

Al Ansab Wetland

Site Management Plan

Jan 2009 – Dec 2013



Sunset at Al Ansab Lagoons

Photo: Claudia Eckardt

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Overview

The Al Ansab Wetland is potentially one of the finest wildlife sites in Oman. Haya water, through the management of the wetland will be providing a nationally and internationally important showcase for some of Omans most important wildlife habitats. The management of the lagoons will simultaneously benefit the efficient operation of the Al Ansab Sewage Treatment Plant (STP) and Treated Effluent (TE) network by providing a much improved water storage and movement system thereby improving the health and environment of Muscat.

The Al Ansab Wetland will become a place where the people of Oman and international guests can enjoy and appreciate wildlife and wild places. Haya water will play an increasingly important role within the local community by providing numerous learning, healthy living and social well being initiatives as well as sustainable livelihood opportunities in a developing responsible tourism sector.

The site requires management interventions to recreate, maintain and develop new features of interest. This management plan is the key working document that not only describes the site and its features of interest, but also defines the management that is required and identifies the resources required to maintain and enhance that interest.

This management plan will be used to explain to anyone with an interest in the Al Ansab Wetland why it is important and how it needs to be managed. All readers are invited to question and comment on the plan and contribute to its continual updating and subsequent revisions. dominicharmer@haya.com.om

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1. Description

1.1 Location

Al Ansab lagoons are located in Madinat Al Erfan, Bousher (Wilayat), Muscat. The centre of nearest town of Al Ansab is 4km away to the SE. with the outskirts 1km (see Map 1). The centre of Muscat is 15km to the NE. Current access is through the Ghala industrial area. The completion of the Southern Expressway road which passes within 0.5km of the southern boundary, and the intersection for the STP, will facilitate easier road access from Muscat.

1.2 Land Tenure

The existing property was acquired by Oman Wastewater Services Company (OWSC) in November 12th 2006. The site was extended to the north east in July 7th 2008. Approximately 40 hectares (ha) of the total land holding is lagoon and associated habitats which are considered in this management plan. Prior to November 2006 the land was the property of the Muscat Municipality.

1.3 Site Status

The Al Ansab lagoons have been recently described as 'formerly the top birding spot of the capital area' for local and overseas birdwatchers. The Oman Bird Group have compiled a comprehensive data set from the records of visiting bird watchers which are a good indication of the sites importance. The site is widely recognised as being of significant nature conservation interest but it currently doesn't have a recognised national or international designation for nature conservation. The operation of a scientific bird monitoring program will provide the evidence for the required criteria to achieve an Important Bird Area (IBA) designation for the site. Approval from the Oman Ministry for the official protection of the lagoons and surrounding habitats is to be sought as a priority.

1.4 Physical Features

The physical aspects of the site which form part of its importance or which have a bearing on its management.

Climate

Climatic conditions in Oman are typified by low and erratic rainfall, high temperatures and high potential evapotranspiration.

Rainfall shows a high inter annual variation. It is not uncommon to have years of very low or even no precipitation in many areas. The mean annual rainfall in Muscat is around 75mm/year, with 200mm to 300mm in a wet year and less than 40 mm in a dry year. Rainfall is infrequent and irregular falling mainly between November and March.

During the summer temperatures reach 48C during the day in June and July and average 32C at night. Humidity can rise to an uncomfortable 90% The mean summer temperature in Muscat is 33C, but the 'gharbi' western wind can raise temperatures by another 6-10C. Winter temperature between October and April average between 25C and 35C during the day and about 18C at night

Hydrology

Surface water flow within the wadi channels surrounding the lagoons is likely to be rare, in most cases probably occurring only for a period of a few hours after a storm. As the upstream catchment appears to be minor, total surface water flows will rarely be significant. During the 2007 cyclone, flows within the wadi overtopped the lagoons, but does not appear to have caused any major damage.

The amount of treated effluent TE discharged into the lagoons is recorded as 2.5 million m³/yr 2006. This figure has significantly increased to a current estimation would of 6 million m³/yr. No significant ground water inflow or rainfall occurs in this area
 Currently no accurate estimation of ground infiltration from the lagoons or outflow into the wadi over the spillway is available. The discharge over the current spillway will in all probability cease following the completion of the new TE pipeline in Q1 2009. However this is both a visually and biologically attractive feature and a managed and monitored flow into the wadi amenity area will be desirable. Evapotranspiration across the lagoons is estimated at 270,000m³/year

Table 1: Shows Surface Area, Depths and Volumes of Existing Lagoons

	Surface area (approximate)	Depth (assumed average)	Approximate volume
Compartment 1 Lagoon B	35,000m ²	1.5m (estimated future maximum depth)	52,500m ³
Compartment 4 Lagoon E	40,000m ²	3.5m	140,000m ³
Compartment 7,8,9 Lagoon C	40,000m ²	2m	80,000m ³
Compartment 5 Lagoon D	10,000m ²	1.6m	15,000m ³
Compartment 6 Lagoon F	10,000m ²	1.6m	15,000m ³
Total	135,000m ²		302,500m ³

The data presented in the above table is based on calculations from the Mott MacDonald feasibility study except Compartment 1 which wasn't included. More accurate data gathering is currently being undertaken.

Geology

The basic geological profile of the area is assumed to consist of limestone and wadi alluvium overlying Hajar supergroup bedrock. The Hajar Supergroup is a highly complex formation , forming the core of the Hajar Mountains and comprising rocks of many types, ranging in age from pre Permian to Tertiary.

Wadi alluvium comprises highly heterogeneous clay, silt, sand, gravel and cobbles of variable mixtures, in the form of coalescing 'braided' deposits. The permeability of wadi alluvium is highly variable , ranging from very high within channel sands and gravels to very low within over bank silts and clays.

The wadi valley is primarily a local structure feature of the Hajar Supergroup; formed by what appears to be a fault on its northern side (forming a small escarpment) and a broader feature on its southern side (possibly the faulted remnants of a synclinal fold structure). The valley may also have been further incised by wadi flows, ie physical and chemical weathering of the bedrock

Several features characteristic of limestone areas such as caves and escarpments will be incorporated into the design and interpretation of the site

A number of previously unrecorded earth works on site have created significant site features such as earth bunds around the lagoons, excavations made into the limestone escarpment, stoning of the wadi banks, excavation of wadi alluvium at various locations. In addition several man made deposits have been apparently randomly deposited around the site. These features will be recorded for the benefit of future planning purposes.

Geography

The area currently identified for the Al Ansab wetland project is approximately 40 hectare of which less than one half is permanent water body. Map 2 overleaf shows the Management Unit and Compartment Areas established for site management purposes based on geographical areas. The surrounding area not currently owned or managed by Haya water is also considered in this plan as considerable potential for compatible management and site expansion exists.

Table 2: Shows the extent of defined management units and some of their significant features

Management Unit	Compartment Areas	Area (m ²)	Physical Description
Unit 1	Compt 1	54756 5.5ha	Formerly, Lagoon B. Currently empty. Bed profile 0-1m approx. Bed reprofiling required before refilling. Marginal vegetation on W and E bank. Closest important bird habitat to proposed car par and Discovery centre. Photo 2
Unit 1	Compt 2	14811 1.5 ha	Low escarpment adjacent to Compt 1. Cut through to wadi created to drain lagoon. Proposed access route and hide and view point located E to W.
Unit 2	Compt 3	36434 3.6ha	Wadi bed with series of shallow pools. Currently permanent flow from Compt 4 lagoon along N edge in wadi. Steep sides of wadi have been reinforced with stone. Position of temporary site office/visitor centre. Proposed route of Wadi trail. Photo 3
Unit 3	Compt 4	55798 5.6ha	Formerly Lagoon E. Currently only accessible lagoon. Access only along E edge and N side. Former access along E and W overgrown by common reed, <i>Phragmites australis</i> as a result of very high water levels and over bank flow. Photos 11 and 12 page 16 show the area 6 years ago and present. Proposed route of main visitor access route. Spillway into wadi in N corner. Redundant water control system from former Lagoon C is located along S edge.
Unit 3	Compt 5	11073 1.1ha	Formerly Lagoon D. Recharged by infiltration and or possible piped flow from Lagoon C. Link in visitor access route along E edge
Unit 3	Compt 6	13782 1.4ha	Formerly Lagoon F. Recharged by overbank flow or infiltration from Lagoon E. Currently completely inaccessible due to encroachment by mesquite, <i>Prosopis juliflora</i> .
Unit 4	Compt 7	30196 3ha	Formerly Lagoon C. Receiving area for TE flow. Irregular outline. Unknown depth. Dominated by unmanaged reed bed. Accumulated biomass substantially limits the TE storage capacity of this lagoon. A ditch along the S edge has been created for an undocumented purpose. Photo 4
Unit 4	Compt 8	8591 0.9ha	Formerly open area of water in the reed bed, assumed deeper areas now dominated by water hyacinth <i>Eichhornia crassipes</i> .
Unit 4	Compt 9	2645 0.3ha	Formerly open area of water in the reed bed, assumed deeper areas, now dominated by water hyacinth <i>Eichhornia crassipes</i> .

Unit 5	Compt 10	76740 7.7ha	Large area with varied topography with 3 significant ridges and low lying areas with potential for the creation of new lagoons. The W edge is currently occupied by the Southern Expressway construction camp. This has resulted in an unacceptable level of disturbance to this area. Agreement has been reached to move operations back from the lagoon and to screen and fence the operation to limit further problems. The physical disturbance of the area will require some landscaping and replanting. Following the completion of the expressway the creation of more lagoons to the W utilising the existing topography would be an obvious way to create more TE storage and wildlife habitat and a buffer zone if the land became available.
Unit 5	Compt 11	9926 1ha	A drainage channel, probably man made, exists and separates Compt 11 from 10. 2 significantly higher 2-3m ridge areas are present. This area is currently inaccessible. Photo 5
Unit 5	Compt 12	24906 2.5ha	Continuous with compartment 12. Significantly disturbed by construction traffic but accessible and currently one of the best bird watching areas with views of the reed bed margins and shallow pools. Part of the proposed maintenance route for the reed bed restoration program.
Unit 6	Compt 13	25565 2.6ha	Escarpment continuous with compartment 14 but with cut channel at W edge which will form part of main visitor access route. S edge has interesting cliff at lagoon edge with small caves currently inaccessible due to mesquite, <i>Prosopis juliflora</i> . Proposed location of the Cliff hide to be excavated in bank.
Unit 6	Compt 14	18339 1.8ha	Current access point in NW corner due to incomplete fence. Narrow strip of rocky semi desert.



Photo 2: Compartment 1 viewed from Compartment 2



Photo3: Compartment 3, Office and visitor centre



Photo 4: Unit 4, unmanaged reed bed, ditch and in distance open water dominated by water hyacinth

Photo 5: Compartment 11

1.5 Biological Features

The plants and animals which form part of the sites importance and which contribute to local national and international biodiversity

Flora

The habitat around the Al Ansab lagoons is typical of the Gulf of Oman desert and semi-desert ecoregion (AT1306) which includes the areas across the Batinah plains of northern Oman

There are four main habitat types on and adjacent to the lagoons; (i) the open, rocky, semi-desert, (ii) dense scrub habitats, (iii), reed beds along the lagoon margins and (iv) the areas of open water.

