaceae	<i>Commelina benghalensis</i> L.
Compositae	<i>Emilia sonchifolia</i> (L.) DC. ex Wight <i>Erigeron philadelphicus</i> L. <i>Flaveria trinorvia</i> (Spreng.) C. Mohr <i>Vernonia cinerea</i> (L.) Lam
Convolvulaceae	<i>Ipomoea aquatica</i> (L.) Brong <i>I. pes-caprae</i> (L.) Sweet
Cyperaceae	<i>Cyperus rotundus</i> L. subsp. <i>Rotundus</i> Hooper <i>C. rotundus</i> L. subsp. <i>tuberosus</i> (Rottb.) Kük <i>C stoloniferus</i> Retz <i>Fimbristylis ferruginea</i> Vahl. <i>F. cymosa</i> R. Br. <i>Juncellus laevigatus</i> C. B.U <i>Pycneus polystachyos</i> Beauv. <i>Queenslandiella hyalina</i> (Vahl.) Ballard
Euphorbiaceae	<i>Croton bonplandianus</i> Baillon <i>Euphorbia cyathophora</i> Murr. <i>Ricinus communis</i> L.
Gramineae	<i>Brachiaria enciformis</i> Griseb <i>Cenchrus echinatus</i> Linn. <i>Chloris barbata</i> Swartz <i>C. pycnotrix</i> Trin. <i>Cynodon dactylon</i> Pers. <i>Dactyloctenium ctenoides</i> (Steud.) Lorch. Ex Bosser <i>Eleusine indica</i> Gaertn. <i>Panicum maximum</i> Jacq. <i>Paspalum geminatum</i> stapf. <i>P. vaginatum</i> Swartz

	<i>Rhynchelytrum repens</i> (willd.) C.E. Hubbard <i>Zoizia matrella</i> (Linn.) Merr.
Leguminosae	<i>Albizia lebbeck</i> (L.) Benth <i>Canavalia rosea</i> (Swartz) Dc. <i>Crotalaria retusa</i> L. <i>Desmanthus virgatus</i> (L.) Willd. <i>Indigofera suffruticosa</i> P. Miller <i>I. tinctoria</i> L. <i>Parkinsonia aculeata</i> L. <i>Pithecellobium dulce</i> (Roxb.) Benth. <i>Pongamia pinnata</i> (L.) Pierre <i>Senna occidentalis</i> (L.) Link <i>Tephrosia purpurea</i> (L.) Pers.
Malvaceae	<i>Abutilon guineense</i> (Schumach.) Baker F. et Exell <i>A. indicum</i> (L.) Sweet <i>A. Pannosum</i> (Forst. F) Schlechtend. <i>Sida sp.</i>
Nyctaginaceae	<i>Boerhavia coccinea</i> Mill <i>B. diffusa</i> L.
Passifloraceae	<i>Passiflora suberosa</i> L.
Papaveraceae	<i>Argemone mexicana</i> L.
Portulacaceae	<i>Portulaca oleracea</i> L.
Pteridophyte	<i>Acrostichum aureum</i> L.
Rhamnaceae	<i>Colubrina asiatica</i> (L.) Brong <i>Zyzuphus mauritiana</i> Lam.
Rubiaceae	<i>Morinda citrifolia</i> L.
Solanaceae	<i>Dathura inoxia</i> Mill <i>Physalis minima</i> L. <i>Solanum torvum</i> Linn. <i>Solanum sp.</i>
Verbenaceae	<i>Stachytarpheta jamaicensis</i> (L.) Vahl. <i>Verbena officinalis</i> L.
Zygophylaceae	<i>Tribulus cistoides</i> L.

As per the landscaping programme proposed for the site, most of the introduced species, especially invasive ones, will be removed and replaced by endemics. It is planned to introduce some 38 endemic species adaptable to the micro-climate of the site.

18. Noteworthy fauna:

No endemics or indigenous avifauna is encountered at Rivulet Terre Rouge Estuary Bird Sanctuary. However, the groups of migratory birds visiting the site mainly from September to March are unique birds which attract the attention of many visitors (birds watchers and Scientists). A list of the common migratory birds is shown in the table below. Very little study has been carried out by the Ministry of Fisheries and it is difficult to report on the pisces endemism.