The open, dry and rocky landscape areas adjacent to the lagoons have a scattering of *Acacia tortilis* and *Prosopis cineraria* trees and low growing drought-tolerant perennials typical of the region.

Dense scrub dominated by *Acacia tortilis* and the invasive alien mesquite *Prosopis juliflora* occur along the bunds and embankments around the lagoons. *Prosopis juliflora* has overwhelmed native species in recent years particularly in compartment 3, 5 and 6. See Photo 6 and 7 below

The water margins of the lagoons are dominated by dense stands of bulrush *Typha* sp. and reeds *Phragmites australis*. With the maturing of the lagoons and no existing management in place the bulrushes and scrub are encroaching into the open water margins. Unit 4 is almost completely dominated by reeds and water hyacinth *Eichhornia crassipes*.

Both the water hyacinth and mesquite species are increasing in abundance across the site and choking out nature species, significantly reducing the ecological value of the site. Specific plans to eradicate these species will be implemented in the early phase of this project.



Photo 6 & 7: Mesquite, *Prosopis juliflora*, overwhelming and native flora and blocking access to the lagoons

Although no detailed botanical surveys have been undertaken the lagoons would be expected to contain at least 80 - 100 plant species. Two rare plant species are known to occur at the lagoons and at no other location in Oman, these being *Solanum surattense* and *Muntingia calabura*.

Fauna

To date 279 bird species have been recorded from the lagoons. The mosaic of diverse habitats within a relatively small area has resulted in the highest density of bird species in Oman. The majority of the bird species recorded from the lagoons are migratory. Bird species migrating along the Al Batinah northern coastal plain or along the ridges of the Al Hajar mountain ridges are likely to stop over at the lagoons to feed and rest in this “greening-of-the-desert”.

A summary of the most important bird species recorded on the lagoons are listed in Table 3. These important species include migratory waders and eagles, over wintering birds, wildfowl (notable black-necked grebe) and breeding populations of black-winged stilt. The Oman Bird Group maintains records of birds from the lagoons.

Table 3: Important Bird Species of the Al Ansab Lagoons

Species	Conservation importance
Black-winged stilt <i>Himantopus himantopus</i>	Only breeding population in Oman, and one of only four breeding sites in the Gulf. Needs water margin vegetation and shallow water.
Black-necked grebe <i>Podiceps nigricollis</i>	Irregular winter visitor to Oman, but large wintering population (30-50 birds) at the lagoons. Needs large areas of open water.
Little stint <i>Calidris minuta</i>	Common passage migrant and winter visitor. Needs open mud/sand banks for feeding.
Temmick's stint <i>Calidris temminckii</i>	Common passage migrant and winter visitor in small numbers. Needs open mud/sand banks for feeding.
Dunlin <i>Calidris alpina</i>	Regular passage migrant in large numbers in Oman. Frequent at the lagoons. Needs open mud/sand banks for feeding.
Curlew sandpiper <i>Calidris ferruginea</i>	Regular passage migrant. Needs open mud/sand banks for feeding.

Green sandpiper <i>Tringa glareola</i>	Common passage migrant and winter visitor. Good numbers at the lagoons. Needs open mud/sand banks for feeding.
Wood sandpiper <i>Tringa ochropus</i>	Passage migrant, but not common. Few seen at the lagoons, but an important habitat. Needs open mud/sand banks for feeding.
Spotted redshank <i>Tringa erythropus</i>	Scarce, irregular migrant and winter visitor. Lagoons are an important habitat for the species. Needs open mud/sand banks for feeding.
Marsh sandpiper <i>Tringa stagnatilis</i>	Passage migrant and winter visitor in very small numbers in Oman. Needs open mud/sand banks for feeding.
Spotted crane <i>Porzana porzana</i>	Passage migrant and winter visitor in small number. Frequently seen at the lagoons, an important site in Oman for this species. Needs dense reed beds for breeding and water margins for feeding
Baillon's crane <i>Porzana pusilla</i>	Passage migrant and winter visitor. Rarely seen. Needs dense reed beds and water margins for feeding
Steppe eagle <i>Aquila nipalensis</i>	Passage migrant and winter visitor. Common eagle at the lagoons
Imperial eagle <i>Aquila heliaca</i>	Globally threatened, regular passage migrant but rare visitor to the lagoons.
Great spotted eagle <i>Aquila clanga</i>	Globally threatened, regular passage migrant and winter visitor in small numbers at the lagoons.
White Pelican <i>Pelecanus onocrotalus</i>	Scarce irregular visitor to Oman and at the lagoons.



Photo 8: Breeding Black-winged stilt at Al Ansab Lagoons Photo: Hanne & Jens Erikson

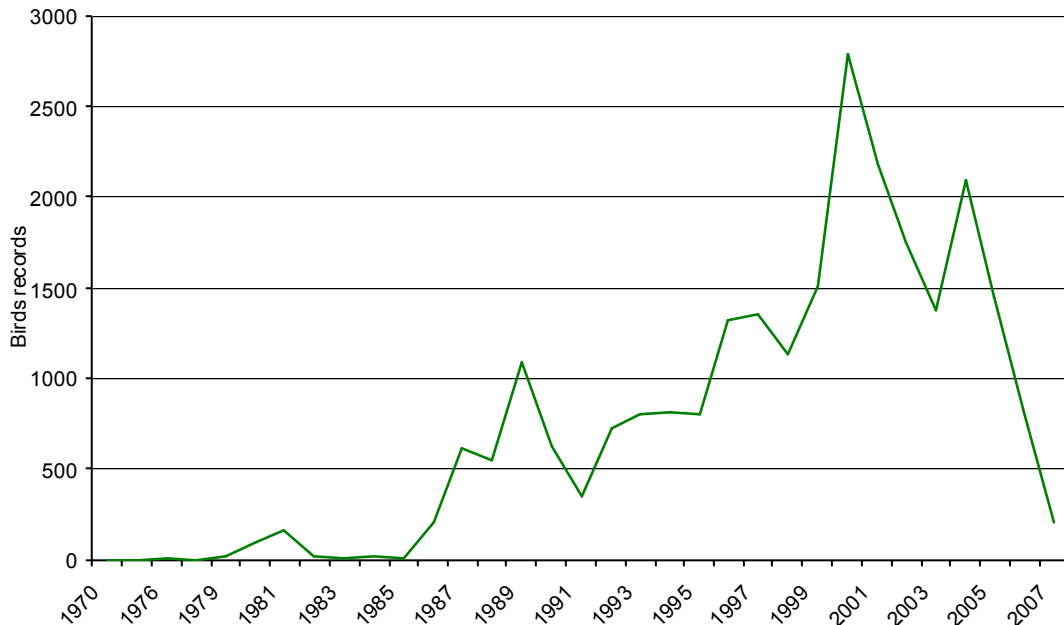
Twenty bird species have been confirmed as having bred at the lagoons including an important Black-winged stilt populations last recorded in 1997. See Photo 8. It is likely that breeding bird species have gone unrecorded without regular monitoring. Past breeding success will have declined in recent years with the loss of suitable breeding habitat and the dramatic increase in the resident feral cat population. Breeding population will benefit

considerable from the creation of islands and management of other habitats and the removal of predators.

The lagoons are also important for large number of gulls, passage barn swallows *Hirundo rustica*, sand martins *Riparia riparia* and pied wagtails *Motacilla alba*. Important regularly occurring bird species likely to attract specialist bird watching tourist include White tailed Plover *Chettusia leucura* and Lichtenstein sandgrouse *Pterocles lichtensteinii*.

Over the past seven years or more the diversity of birds at the lagoons has declined, in particular for migratory wader species and birds of prey. See Graph 1 below.

Graph 1: Al Ansab Bird records 1970-2007



Population trends for the important bird species identified in table 3 are shown in Appendix 1. Population trends for small and medium sized waders are dealt with separately as are crane and raptor species.

Bird records from the site increased consistently from 1987 onwards following the development of the STP and the creation of the lagoons. 2001 marks the peak in birds recorded on site. Subsequently there has been a similarly dramatic decline in the number of birds recorded on the site.

Four main reasons can help explain the observed downward trend.

1. Firstly the amount of water in put into the lagoons has increased dramatically. Without the facility to move water for management purposes or sufficient demand for TE sub optimal conditions for bird species have been created except by coincidence. When water levels are so high throughout the site wading birds in particular can not find the required marginal feeding habitats and suitable safe roosting areas.
2. The second main factor is that habitats on site have matured. This is a natural process that has created less favourable conditions for the range of bird species. For example the reed bed has started to dry out and develop into scrub significantly reducing the availability of specific bird niches as well as its water storage capacity.
3. Non native invasive species have either been deliberately introduced eg water hyacinth or 'naturally' established themselves and have been allowed to spread and dominate native habitats eg mesquite. These species have significantly reduced the biodiversity of the site.

4. The decline in the bird of prey is largely due to the closure of the Sunub Waste Disposal site which provided the birds of prey with a good food supply from local abattoirs. However eagles still visit the lagoons as a resting point during migration.

Difficulties in accessing the site in recent years have resulted in a significant reduction in the number of reported bird sightings being submitted to the Oman Bird Group. This must be considered when interpreting the currently available bird data.

A constant effort bird monitoring scheme and breeding bird census work will be undertaken as a priority. This will provide the mechanism for a more complete understanding of population trends.

Relatively few other animal species have been documented as occurring at the lagoons, but are probably present. Insect diversity is likely to be particularly high owing to the diversity of habitats within a relatively small area. Dragonflies are particularly abundant and of interest to visiting nature watchers.

Lizards and snakes, much to the dismay of some people, occur throughout the site. The wadi racer, *Coluber rhodorachis*, a harmless species of snake without fangs and venom is the only species recorded by the author. There appears to be an abundance of amphibians judging by the evening calls and the prey items taken by heron species.

The Arabian gazelle *Gazella gazelle* has been recorded from the lagoons as have an unidentified species of fox.

Feral cat and dog populations which appear to have increased dramatically within the last few years are likely to have a significant impact on the native local fauna. The removal of these populations is priority for recovery of the indigenous fauna.

Ecological Importance of the Al Ansab Lagoons

The Al Ansab lagoons can be regarded as being of international importance for migratory species and nationally important for breeding birds and species diversity, this is because:

- The lagoons regularly hold globally threatened species, e.g. imperial and great spotted eagles.
- The lagoons are important for a significant number of nationally important passage migrants, e.g. gulls, waders and eagles.
- The lagoons are known to attract rare passage species which are declining throughout all or large parts of their range, e.g. sacred ibis.
- The lagoons represent a rare combination of habitats possessing characteristic bird communities which are untypical in the region, e.g. the large reed bed areas, scrub, open water and desert habitats all within a relatively small area which is depicted in the high density of species at the site.
- The lagoons are undoubtedly important for bird conservation in Oman in particular as a future education, research and tourism potential.

It is therefore important for the conservation of biodiversity in Oman that the Al Ansab lagoons are protected, and subsequently expanded to enhance the diversity and the ecological importance of the lagoons.

The proposed bird migration monitoring scheme discussed in Appendix 2. Feasibility study into a long term ringing project, will provide the required evidence to achieve a Important Bird Area (IBA) designation by 2010.

1.6 Cultural Features

Important features of the site and its use for purposes other than nature conservation

Land-use History

The site of the lagoons was formerly an area of semi-desert and wadi beyond the outskirts of Muscat, probably used as limited grazing for goats by local people. No other recorded use is available at this time.

With the expansion of Muscat and the increase in nearby industrial activity unplanned and unregulated dumping of domestic and industrial waste including oil occurred in the NE section of the current landholding.

A series of lagoons were constructed in 1986 and 1987 as settling areas for domestic effluent. Bunds were formed to create unlined broadly rectangular lagoons of varying depths to store the effluent.

When the first STP opened in 1989-1990 8 operational staff were based at Al Ansab.

In 1991 a TE pumping station began operating and water levels were raised in the lagoons. Up until 1995 oil and industrial waste was still dumped on site

Since 2006 works to build a 'state of the art' MBR treatment plant and TE network have been ongoing. Compartment 2, formerly Lagoon B, was drained for construction purposes during this period and subsequently water levels were raised in the other lagoons to try to accommodate rapidly increasing volumes of TE. Areas outside the lagoons have been used to temporarily store TE. A series of dams created along the wadi have formed lakes. These have been small scale temporary structures created to relieve surface water flooding issues downstream.

Historic Features

No major historic features other than the recent man made lagoons and dams have been recorded. With so much recent disturbance an unrecorded earth movement features of interest may have been lost but every effort will be made to record and protect what remains. The photograph below shows a feature created during a recent military exercise.



Photo 9: Gun emplacement created for military practice

Socio economic use

Haya water will continue to use the lagoons to manage the supply of treated effluent to Muscat Municipality and other customers which is provided for irrigation purposes. It is proposed that through improved management of the existing lagoons and the creation of additional lagoons TE storage capacity and nature conservation benefits will both be significantly improved.

Haya water will soon be relocating the majority of its 400 staff to Al Ansab. To date little use of the site by Haya water employees has been made other than during routine maintenance. The wetland will provide a valuable recreational amenity for employees and their families in the future

Low levels of 'unofficial' camping and fishing have historically been observed around the lagoons and in the adjoining wadi area. It is very hard to quantify this use as staff rarely patrol the site. It may be possible and desirable to provide some facilities in the adjoining wadi area for these activities in the future.

Since the author has been on site unauthorised groups and individual have been seen on site and evidence of shooting and trapping of birds observed. These illegal activities will be prevented in the future, by undertaking regular patrols, as they are completely incompatible with nature conservation and bird watching activities.

The northern boundary of the lagoons appears to be a popular pedestrian route for local construction workers. Areas along this route are unfenced and these workers frequently enter the site presumably out of curiosity?

There is currently a significant and disturbing increase in the use of the lagoon edges and areas immediately adjacent for the illegal dumping of waste construction materials etc. Personal observation indicates several new loads are deposited each week. Dumping from the neighbouring escarpment into the wadi bottom is particularly damaging as this material will be very difficult to remove



Photo 10: Dumping of construction and general waste by Galfar Southern Expressway Camp in and adjacent to the lagoons in Compartment 10

Education, Research and Demonstration

Occasional visits, 1 or 2 per year, are currently made by educational institutions in Muscat wishing to understand more about the operation of the STP.

Some use of the 'Water Box' education tool for promoting understanding of water treatment and wise use of water has been undertaken by Haya water. There is potential to develop this further through educational and community links created by the Al Ansab Wetland project.

The development of educational, research and demonstration potential of the wetland is central to this project and is dealt with in detail in Section 2.2 the site management policy.

Community Involvement

In spite of the importance of the work of Haya water and the Al Ansab STP for the health and environmental benefits to the local community there appears at this stage to be a relatively low level of appreciation of the role of Haya water in the local community. Innovative pilot projects such as the 'water box' and other schools projects have improved this situation in recent times. Considerable potential exists to create much greater community involvement and understanding through the development of Al Ansab wetland project. This is discussed in section 2.2

1.7 Access & Visitor Facilities

Accessibility and visitor appeal, transport links access routes and visitor facilities

Visitors to Al Ansab lagoons to date have almost exclusively been highly dedicated birdwatchers predominantly from Northern Europe and the US. The 'unofficial' access policy of OWSC for the site has been the non promotion but acceptance of occasional visiting individuals and groups of birdwatchers. Estimates of annual bird watching visitor numbers peaked in 2001 at approximately 1000 visitors per year. This is a niche but significant and growing sector with significant potential to contribute the developing tourism market in Oman.

At this early stage of the development of this bird watching market the overriding priority for visiting groups is obtaining good views of birds in general and of certain target species not easy to find elsewhere. Unlikely locations such as sewerage works and rubbish dumps are often selected as they provide these opportunities

The excellent reputation of Al Ansab Lagoons for overseas birdwatchers has suffered somewhat in recent years as excessive water levels have reduced the number and diversity of species on site and invasive and non native plant species have become dominant blocking access routes and view points. The general lack of management, dumping of rubbish, feral dog and cat population etc all contribute to a sense that the site is currently unsafe to visit. The current state of the site requires significant practical management to meet the basic requirements of visitor safety, access and something to see. Remedying these basic problems is fairly straightforward and significant progress can be achieved in the first year once on site construction work for the STP is finished. It should be possible to reach previously recorded peak levels of 1000 visitor per year in the first year of this plan. See section 2.2

If significant progress isn't made at an early stage there is a risk that a recent trend amongst visiting birdwatchers to 'miss out' the capital area and go straight to Salalah will continue. This is not only a result of conditions at Al Ansab but also at Qurum Park



Photo 11: Photo: Hanne & Jens Erikson



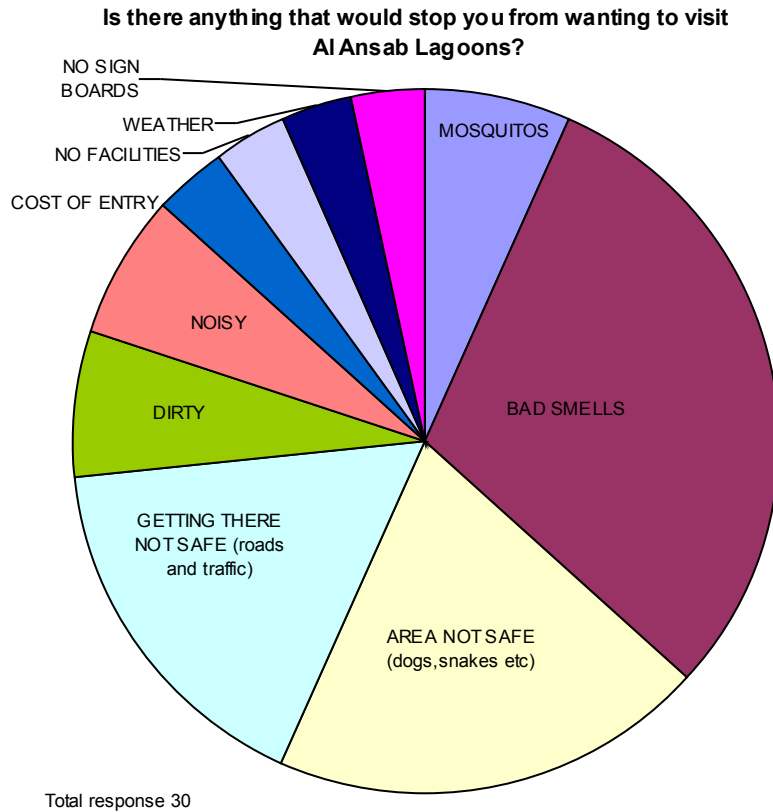
Photo 12

Photo 11: Access along southern edge of compartment 4 2001. Excessively high water levels and bank overflow made this route unusable and have encouraged the spread of dense reed *Phragmites australis* and mesquite *Prosopis Juliflora*. Photo 12: Early attempt to reopen this path where of limited success. Specialist equipment and techniques will be used for efficient ongoing access and habitat management.

No information has been available on the use of the site by Omani visitors. This is probably because levels of use have been so low as to go unnoticed and unrecorded. In order for the wetland project to be a success a new market amongst Omani visitors needs to be created. This is discussed in detail in Section 2.2 Site Management Policy.

The commercial department of Haya water kindly participated in the market research illustrated below undertaken in November 2008. Ongoing market research will be undertaken as part of the development of visitor facilities.

Several factors currently limit the visitor appeal of the lagoons particularly to potential Omani population. Some are quite real e.g. no facilities and some are unavoidable e.g. mosquitoes in certain locations at certain times. The effects of others factors such as concerns regarding the presence of snakes, and the perception that that the area is smelly dirty and noisy can in part be overcome through education and visiting the site. Road access to the site will be dramatically improved with the opening of the new Southern Expressway .



1.7 Summary of Site Features

Biological features				
Feature No.	Specific Feature	Explanation	Legal Designation	Other Classification
1	Significant numbers of passage migrants	Waders, eagles and gulls	None	Nationally important
2	Rare passage species	e.g. sacred ibis.	None	Declining throughout all or large parts of their range
3	Threatened species	e.g. imperial and great spotted eagles	None	Globally threatened
4	Breeding birds	e.g. Black winged stlit	None	Nationally important
5	Combination of habitats supporting high density of bird species	Reed bed, scrub, open water and rocky semi desert. 279 species recorded on site	None	Rare and untypical combination in region
6	Invasive species	Prosopis Juliflora, water hyacinth	Notifiable pest species?	Highly significant local national and international threat to biodiversity
7	Invertebrates	Dragonflies	None	Interesting, notable

8	Rare plants	<i>Solanum surattense</i> and <i>Muntingia calabura</i> .	None	Not recorded in other location in Oman
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Other features					
Feature No.		Past/Current		Projected (see section 2.2)	
		Insignificant	Important	Important	Very important
9a	Public access-Overseas birdwatchers		X		X
9b	Public access-Omani visitors	X			X
10	Education-environmental and sustainability awareness	X			X
11	Research - Biological	X		X	
12a	Demonstration - water treatment, recycling	X			X
12b	Demonstration – use of renewable energy technologies, traditional architecture	X		X	
12c	Demonstration-conservation management techniques	X		X	
13a	Economic use – Operation of STP		X		X
13b	Economic use – sustainable tourism	X			X
14	Community involvement	X			X