Table 3 A list of migratory birds

Common Name	Scientific Name	Family	French Name
Crab plover	<i>Dromas ardeola</i>	Dromadidae	Pluvier Crabier
Pied avocet	<i>Recurvirostra avosetta</i>	Recurvirostridae	
Grey plover	<i>Pluvialis squatarola</i>	Charadriidae	Pluvier Argenté
Ringed plover	<i>Charadrius hiaticula</i>	Charadriidae	Grand Gravelot
Greater sandplover	<i>Charadrius leschenaultii</i>	Charadriidae	Pluvier de Leschenaule
Bar tailed godwit	<i>Limosa lapponica</i>	Scolopacidae	Barge rousse
Whimbrel	<i>Numenius phaeopus</i>	Scolopacidae	Courlis corlieu
Eurasian curlew	<i>Numenius arquata</i>	Scolopacidae	Courlis cenché
Redshank	<i>Tringa totanus</i>	Scolopacidae	Chevalier gambette
Greenshank	<i>Tringa nebularia</i>	Scolopacidae	Chevalier aboyeur
Terek Sandpiper	<i>Xenus anerus</i>	Scolopacidae	Bargette cenchée
Common sandpiper	<i>Actitis hypoleucos</i>	Scolopacidae	Guignette
Ruddy Turnstone	<i>Arenaria interpres</i>	Scolopacidae	Tourne pierre
Curlew sandpiper	<i>Calidris ferruginea</i>	Scolopacidae	Bécasseau cocorli

Some other species of birds encountered at this site are:

B. Marsh birds.

Little green heron (*Butorides striatus*) Indigenous

C. Exotic birds

Spotted dove (*Streptopelia chinensis*)

Indian crow (*Corvus splendens*)

Indian mynah (*Acridotheres tristis*)

Red whiskered bulbul (*Pycnotus jocosus*)

19. Social and cultural values:

The site is used mainly by fishermen to have access to the Fish Landing Station. Some of the fishermen exploit the marshy estuary area to dig for baits as this area is known to abound in these creatures.

Eleven species of fish one caught at this site and the amount varies at different periods.

The site also includes a spacious sandy area which adjoins the mudflats. This area is used for recreational activities by youngsters who play soccer on this area. This activity caused some disturbance and scares the birds when they come to feed on the mudflats.

However, the local authority has made provision for a football pitch which has been recently built and another one is under way so as to channel these young to these grounds for their recreational activities.

20. Land tenure/ownership of: (a) site (b) surrounding area ;

(a) SITE

The area forming the Rivulet Terre Rouge Estuary Bird Sanctuary is State land. It has been proclaimed as a reserve. A copy of the proclamation of Rivulet Terre Rouge Estuary Bird Sanctuary as a reserve is at ANNEX III.

21. Current land use:

21.1 Site

The site has been proclaimed as a reserve to provide protection to these migratory birds which visit the site every year.

However, some fishermen are still using part of the site as access road to proceed to their fishing sites and the mudflats to search for fishing baits.

However after the completion of Visitors Centre, it is proposed to restrict the site only to visitors. Public awareness campaigns are being carried out to sensitize the fishermen to use an alternative access road located outside the reserve so as to cause minimal disturbance to the birds.

21.2 Neighbouring activities

The westward of the reserve is contained by a fish landing station. The South/South West Ward is reclaimed area and harbours most of the port activities like Mauritius Port Authority, Freeport Authority, and other related port activities like- Warehouses, Petrol Storage tanks. The Eastern side of the estuary holds housing estate, agricultural related activities like the Mauritius Meat Authority (involved in slaughtering and in processing of meat, pig farmers, industrial activities (mostly dyeing factories) and dumping site for solid wastes (closed and converted into a transfer station).

The North/Northwest ward comprises of residential area, industrial zone (textile industries).

22. Factors:

Existing adverse factors

- **Over fishing**
Many of the local people are fishermen by profession and have been exploiting the mud flats baits.
- **Pollution**
Due to presence of ex-dumping ground, leachate is bound to be percolating into the estuary. However, a project for rehabilitation of dumping ground is under study and this will be undertaken by the Ministry of Environment.

Industrial waste water is sometimes detected when there is an overflow or damage in the discharge pipe of the sewerage system. Discharge of effluents directly into the stream is prohibited by law.

Agricultural wastes/effluents were also released in the estuary. But this factor is likely to be eliminated quite significantly since most of the pig farmers and the quarantine station will be relocated away from the estuary.

Port related activities could likely be a source of pollution from ships and tankers carrying petrol, oil and other toxic chemicals. However there is an oil spill contingency plan put in place by the port authority with the collaboration of the Ministry of Environment.

- **Excessive Human disturbance**

The use of the site by the fishermen as an access road, the mud flats for digging their baits and the many youngsters who use part of the site as a football pitch could be the cause for a lot of disturbances to the birds and the ecology of the place

Potential Adverse Factors

1. Pollution Leachate and noxious gases can move laterally towards the estuary/estuarine water.
2. Since RTREBS is found near the port, any hazards like shipwrecks could cause spill (oil, petrol, toxic chemicals) and this would affect fauna and flora of the reserve.
3. The presence of several strategic points (storage of domestic gas, petrol, fertilizer and chemicals) near the port is also a potential hazard to RTREBS in the event of an outbreak of fire.

23. Conservation measures taken

1. RTREBS has been proclaimed as a reserve under Wildlife and National Parks Act 1993 section 11 This proclamation constitutes a major tool for the protection of the reserve.