2. Evaluation, Formulation of Vision and Site Objectives

2.1 Site Analysis

The issues which positive and negative effects on management of the site

Site Strengths	Site Weaknesses	External Opportunities	External Challenges
<ul style="list-style-type: none"> • Rare combination of habitats including significant permanent water. • Relatively small area manageable with predicted resources • Potential to expand lagoon area and associated habitats • Nationally important migrant bird populations • Attracts rare passage species • Nationally important breeding bird populations • Site owned and managed by Haya water • First of its kind in Oman • Excellent opportunity for development and demonstration for a range of management processes and techniques • Existing visitor base and close to Muscat • Scenically attractive • Adjacent to new HQ for Haya . Encourage access for employees and families 	<ul style="list-style-type: none"> • Isolation. Similar habitats nearby such as Al Qurm Natural Park currently in unfavourable condition • Due to small size there is potential conflict between public access and nature conservation • Nature conservation and visitor interest must be integrated with requirements for TE storage • Water control are not currently adequate • Invasive species – mequite and water hyacinth well established on site • Only limited biological data for management purposes available at present • Site not currently designated as a protected area. • Currently site access is very limited and there are no dedicated facilities for visiting public • Currently no demand exists for Omani visitors • Local concerns exist about the presence of snakes, mosquitoes and other dangerous animals • Algal blooms, offensive odours, potential contamination have been recorded in the lagoons 	<ul style="list-style-type: none"> • Possibilities to promote compatible land management with nature based recreational facilities exist in adjoining wadi • A Discovery centre will be provided on adjoining land by OMRAN in 2010 • Significant opportunities for joint interpretation, marketing and education strategy with Oman Botanical Gardens • Significant improvement to road access will occur with opening of Southern Expressway • Pedestrian and buggy access will be planned from proposed convention centre, 2010-12 • The promotion and development of nature based tourism is occurring throughout Oman. 	<ul style="list-style-type: none"> • Potentially incompatible development pressure could occur in surrounding area. No buffer area currently exist • Avian Influenza could have very serious consequences with high concentrations of avi- fauna on site • Reversing declines in globally threatened species throughout their ranges is largely beyond the scope of this site management.

2.2 Site Management Policy

The broad management policies and the reasons why these options have been chosen. All policies are wherever possible socially, environmentally and economically sustainable.

Biological features

Management of the existing habitats and the creation of new habitats is required in order to support the high density of bird species previously recorded in particular the passage migrants, including rare and threatened species and breeding bird populations. This policy will also benefit interesting invertebrate and plant communities

There are four main habitat types on and adjacent to the lagoons; (i) open water- lagoons and pools (ii) reed bed and lagoon margins (iii) dense scrub habitats (iv) open, rocky, semi-desert,

Open Water- lagoons and pools

- Install a low maintenance, easy operation, efficient water level management system to facilitate the creation of optimal conditions for passage waders and winter wildfowl. This can be accommodated within the function of the lagoons as a TE storage facility with cooperation, coordination and increased understanding of conservation requirements.
- Create vegetated floating islands, using planted mats, suitable for roosting and breeding birds and aquatic organisms. Investigate suitable native, non invasive species of aquatic macrophytes to introduce. This will provide maximum TE storage in Compartment 4 without compromising nature conservation interest. Water quality and biodiversity will also be improved.
- Create un-vegetated floating islands or 'tern rafts' for roosting and breeding birds floating islands using mats suitable for roosting and breeding birds and aquatic organisms. This will provide maximum TE storage in Compartment 4 without compromising nature conservation interest.
- Create new permanent islands and margins for feeding waders, safe roosting and breeding areas in compartment 1. Allow some to vegetate through natural succession and maintain others free from vegetation. These islands will also increase visitor awareness of the role of Haya water in managing the site through branding.
- Utilise existing features and create new scrapes in compartment to provide suitable feeding conditions for breeding and passage waders. Work with seasonal draw down of water levels in Summer with peak TE demand but ensuring that the area doesn't completely dry out
- Investigate existing fish populations and the potential for stocking with suitable species as prey items for herons, osprey and other important species
- Create new lagoons in future designed for the combined purpose of water storage, nature conservation and water treatment
- Maintain water at appropriate level ensuring lagoon margins are available for feeding wader species and crakes
- Maintain and create a series of temporary and permanent pools of varying sizes throughout the site for specific species of birds insects and aquatic vegetation to increase the biodiversity of the site
- Maintain and create some surface flow over spill ways as an ecological niche favoured by wagtails etc. Monitor flows and water quality. Investigate use of Falaj type system



Photo 13: Compartment 4 (Lagoon E) in favourable condition for passage waders and breeding birds. Similar conditions will now be created in Compartment 2.

Photo: Hanne & Jens Erikson

Reed bed and Lagoon margins

- Instigate reed bed restoration and management plan.
- Carefully remove water hyacinth *Eichhornia crassipes* through the implementation of the eradication program. Ensure it doesn't spread to other lagoons- trial various control techniques –physical, chemical and biological
- Remove significant amounts of accumulated biomass to significantly increase water storage capacity to increase biodiversity and improve water quality.
- Rotationally cut reed on a five year cycle.
- Create system of large and small, deep and shallow pools and ditches within the reed bed
- Create boardwalk to gain access into the reed bed
- Identify and maintain favourable locations for opening areas for viewing particular species such as rails and crakes

Dense scrub habitats

- Manage mesquite *Prosopis juliflora* through the implementation of the eradication program,
- Encourage native species
- Maintain and create new access
- Create standing dead wood and habitat piles

Open, rocky, semi-desert

- Manage areas by non intervention and non disturbance
- Re profile and re plant heavily disturbed areas with suitable native species as necessary and to biodiversity of the site.
- Manage mesquite *Prosopis juliflora* through the implementation of the eradication program
- Clear encroaching scrub along the escarpment face in compartment 13 which has several small cave features. Create experimental borings into cliff for nesting opportunities – Bee eaters, bats etc.

Other features

Public access

The access policy adopted is to provide high quality natural environment and facilities to encourage nature based recreational and tourist activities without compromising or damaging the biological or other physical features of the site

A zoned approach to access management, incorporating the use of the neighbouring land being developed by OMRAN, will be adopted to maximise visitor opportunities and minimise conflicts of interest. In cooperation with OMRAN many of the desired facilities and features can be provided within the Al Ansab site or in the immediately adjacent wadi area in association with the development of the Convention centre. This strategy will facilitate access to parts of the area whilst leaving other parts relatively undisturbed. This will overcome one of the basic problems with the Al Ansab site which is its relatively small size and the potential of high visitor pressure compromising its important biological features. Extension of the lagoons, planned for increasing TE storage and nature conservation, to the west following the completion of the Southern Expressway will also address some of the issues associated with the size of the site. Site facilities such as paths are being designed now to accommodate projected plans in order to minimise disruption, disturbance and unnecessary future expense.

General recreational visits will be focused primarily in the adjoining wadi areas where play, restaurant camping and other facilities can be accommodated. Compartments 2,3 and the eastern section of 4 will provide the main focus for general site visits and education services. Specifically bird watching groups will make most use of the main visitor access loop and boardwalk. Areas of the reserve accessed by the maintenance route will be managed as limited access, non disturbance and zones.



Photo 14: View from wadi, proposed amenity area, looking back to Al Ansab Lagoons

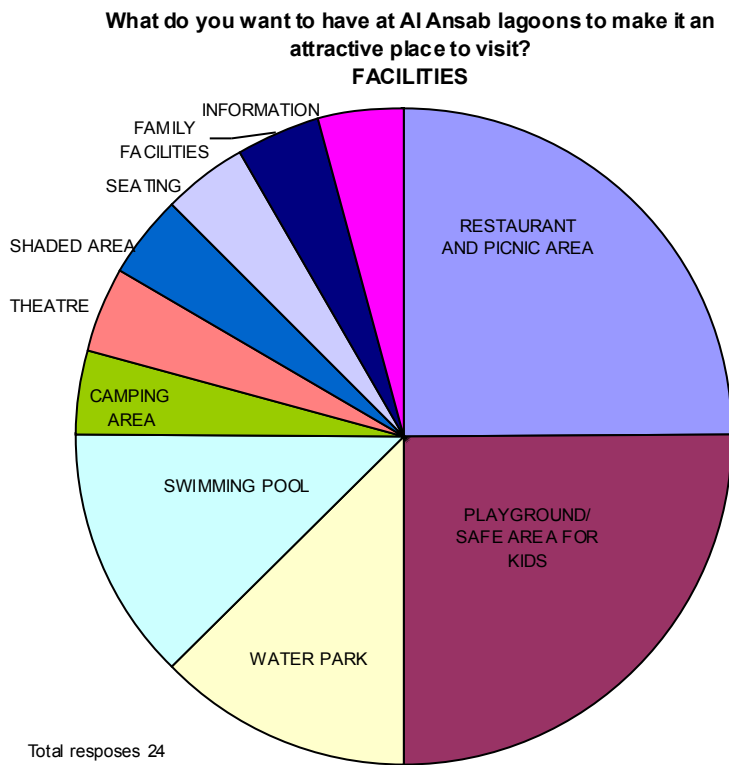
Understanding what future visitors require is critical to the success of this project.

In order to accommodate increased visitor numbers and a more demanding and sophisticated tourist market facilities such as comfortable viewing hides, a discovery centre, interpretation facilities and restaurant etc will be required. It is vital to get basic temporary facilities will be in place in the first year of this plan. Re establishing the good name of Al Ansab amongst international visitors at an early stage will build the reputation of the site and will give a good indication of the type of future infrastructure required thereby ensuring efficient and cost effective infrastructural investment is made.



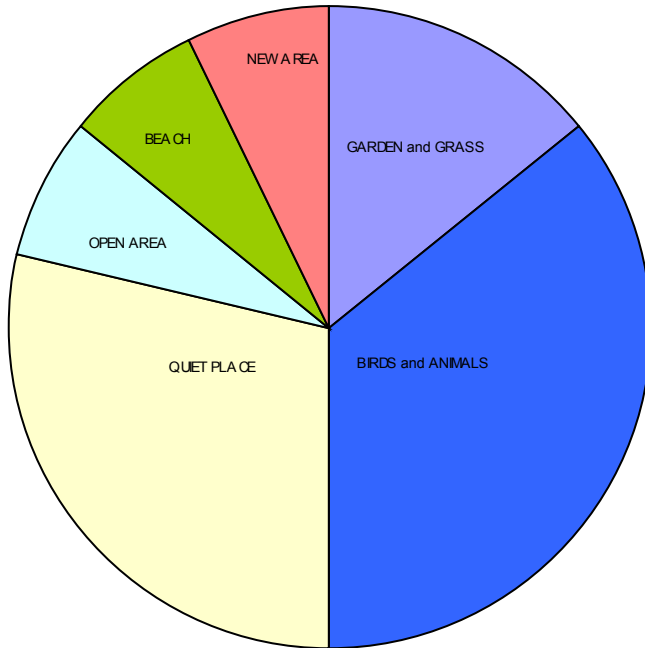
Photo 15: First group of overseas birdwatcher visiting the lagoons - October 2009

In order to develop the future Omani visitor profile it is vital to understand the requirements of this group of potential visitors so that desired facilities and features can be incorporated into the management of the site. The commercial department of Haya water kindly participated in the market research illustrated below.



What do you want to have at Al Ansab lagoon to make it an attractive place to visit?

NATURAL FEATURES



Total responses 14

The emphasis placed on family friendly and eating facilities is significantly greater than might be expected from international bird watching tourists who are typically older visitors without young children who visit for an hour or two rather than come with families stay longer and have a meal.

Potential Omani visitors also place more importance on quiet and garden like outdoor experience than the presence of observable birds and animals.

Basic provision of facilities will be made in the early phase of the project with upgraded permanent facilities such as a Discovery centre and permanent hides completed during the duration of this plan. Planned access routes and visitor facilities are shown overleaf. Map 2 Al Ansab Lagoon Project Design.

Access routes and parking

An all-ability access is feasible from the proposed visitor parking area and visitor centre with a circular route established around the perimeter of Compartment 4 (Distance 1.5km). Vehicle transportation by golf cart type vehicles will be available for specific user groups along a defined and restricted path. This will also allow use of the site during the hot summer when walking around the site would be impractical. Vehicle movements will be unidirectional depending on time of day, supervised by accredited guides and separated from pedestrian access for safety purposes.

Work commissioned by Parsons Int. will provide car parking facilities and access to the temporary site office (Distance 0.5km) by Q2 2009. This area will provide the focus for the majority of the site visitor and education service site. The short distance to the Discovery centre and the most used areas has again been planned to overcome issues associated with walking in hot conditions.

An outer circular maintenance route (Distance 2km) primarily for site management purposes such as reed bed restoration and invasive species eradication, will be established in the early stages of the project to avoid conflict with visitors. With possible expansion plans connective paths could easily be established with minimal disturbance. In areas to the west non disturbance zones for experiment, ringing activities etc will be designated.

Hides and Screens

No bird watching facilities currently exist on site. This results in considerable disturbance to birds when people are present on site. Most birds fly away and out of view when people arrive. This may be a recent development as a result of increased construction activity and shooting but is a relative straightforward matter to address. All visitor routes will be designed to minimise disturbance by managing existing marginal lagoon vegetation as 'natural screening'. The positioning of hide structures is critical for their success and consideration of suitable habitats and species to observe, orientation in terms of light and wind etc are vital. Temporary observation structures will be installed as a priority in 2009 to allow research and the limited public use expected in 2009. These trial structures will provide the template for permanent structures. The final design of these permanent structures on site will demonstrate traditional Omani building techniques combined with the use of renewable energy for cooling and lighting.

Discovery centre

The establishment of a Discovery centre for the wetland project with associated education facilities family friendly restaurant and toilets and environmental recreation area is currently being planned and will be constructed in 2010 with the cooperation of OMRAN. It is hoped that this facility will overcome some of the basic problems of extreme summer heat, potential disturbance and visitor perceptions of danger that have been expressed by Omani colleagues.

Remote access to all parts of the reserve, all year round will be provided from the Discovery centre via live feed, operator controlled camera and screens. In addition to information available from the discovery centre, site office and hides interactive reserve interpretation via mobile phone or local looped audio communication will provide a continually updated service.

From January 2009 staff will be based at the site office to welcome visitors and provide interpretation services. This is the most effective form of communication in the early stages of this type of project. This will be supported by a project website providing up to date information about the site and ongoing management before visits are made. Facilities to view the reserve through the new website will be available by 2010.

Education, Research and Demonstration

Al Ansab is currently under utilised for all these purposes despite the fact that it is so close to all the schools and university in Muscat. The site management policy will be to encourage much greater use of the site for educational research and demonstration purposes. The project will actively promote environmental awareness through environmental educational programs and initiatives on good water management. These are two key themes identified in the National Biodiversity Strategy and Action Plan (NBSAP)

Partnership working and multi functionality are the key themes for delivering these important aspects of the management plan

Following the completion of the education and interpretation plan in 2009 opportunities for partnership working will be fully developed. Currently joint working with the Oman Botanic Garden OBG on educational work is being discussed. OBG will have a fully equipped field studies centre. It is proposed that on a day visit students will go to OBG in the morning to discover more about the native flora of Oman. Then they will visit the wetland in the afternoon to learn more about the birds of Oman. This is a very important strategic link. A much improved physical connection will be facilitated by the opening of Southern Expressway. The benefits in terms of not duplicating effort and joint marketing should not be underestimated and represent a great opportunity.

The proposed creation of a bird ringing station also has significant role in delivering research, education and demonstration functions. The identification of key species using the site on migration will provide the necessary evidence for the designation of Al Ansab Wetland as an Important Bird Area (IBA) and wildlife reserve at the same time providing an interactive

platform to deliver educational programs and training opportunities for developing ringing and bird monitoring skills.



Photo 16: Bird ringing for combined, education, research and demonstration purposes Photo: Peter Fearon

Through the innovative use renewable materials, energy resources, traditional architectural styles and building techniques in site facilities cultural heritage and responsible use of natural resources will be demonstrated in a practical, understandable and relevant way.

The unique nature of this project also presents opportunities to share best practice and develop new practical nature conservation techniques which will be demonstrated and employed at other locations.

Economic use

The main direct economic functions of the wetland project can be considered as its role as for Haya water as a Treated Effluent (TE) storage facility and as a mechanism for delivering its Corporate Social Responsibility policy and the contribution the site can make to the national economy in terms of its contribution to the developing responsible tourism sector.

The first priority is to ensure Haya water operate the Al Ansab wetland as an integrated TE storage and biological resource. Through the delivery of this management plan additional water storage capacity will be created primarily through the restoration of the reed bed area and by reinstating the lagoon in compartment 1. This is achievable with significant benefits to the nature conservation interest by moving away from a largely unplanned to a holistic TE storage program. Promoting mutual understanding and cooperation between colleagues in the Haya water family will ensure continued success for the STP and TE network and the Al Ansab wetland project. Scope may exist to develop new lagoons for TE storage and nature conservation purposes within the timescale of this plan. A number of proposals have been provided in a feasibility study from Mott MacDonald. These will be considered following the completion of the required site management to make the current lagoons function optimally and when the Southern Expressway camp is cleared.

The STP is continuing to produce more TE, the TE network is being completed and new markets for the TE developed. Accurate calculations of the minimum requirements to maintain the wetland biological function and its maximum winter storage capacity will be made in the early stages of the project development following completion of more accurate data collection

on lagoon topography, infiltration rates, overspill into the wadi etc. This will provide the benchmark for all future development decisions

The tourism industry in Oman is developing at an impressive rate with the tourist numbers doubling year on year. The establishment of the Al Ansab wetland as a world class eco-tourism destination in Muscat will undoubtedly have a significant benefit to the Oman economy.

Future decisions on whether the Al Ansab wetland project lagoons should generate income for Haya directly from its visitor and educational service provision will need to be discussed as they are developed. The unique nature of this project has generated considerable interest from companies in the international bird watching and other sectors in providing sponsorship and financial support to the project.

Community involvement

Engagement with the local community is central to the successful development of the Al Ansab wetland project. Initially this will involve a stakeholder dialogue process associated with the circulation of this plan.

Key elements of the plan will have a very direct positive impact on local communities and improve the company profile. The facilities for visitors and educational groups already discussed will promote a positive image of Haya water in communities which can be somewhat negative at present because of inevitable disruption caused by work to develop the sewage network in Muscat.

Employing Omani staff to manage the will be an important early step to ensure a sense of local community ownership of the project. In addition training will be available to any volunteers who wish to develop their skills particular in ornithology. Such trained people will be community ambassadors for the project. Suitable candidates will be equipped to realise sustainable livelihoods as freelance bird guides in the developing bird watching tourism industry.

Initial discussions with Saraya holdings have presented a potential partnership to provide community access in locations where they are working and to support community initiatives and open days at the Al Ansab Wetland. A nature conservation community network has also been proposed.

2.3 The Vision

The Al Ansab Wetland in 2059

The lagoons are a focal point and essential first stop for the well established responsible tourism market in Oman. The reputation of Haya water and its commitment to corporate social responsibility and sustainability are clearly reflected in the environmental and socio economic use of the lagoons.

The clear water of the extensive lagoons support an incredibly rich diversity of birds, plants and other wildlife. Managed reedbeds provide an important wildlife habitat in their own right and also contribute to improved quality of the recycled water in the lagoons. Water from the lagoons is used wisely to improve the environment of Muscat through the greening of public places using native species

A series of exciting viewpoints and observation hides provide vistas of the landscape and its wildlife, supported by easily-understood interpretation explaining the area's rich natural. Visiting the lagoons excites and challenges with new experiences and innovative design to attract the interest of all ages. Physical access to some areas is zoned to provide disturbance

free sanctuary areas for wildlife. Remote access to the entire reserve is available 24hrs a day anywhere in the world through the use of appropriate, sustainable technology.

The surrounding land is well-served with footpaths, cycle ways and access route providing low-key access over a wide area and easing visitor pressure on the reserve itself. A small car park mobile and a public transport system provide easy access to the site from further afield.

Extensive use is made of the lagoons for educational purposes and for scientific research. Every school child in Muscat is given the opportunity to visit the lagoons to learn more about the wildlife and water treatment and conservation. Working in partnership with Oman Botanic Gardens an understanding of the rich diversity of Oman's flora and fauna is provided to all interested audiences. The reserve is also used as a regional centre for the demonstration of sustainable methods of wetland habitat management, nature conservation techniques, sustainable energy and Omani culture.

The ecological and socio-economic importance of the site is recognised by all stakeholders and the integrated approach to management involves a forum of interested bodies including the lagoon managers and users who have a shared responsibility for the management of this nationally and internationally important wildlife site.

2.4 Site Objectives

What we want to be doing during the period of the plan to take us towards the Vision

1. To ensure effective ongoing management of the lagoons as an integrated TE storage and biological resource for the benefit of Haya water and the people and environment of Muscat
2. To achieve legal designation and protection of Al Ansab lagoons as a protected site for its nationally and internationally important nature conservation interest by 2010.
3. To manage existing habitats, in order to achieve unfavourable recovering or favourable ecological condition for associated avifauna assemblages by 2013.
4. To manage existing habitats, in order to achieve unfavourable recovering or favourable ecological condition for other important associated flora assemblages and fauna by 2013.
5. To create and manage new or extended existing habitats for passage and breeding birds by 2013
6. To encourage public access to the site for recreation and ecotourism at a level that is compatible with the nature conservation requirements
7. To establish an environmental education resource, which will contribute towards the national targets for increasing environmental and sustainability awareness
8. To maintain reserve buildings, estate structures public areas, other areas, machinery and records not addressed by other objectives.