23.1 Management practices

A Steering Committee already exists, consisting of representative from different Ministries, Non-governmental organisations, municipality of Port-Louis and local organisations of Roche Bois. The committee's objectives is to advise and monitor the proper development of the project and is chaired by a person outside government.

Several management practices are carried out like:

1. Management of flora: removal of invasive exotic species and landscaping programme to create a green buffer zone
2. Management of fauna: monitoring of migratory birds, bird count and identification
3. Chemical detection and control measures related to pollution of water on the site
4. Education and public awareness. The participation of non governmental organisation and secondary institutions in this aspect is encouraged
5. Inventory of the site (on going) in terms of floral and faunal biodiversity.
6. A RTREBS Prime Minister's Appeal Fund has been established to raise money for the development of the site as a water bird habitat and for ecotourism.

24. Conservation measures proposed but not yet implemented:

1. The preparation of a Management Plan is in progress. A draft copy has been compiled and the collaboration of several other institutions will be needed to finalise this plan. Steps have already been initiated in this direction and a comprehensive management plan will be edited by the end of 2002.
2. The Construction of a Visitors Centre on the site will help visitors to have ample information on this site. The administrative part has been completed and fund has also been earmarked. The construction of the visitors centre will start soon. ,
3. A landscaping plan has also been prepared for the site and is already under implementation. The main objective is to revegetate the area and to create some shady points which could eventually be used by bird watchers and researchers for observations purposes.

25. Current scientific research and facilities:

Current projects:

1. The undergraduate and postgraduate students of tertiary institutions are invited to undertake research studies on aspects related to the reserve, pollution and biodiversity. Some studies have already been carried out. One recent project study was Estuarine life in the midst of migratory birds, microbes and anthropogenic activities.
2. The technical staff of NPCS has carried out a survey to monitor bird count on the site and to assess the trend of the migratory bird population during a bird season. The aspects of bird identification will need some training and equipment.
3. The Construction of a Visitors Centre.
4. The creation of a green belt in the site through a proper landscaping program.

26. Current conservation education:

1. The role of the Visitor Centre at RTREBS would provide facilities like conference room, display room, TV, VCR, etc. which would help the public to learn more on wetland issues.
2. The NPCS is working with local organisations of Roche Bois, NGO's, Primary and Secondary school children as well as University students to sensitise them on issues related to wetlands. A set of pamphlets, brochures, posters will be published. Activities are organised on special occasions like Wetland day, Environment day, Biodiversity day to create more awareness.
3. The National Parks and Conservation Service is creating a database, compiling every useful information on RTREBS. The NPCS is a planning to work in collaboration with University students to provide a helping hand in setting up these database.
4. NPCS is making use of media (TV, radio and press) to inform people about wetlands.

27. Current recreation and tourism:

Many bird watchers come as tourists from different countries like Australia, South Africa, England and others to watch those migratory birds. These visitors are commonly seen during the summer period (September to March) when the birds come to this site. Many local people are also seen visiting the place

The Visitors Centre would be an important site to enhance education, ecotourism and leisure activities.

The conversion of the present dumping ground into a recreational site by the Ministry of environment will attract more visitors as this site may also be used to have a better panorama of RTREBS.

The completion of the landscaping programme whereby the whole area will be revegetated will make it an important ecotourism site.

This site could also be used for information and education of the primary and secondary children.

28. Jurisdiction:

Territorial Jurisdiction: Ministry of Agriculture, Food Technology and Natural Resources

Functional Jurisdiction: National Parks and Conservation Service, a unit of the Ministry of Agriculture, Food Technology and Natural Resources

29. Management authority:

National Parks and Conservation Service
Ministry of Agriculture, Food Technology and Natural Resources
Réduit
MAURITIUS
Tel No. : (230) 464 2993
Fax No. : (230) 465 1184
E mail : npcsagr@intnet.mu

30. Bibliographical references:

1. A survey of endemic plants at RTREBS by D. Florens. An unpublished report NPCS 1996 .
2. Project study: Bird count and identification at RTREBS during period September to April 1997. Unpublished report, National Parks and Conservation service.
3. Landscaping project plan for RTREBS – Document prepared by M.A. Guimbeau and Carmagnole 1998.
4. Report on climatic data for the last 10 years. Unpublished Meteorological Department. 1998.
5. Monthly report on tidal variations. Unpublished. Mauritius Port Authority.
6. National oil spill response plan (unpublished report) department of Environment, Ministry of Environment Mauritius December 2000.
7. Wildlife and National Park Act 1993.
8. Rehabilitation of the closed solid waste disposal site at Roche Bois. Revised Draft Technical Report. Scolt Wilson Kirkpatrick and co ltd. June 2001.

Please return to: Ramsar Convention Bureau
Rue Mauverney 28
CH-1196, GLAND
Switzerland
Tel: +41 22 999 0170
Fax: +41 22 999 0169
e-mail: ramsar@hq.iucn.org