Objective 1
To ensure effective ongoing management of the lagoons as an integrated TE storage and biological resource for the benefit of Haya water and the people and environment of Muscat
Features addressed by this objective:
5, 13a
Attribute/targets for key features
<p>Feature 5: Combination of habitats supporting high density of bird species Attribute: Extent and condition Target: No loss 2010, Increase 2013</p> <p>Feature 13a: Economic use – Operation of STP Attribute: Compliance with organisational needs Target: Increase winter TE storage capacity by 25% 2010, 50% 2013</p>
Objective Methods
<p>Design, install and operate a water level management system to meet organisational requirements for storage of treated effluent particularly during the winter when more storage is required and provide optimum habitat conditions for priority species.</p> <p>Work with TE demand cycle to provide suitable conditions for passage waders during spring and autumn. Maintain minimum water levels during summer months. Accommodate higher levels during winter but not to excessive levels that seriously compromise nature conservation interest or visitor experience by flooding paths and covering shallow marginal feeding areas for wader species.</p> <p>Ensure that water can be moved into the lagoons from the TE network and around the lagoons in a cost /time efficient manner. Maintain water levels within minimum/maximum parameters agreed with operators of the STP and TE network</p> <p>Liaise regularly, fortnightly in year 2009, with operators of the STP and TE network to ensure mutual understanding and cooperation</p> <p>Provide practical demonstration of how water level management impacts on key species population to managers and site operatives. Ensure reserve staff understand the practical issues associated with managing the flow of TE from the STP and through the network</p>
Monitoring Methods:
<p>Minuted meetings with STP and TE network staff. Staff demonstration events. Record water levels each week on each of the main lagoons and TE demand.</p>

Objective 2:
To achieve legal designation of Al Ansab lagoons as a protected site for its nature conservation interest by 2010.
Features addressed by this objective:
1,2,3,4,5,10, 11
Attribute/targets for key features:
<p>Feature 1: Significant numbers of passage migrants Attribute: Population size Target: Achieve recorded peak levels 2001 levels by 2010</p> <p>Feature 2: Rare passage species Attribute: Population size Target: Achieve previously recorded peak levels, subject to population change</p>

Feature 3: Threatened Birds species

Attribute: Population size

Target: Achieve previously recorded peak levels, subject to population change

Feature 4: Breeding Bird populations

Attribute: Population size

Target: Achieve previously recorded peak levels, subject to population change

Feature 5: Combination of habitats supporting high density of bird species

Attribute: Extent

Target: No loss 2010, Increase 2013

Feature 10: Education- environmental and sustainability awareness

Attribute: No of events/ users

Target: Pilot school visit 2009, min 5 groups 2010 increasing to min 25 visits 2013

Feature 11: Research - Biological

Attribute: Base line surveys and ongoing

Target: Establish constant effort bird monitoring site by 2009. Continue to operate throughout duration of current plan 2013.

Objective Methods:

Establish a bird monitoring/ ringing station to accurately record numbers and species of birds on site in order to provide evidence of meeting the qualifying criteria for nature reserve and Important Bird Area (IBA) status. Compile all reports required for meeting criteria for nature reserve, and IBA status. Consult and lobby ministries, NGO's and others to achieve site designation

Verify records of rare species identified by visitors where ever possible
Provide all requested bird data to the Oman Bird Group

Undertake at least weekly count of all species on site and establish/maintain a database of species recorded. Complete a breeding bird survey. Provide training in bird identification and monitoring techniques to new staff

Demonstrate educational potential of site by designing, piloting and developing ongoing education program to meet IBA criteria.

Monitoring Methods:

Production of Annual bird report.

Achievement of statutory or other nature conservation designation

Record numbers of education events and participation levels

Objective 3
To manage existing habitats, in order to achieve unfavourable recovering or favourable ecological condition for associated avifauna assemblages by 2013.
Features addressed by this objective:
1,2,3,4,5,6
Attributes/targets for key features
<p>Feature 1: Significant numbers of passage migrants Attribute: Population size Target: Achieve recorded peak levels 2001 levels by 2010</p> <p>Feature 2: Rare passage species Attribute: Population size Target: Previously recorded levels, subject to population change</p> <p>Feature 3: Threatened Birds Species Attribute: Population size Target: Previously recorded levels, subject to population change</p> <p>Feature 4: Breeding Bird populations Attribute: Population size Target: Previously recorded levels by 2010, subject to population change</p> <p>Feature 5: Combination of habitats supporting high density of bird species Attribute: Extent Target: No loss 2010, Increase 2013</p> <p>Feature 6: Invasive species Attribute: Extent and distribution and presence of negative indicator species. Target: No increase and phased reduction of mesquite <i>Prosopis juliflora</i> to less than 25% of current extent by 2013 No increase and removal of water hyacinth <i>Eichhornia crassipes</i> to less than 10% by 2013</p>
Objective Methods:
<p>Establish a bird monitoring/ ringing station to accurately record numbers and species of birds. Undertake at least weekly count of all species on site and establish/maintain a database of species recorded. Complete a breeding bird survey.</p> <p>Design, install and operate a water level management system to provide optimum habitat conditions for passage and breeding waders.</p> <p>Produce and implement reed bed restoration, scrub and marginal vegetation management plan. Produce and implement invasive species eradication program. Train staff and supervise the prescribed habitat management works</p>
Monitoring Methods:
<p>Production of Annual bird report. Analyse annual recorded bird data in relation to historical records to determine population trends.</p>

Objective 4
To manage existing habitats, in order to achieve unfavourable recovering or favourable ecological condition for other important associated flora and fauna by 2013.
Features addressed by this objective:
5,6,7,8
Attribute s/targets for key features
<p>Feature 5: Combination of habitats supporting high density of bird species Attribute: Extent, structure and composition of key habitats Target: Reed bed, scrub and marginal vegetation management plan complete in 2009. Priority 1 annual projects identified completed</p> <p>Feature 6: Invasive species Attribute: Extent Target: No increase and phased reduction of mesquite <i>Prosopis juliflora</i> to less than 25% of current extent by 2013 No increase and removal of water hyacinth to less than 10% of current extent by 2013</p> <p>Feature 7: Invertebrates Attribute: Diversity, populations and positive indicator species Target: Base line species list complete by 2010.</p> <p>Feature 8: Rare plants Attribute: Distribution, extent and presence Target: Record, map and monitor known species 2010.</p>
Objective Methods:
<p>Produce and implement reed bed restoration, scrub and marginal vegetation management plan. Produce and implement invasive species eradication program. Train staff and supervise the prescribed habitat management works.</p> <p>Design, install and operate a water level management system to provide optimum habitat conditions for priority species.</p>
Monitoring Methods:
<p>Record water levels each week on each of the main lagoons.</p> <p>Complete annual assessment report for reed bed restoration, scrub and marginal vegetation management plan and invasive species eradication program</p>

Objective 5
To create and manage new or extended existing habitats for passage, wintering and breeding birds by 2013
Features addressed by this objective:
1,4,5
Attribute s/targets for key features
<p>Feature 1: Significant numbers of passage migrants Attribute: Population size, Target: Increase recorded level above 2001 peak by 2011</p> <p>Feature 4: Breeding Bird populations Attribute: Population size species diversity and positive indicator species. Target: Increase recorded level above 2001 peak by 2011</p> <p>Feature 5: Combination of habitats supporting high density of bird species</p>

<p>Attribute: Extent, distribution</p> <p>Target: Create new islands vegetated and unvegetated as indicated in Map 2 by 2010. Create and manage newly created shallow pools. Extend the existing lagoon system by 25% or more by 2013.</p>
<p>Objective Methods:</p>
<p>Redesign profile of lagoon in Compartment 1 to provide a system of permanent island, channels and pools. This work will provide extended wetted margin for wading birds, and protected roosting and breeding areas. In Addition the islands will provide visitor recognition of Haya water. Employ contractors to undertake earthmoving works. This work to be completed before planned refilling of the lagoon. No material will be bought on to the site or removed</p> <p>Produce and implement reed bed restoration, scrub and marginal vegetation management plan. Produce and implement invasive species irradiation program. Train staff and supervise the prescribed habitat management works</p> <p>Design, install and operate a water level management system to provide optimum habitat conditions for priority species</p> <p>Design additional lagoons associated with extension of site incorporating integrated requirements for nature conservation and treated effluent storage</p> <p>Excavate small shallow pools at strategic points</p> <p>Design and build / create floating islands for the lagoon in compartment 3. These islands will consist of planted native non invasive aquatic macrophytes in a suitable net medium and unvegetated constructed floating islands 'tern rafts' . These will provide additional 'artificial' habitat for a diversity of flora and fauna.</p> <p>Provide standing dead wood, habitat piles, nest boxes and other structures for bird bat and insect species</p>
<p>Monitoring Methods:</p>
<p>Annual site management report.</p> <p>Breeding Bird records from created islands</p>

<p>Objective 6</p>
<p>To encourage public access to the site for recreation and ecotourism at a level that is compatible with the nature conservation requirements</p>
<p>Features addressed by this objective:</p>
<p>9a, 9b, 10, 13b,14</p>
<p>Attributes/targets for key features</p>
<p>Feature 9a: Public access – overseas birdwatchers, other eco tourist Attribute: Visitor numbers. Target: 1K by 2009, 4K p.a by 2011,10K p.a by 2013</p> <p>Feature 9b: Public access – Local Omani (including Haya employees but excluding school group) Attribute: Visitor numbers. Target:1K by 2009,10K p.a by 2011, 20Kp.a by 2013</p> <p>Feature 10: Education- environmental and sustainability awareness Attribute: No of education visits (assumed average 50 participants per group visit)</p>

<p>Target: pilot 2 visits (100) 2009, 25 visits 1.5K 2010, 50 visits 3K 2011, 100visits p.a 5K by 2013</p> <p>Feature 13b: Economic use – sustainable tourism Attribute: Contribution of overseas birdwatchers and other eco tourists to Oman national economy. Target: Significant contribution to national income from responsible tourism project. Use of Al Ansab as a template for other 'Natural Tourism' sites in Oman</p> <p>Feature 14: Community involvement Attribute: Organisational recognition in local community. Customer/ visitor satisfaction level. Number of local people employed directly or indirectly as local birds guides. Target: By 2013 75% of visitors recognise Haya water manage the wetland, 25% of the wider community recognise Haya water manage the wetland. 90 % of visitor are satisfied with their visit.</p>
<p>Objective Methods:</p> <p>Employ at least 3 local people in managing the reserve and education services. Train local bird guides to provide services to visitors to the site Provide on site infrastructure including Discovery centre, car park and a well maintained all ability access route to all but ecologically sensitive areas. Encourage use of the neighbouring wadi area as a recreation and amenity area. Provide on a range of on and off site interpretation suitable for all projected user groups following the completion of the site interpretation plan. Actively promote the role of Haya water in developing this pioneering project through branding and marketing. Encourage visitor feedback and randomly sample 1% of visitors with more detailed questionnaire.</p>
<p>Monitoring Methods:</p> <p>Install visitor counters. Provide annual report on visitor numbers and satisfaction Undertake and publish bi annual market research in wider community.</p>

<p>Objective 7</p> <p>To establish an environmental education resource which will contribute towards the national targets for increasing environmental and sustainability awareness</p>
<p>Features addressed by this objective:</p> <p>10,11, 12a,12b,12c</p>
<p>Attribute s/targets for key features</p> <p>Feature 10: Education- environmental and sustainability awareness Attribute: No of education visits (assumed average 50 participants per group visit) Target: pilot 2 visits (100) 2009, 25 visits 1.5K 2010, 50 visits 3K 2011, 100visits p.a 5K by 2013</p> <p>Feature 11: Research - Biological Attribute: No of events, number of participants. Target: Establish a constant effort bird monitoring site by 2009. Continue to operate throughout duration of current plan 2013. Use this facility for a programme of weekly 'hands on' practical demonstration of bird ringing and talks on bird conservation and migration</p> <p>Feature 12a: Demonstration - water treatment, recycling Attribute: Visitor awareness and understanding Target: 75% of annual visitors demonstrate a basic understanding of issues by 2013</p> <p>Feature 12b: Demonstration – use of renewable energy technologies, traditional</p>

<p>architecture Attribute: Visitor awareness and understanding Target: 75% of annual visitors demonstrate a basic understanding of issues by 2013</p> <p>Feature 12c: Demonstration- conservation management techniques Attribute: No of events, number of participants. Target: All training in house training for reserve staff completed within 6 months of commencement of employment Minimum of 1 event each year for external conservation practitioners.</p>
Objective Methods:
Design and implement an education and interpretation plan. Production of education information displays, learning packs and other educational demonstrating the full extent of learning opportunities. Employment of a dedicated education officer post and community outreach officer possibly in partnership with Saraya holdings.
Monitoring Methods:
Record feedback from education professionals and participants using the site services and review annually in order to develop/ improve the facilities /service. Complete questionnaire for random sample of participants. Analyse the questionnaire and provide data in the reserve annual report

Objective 8:
To maintain reserve buildings, estate structures, public areas, other areas, machinery and records not addressed by other objectives.
Features addressed by this objective:
5,9,10,11,12
Attribute s/targets
<p>Feature 5: Combination of habitats supporting high density of bird species Attribute: Completion of habitat management work Target: 100% of all risk assessments before any site management work commences. No serious injuries or accidents and all near misses and minor injuries recorded. No cancellation of planned program due to lack of site maintenance.</p> <p>Feature 9: Public access – overseas birdwatchers, other eco tourist and local residents (including Haya employees but excluding school group) Attribute: Safe condition of all site infrastructure. No cancellation to planned program due to lack of site maintenance Target: Completion 100% of all risk assessments before public access to the site is permitted. No serious injuries or accidents and all near misses and minor injuries recorded</p> <p>Feature 10: Education- environmental and sustainability awareness Attribute: Completion of educational work Target: Completion 100% of all risk assessments before public access to the site is permitted. No serious injuries or accidents and all near misses and minor injuries recorded. No cancellation of planned program due to lack of site maintenance.</p> <p>Feature 11: Research - Biological Attribute: Completion of research work Target: Completion 100% of all risk assessments before public access to the site is permitted. No serious injuries or accidents and all near misses and minor injuries recorded. No cancellation of planned program due to lack of site maintenance.</p> <p>Feature 12: Demonstration- water treatment, recycling, use of renewable energy technologies, traditional architecture, conservation management techniques Attribute: Completion of demonstration work Target: Completion 100% of all risk assessments before public access to the site is</p>

permitted. No serious injuries or accidents and all near misses and minor injuries recorded. No cancellation of planned program due to lack of site maintenance.
Objective Methods:
Regular maintenance of all the above is required to keep them in desired condition. Undertake regular safety inspection and risk access all operations and review at regular intervals. Train and maintains skills of all site staff including first aid, operation of all machinery. Have daily/ weekly safety briefings for all staff and operation Undertake required projects to complete site records for relevant features.
Monitoring Methods:
All buildings/structures/paths etc will inspected as part of six-monthly reserve safety inspection. All accidents and near misses appropriately recorded and investigated as necessary. Complete all H&S requirements and have regular, monthly meetings with Haya waters H&S adviser. Submission of all required reports

3. Action Plan

3.1 Identification of projects

The management required to achieve the plan objectives

Objectives	Project code	Standard Project Title
1. To ensure effective ongoing management of the lagoons as an integrated TE storage and biological resources for the benefit of Haya water and the people and the environment of Muscat.	RP13/01 RP14 ML00/01 MH51 MH60/01 MH60/02 MH64/01 AA01 AP20/02 AP20/06	Collect data, hydrological. Monitor Collect data, hydrological. Measure Liaise neighbours/others Manage habitat, reed bed Manage habitat, open water by water level control Manage habitat, open water by water level control Manage habitat, open water by re profiling. Site acquisition Prepare/revise plan Prepare/revise plan
2. To achieve legal designation of Al Ansab lagoons as a protected site for its nature conservation interest by 2010.	RA13/01 RA 14 RA 16 RH02 RH31 ML04 ML40 AN01 AN02 AL00 AP00 AR60	Collect data, birds. Monitor. Collect data, birds. Count census Collect data, birds. List species Collect data, human impact. Monitor Collect data, public use, education Liaise neighbours/others Liaise local, national authorities Site notification Site notification Legal/land agency matters Prepare/ revise legal site description Prepare report and correspondence
3. To manage existing habitats, in order to achieve unfavourable recovering or favourable ecological condition for associated avifauna assemblages by 2013.	RA 14 RA13/01 RA 16 RH02 MP00/02 MH51 MH60/01 MH60/02 MH64/02 MH65 MS00/01 MS10/01 MS40/01 MS40/03 MS41 AP20/01 AP20/02 AP20/03 AP20/04 AS00 AR00	Collect data, birds. Count census Collect data, birds. Monitor. Collect data, birds. List species Collect data, human impact. Monitor Patrol site - Species protection Manage habitat, reed bed Manage habitat, open water by water level control. Manage habitat, open water by water level control. Manage habitat, open water by re profiling. Shallow pools. Manage habitat, lagoon margins. Manage species, tree/shrub. Manage species, other vascular plant. Manage species, bird. Breeding birds. Manage species, bird. Breeding birds Manage species, bird. Roosting birds Prepare/ revise plan Prepare/revise plan Prepare/revise plan Prepare/revise plan Protect site by enforcing laws Prepare reports. Project recording
4. To manage existing habitats, in order to achieve unfavourable recovering or favourable ecological	RF12 RF13 RF16 RF26	Collect data, trees/shrubs. Survey Collect data, trees/shrubs. Monitor Collect data, trees/shrubs. List species Collect data, other vascular plants Collect data,

<p>condition for other important associated flora and fauna by 2013.</p>	<p>RF43 RF52 RF62 RA02 RA26 RA36 RA46 RA43 RA56 RA66 RA76 RA80 MH64/02 MS00/01 MS00/02 MS10/01 MS10/02 MS30/01 MS30/02 MS30/03 MM00 MM10 AP20/01 AP20/02 AP20/03 AP20/04</p>	<p>algae Collect data, lichens. Survey Collect data, fungi. Survey. Collect data, mammals. Survey Collect data, herptiles. List species Collect data, fish. List species Collect data, Lepidoptera. List species Collect data, Lepidoptera. Monitor Collect data, odonata. List species Collect data, orthoptera. List species Collect data, other/general insects list species. Collect data, other/general invertebrates Manage habitat, open water by re profiling. Shallow pools. Manage species, tree/shrub. Manage species, tree/shrub Manage species, other vascular plant. Manage species, other vascular plant Manage species, mammal. Manage species, mammal. Manage species, mammal. Manage estate, machinery. Acquire /service vehicles and boats Manage estate, machinery. Acquire /service vehicles and boats Prepare/revise plan, Prepare/revise plan Prepare/revise plan, Prepare/revise plan,</p>
<p>5. To create and manage new or extended existing habitats for passage, wintering and breeding birds by 2013</p>	<p>RP13/01 RP20 RP30 RP40 RP50 RA13/01 RA14 RA16 MH60/01 MH60/02 MH69 MH62 MH64/01 MH65 MS30/01 MS40/01 MS40/02 MS40/03 MS41 AP20/06 AS00</p>	<p>Collect data, hydrological. Monitor Collect data, geological Collect data, geomorphological Collect data, pedological Collect data, landscape Collect data, birds. Monitor Collect data, birds. Count census. Collect data, birds. List species Manage habitat, open water by water level control Manage habitat, open water by water level control Manage habitat, open water by other activities. Manage habitat, open water by plant introduction Manage habitat, open water by reprofiling. Shallow pools. Manage habitat, lagoon margins Manage species, mammal Manage species, bird. Breeding birds Manage species, bird. Breeding birds Manage species, bird. Breeding birds Manage species, bird. Roosting birds. Prepare / revise plan Protect site by enforcing laws</p>
<p>6. To encourage public access to the site for recreation and ecotourism at a level that is compatible with the nature conservation requirements</p>	<p>RH02 RH07 RH35 RH31 RH32 RH33 RH34/01 RH34/02 RF43</p>	<p>Collect data, human impact. Monitor Collect data, human impact, pollution Collect data, public use. The trespass /theft / damage Collect data, public use, education Collect data, public use, demonstration Collect data, public use, recreation Collect data, public use, Collect data, public use Collect data algae</p>

	MI00/01 MI00/02 MI10/01 MI10/02 MI30 MI50/01 MI50/02 MI50/03 MI50/04 ML00/04 ML00/05 MS40/03 MS41 ME04 ME11 ME40/01 ME40/02 AP22/01 AP22/02 AP22/03 AP20/05 AP50	Inform public, offsite Inform public, offsite Inform visitors, general. Inform visitors, general. Inform visitors, specialist Provide interpretative material. Provide interpretative material. Provide interpretative material. Provide interpretative material. Liaise neighbours/others Liaise neighbours/others Manage species, bird. Breeding birds Manage species, bird. Roosting birds. Manage estate fabric, remove rubbish Manage estate fabric. Buildings Provide/maintain paths/roads- Provide/maintain paths/roads- Prepare/ revise plan Major projects. Prepare/ revise plan Major projects Prepare/ revise plan Major projects. Prepare / revise plan Prepare/revise plan, safety
7.To establish an environmental education resource which will contribute towards the national targets for increasing environmental and sustainability awareness	RH31 RH32 RH34/01 RH34/02 MI00/01 MI00/02 MI10/01 MI10/02 MI30 MI50/01 MI50/02 MI50/03 MI50/04 ML00/02 ML00/03 ML00/05 ML40 ME40/01 ME40/02 AP22/01 AP22/02 AP20/05 AT00/02 AT00/03 AE00/01 AR00	Collect data, public use, education Collect data, public use, demonstration Collect data, public use Collect data, public use Inform public, offsite, Inform public, offsite Inform visitors, general. Inform visitors, general Inform visitors, specialist Provide interpretative material. Provide interpretative material. Provide interpretative material. Provide interpretative material Liaise neighbours/others Liaise neighbours/others. Liaise neighbours/others Liaise local , national authorities Provide/maintain paths/roads Provide/maintain paths/roads Prepare/ revise plan Major projects. Prepare/ revise plan Major projects Prepare/ revise plan Major projects Training and management. Training and management Employ staff Prepare reports. Project recording
8.To maintain reserve buildings, estate structures, machinery, public areas, other areas machinery and records not addressed by other objectives.	RV0* RP03 RH10 RH21 RH80 RH90 ML00/03 MP00/01 ME01 ME04 ME12	Manage archive records Collect data, climatological .Monitor Collect data, climatological .Monitor Collect data, archaeological Collect data, management, neighbours Collect data, other activities neighbours Liaise neighbours/others Patrol site - Site security Manage estate fabric, boundary structures. Manage estate fabric, remove rubbish. Manage buildings

	ME20 AP50 AI00 AR10 AF00/01 AF00/02	Comply with legal obligations Prepare/revise plan, safety Inspections and audits Prepare reports incidents and accidents Financial planning and recording Financial planning and recording
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3.2 Projects Register

A complete list of projects for this management plan

Project Code	Project Title	Project Description
RV0*	Manage archive records	Continue to gather all historic information into site archive.
RP03	Collect data, climatological. Monitor.	Install computerised weather station and keep records.
RP05	Collect data, climatological. Research Project.	Analyse data in relation to bird records
RP13/01	Collect data, hydrological. Monitor	Record weekly depth in each lagoon
RP13/02	Collect data, hydrological. Monitor.	Submit monthly samples for analysis of water quality in lagoons
RP14	Collect data, hydrological. Measure	Record flow of TE over spillway.
RP20	Collect data, geological	Add to existing record
RP30	Collect data, geomorphological	Add to existing record
RP40	Collect data, pedological	Add to existing record
RP50	Collect data, landscape	Add to existing record
RF12	Collect data, trees/shrubs. Survey.	Record numbers and position of <i>Prosopis juliflora</i>
RF13	Collect data, trees/shrubs. Monitor	Record effect of <i>Prosopis juliflora</i> reduction eradication plan
RF16	Collect data, trees/shrubs. List species	Compile site list of species
RF26	Collect data, other vascular plants.	Compile site list of species.
RF43	Collect data, algae.	Monitor and evaluate impact of any algal blooms in lagoons
RF52	Collect data, lichens. Survey.	Compile site list of species.
RF62	Collect data, fungi. Survey.	Compile site list of species.
RA02	Collect data, mammals. Survey	Compile site list of indigenous species
RA03	Collect data, mammals. Monitor.	Record presence and impact of feral cats and dogs
RA14	Collect data, birds. Count census.	Weekly record of all birds on site

RA13/01	Collect data, birds. Monitor.	Operate migration monitoring station.
RA16	Collect data, birds. List species	Records from staff and visitors
RA26	Collect data, herptiles. List species	Compile site species list.
RA23	Collect data, herptiles. Monitor	Record reports of snakes made by visitors. Location, description and outcome.
RA36	Collect data, fish. List species.	Compile site species list.
RA46	Collect data, Lepidoptera .List species .	Compile site species list
RA43	Collect data, Lepidoptera. Monitor	Transect monitoring for Butterflies
RA56	Collect data, odonata. List species	Compile site species list for dragonflies .
RA53	Collect data, odonata. Monitor.	Transect monitoring for dragonflies
RA66	Collect data, orthoptera. List species.	Compile site species list for orthoptera.
RA76	Collect data, other/general insects list species.	Compile site species list.
RA80	Collect data, other/general invertebrates	Compile site species list
RH02	Collect data, human impact. Monitor	Record incidents of illegal hunting and impact on bird populations
RH07	Collect data, human impact, pollution.	Record incidents of dumping
RH35	Collect data, public use. The trespass /theft / damage.	Record incidents of trespass.
RH10	Collect data, land use history	Add to existing record
RH21	Collect data, archaeological	Add to existing record
RH31	Collect data, public use, education	Count and record
RH32	Collect data, public use, demonstration	Count and record
RH33	Collect data, public use, recreation	Count and record
RH34/01	Collect data, public use,	Count visitors to site
RH34/02	Collect data, public use	Count visitors to website
RH80	Collect data, management, neighbours	Record management activities on neighbouring land that impact the site
RH90	Collect data, other activities neighbours	Record other activities on neighbouring land that impact the site
MI00/01	Inform public, offsite.	Create and maintain interactive website
MI00/02	Inform public, offsite.	Provide talks and presentations to schools and other bodies
MI10/01	Inform visitors, general.	Rangers and guides present on site

MI10/02	Inform visitors, general.	Annual program of walks and events
MI30	Inform visitors, specialist	Provide species lists and permit access for researchers
MI50/01	Provide interpretative material.	Establish and maintain phone based audio commentary around site
MI50/02	Provide interpretative material.	Bird identification aids in hides. Photographs and drawings
MI50/03	Provide interpretative material.	Install and maintain user operated camera system to access site through Discovery centre
MI50/04	Provide interpretative material.	Provide range of interactive interpretational facilities through the Discovery centre
ML00/01	Liaise neighbours/others- .	Regular minuted meetings with STP and TE network colleagues
ML00/02	Liaise neighbours/others-	OMRAN Convention Centre and Discovery Centre
ML00/03	Liaise neighbours/others –	Galfar construction of Southern Expressway
ML00/04	Liaise neighbours/others-	Oman Botanic Gardens re partnership for education.
ML00/05	Liaise neighbours / others –.	Saraya holdings re partnership for community engagement
ML40	Liaise local , national authorities -	Government depts and NGO concerned with environmental issues
MP00/01	Patrol site - Site security	General site security. Service provided by existing STP operations security service
MP00/02	Patrol site - Species protection	Site staff to undertake species protection work
MH51	Manage habitat, reed bed.	Implement reed bed restoration plan. Rotational cutting, creating ditches and pools
MH60/01	Manage habitat, open water by water level control.	Maintain appropriate water levels for winter wildfowl
MH60/02	Manage habitat, open water by water by water level control.	Maintain water levels appropriate to provide favourable conditions for migratory species of waders.
MH69	Manage habitat, open water by other activities.	Create and maintain unvegetated floating islands
MH62	Manage habitat, open water by plant introduction.	Create and maintain vegetated floating islands
MH64/01	Manage habitat, open water by re profiling. Shallow pools.	Create and maintain permanent islands, reprofile lagoon bottom to create channels and deeper pools.
MH64/02	Manage habitat, open water by re profiling. Shallow pools.	Maintain and improve existing pools in wadi
MH64/03	Manage habitat, open water. Shallow pools	Create and maintain new pools for key species e.g. wading birds, dragonflies, amphibians
MH65	Manage habitat, lagoon margins.	Manage water levels and marginal vegetation for bird species e.g. waders, crakes
MH01	Manage habitat, woodland/ scrub by planting	Recreate woodland/ scrub in areas disturbed during construction using native species

MH02	Manage habitat, woodland/scrub by managing dead wood.	Leave standing dead wood and create suitable habitat piles
MH80	Manage habitat, open rocky semi desert.	Non intervention
MS00/01	Manage species, tree/shrub.	Implement <i>Prosopis juliflora</i> eradication program
MS00/02	Manage species, tree/shrub.	Monitor and remove other non native invasive species
MS00/03	Manage species, tree/shrub.	Produce and implement planting and after care plan for indigenous species
MS00/04	Manage species, tree/shrub.	Establish nursery for local site species for replanting in wadi area
MS10/01	Manage species, other vascular plant.	Implement Water Hyacinth control and eradication plan
MS10/02	Manage species, other vascular plant.	Monitor and remove other non native invasive species
MS10/03	Manage species, other vascular plants.	Establish and implement planting and after care plan for indigenous species
MS10/04	Manage species, other vascular plants.	Establish suitable growing condition for introduction of native, non invasive aquatic macrophytes
MS10/05	Manage species, other vascular plant.	Establish nursery for local site species for replanting in wadi area
MS30/01	Manage species, mammal.	Remove feral cat and dog populations from site
MS30/02	Manage species, mammal.	Establish wildlife corridor to enable access for native species
MS30/03	Manage species, mammal	Protect any breeding sites from disturbance
MS30/04	Manage species, mammal.	Create suitable breeding, roosting sites for micro-chiroptera
MS40/01	Manage species, bird. Breeding birds.	Limit excessive predation by interventions e.g. electric fencing, limited control methods
MS40/02	Manage species, bird. Breeding birds.	Provide and monitor suitable artificial nesting sites. Bird boxes, cavities etc
MS40/03	Manage species, bird. Breeding birds	Prevent egg collection and other disturbance by visitors
MS41	Manage species, bird. Roosting birds.	Prevent disturbance to sensitive roosting areas by visitors
ME01	Manage estate fabric, boundary structures.	Fences and gates.
ME04	Manage estate fabric, remove rubbish.	Remove rubbish asap. Prevent further dumping
ME11	Manage estate fabric. Buildings	Construct hides , visitor centre
ME12	Manage buildings,	Maintain temporary site office.
ME20	Comply with legal obligations	Meet all legal requirements for the operation of the site
ME40/01	Provide/maintain paths/roads-	Reopen paths currently unusable.
ME40/02	Provide/maintain paths/roads-	Upgrade, extend and maintain new network.
MM00	Manage estate, machinery. Acquire /service vehicles and boats.	Purchase and maintain all equipment needed for site management
MM10	Manage estate,	Purchase and maintain all equipment needed for site

	machinery. Acquire and service machinery and tools	management
AN01	Site notification.	Provide evidence for statutory designation of site
AN02	Site notification.	Lobby and consult on regional and international recognition of site
AA01	Site acquisition-	site extension to cover to land currently occupied by expressway camp
AL00	Legal/land agency matters.	Liaise with Haya water legal adviser and PRO's
AP00	Prepare/revise legal site description	Prepare reports and documents for legal designation of nature conservation site
AP22/01	Prepare/ revise plan Major projects.	Final design of site structure access routes, car park and hides
AP22/02	Prepare/ revise plan Major projects.	Work with OMRAN and Europtima on design of visitor centre.
AP22/03	Prepare/ revise plan Major projects	Work with OMRAN and Europtima on landscape design, and other facilities in neighbouring amenity area
AP20/01	Prepare/revise plan,	Site management plan
AP20/02	Prepare/revise plan	reed bed management
AP20/03	Prepare/ revise plan,	<i>Prosopis juliflora</i> eradication program
AP20/04	Prepare/ revise plan,	Water hyacinth eradication program
AP20/05	Prepare / revise plan	Interpretation plan
AP20/06	Prepare / revise plan	Lagoon extension plan
AP50	Prepare/revise plan, safety.	Complete and regularly site safety plan for all areas and activities
AS00	Protect site by enforcing laws.	Site & species safeguard relating to shooting, egg collection, dumping etc
AI00	Inspections and audits.	Regular site safety inspections and liaison with Haya water H&S adviser
AR00	Prepare reports. Project recording	Prepare annual site report recording progress on all projects
AR10	Prepare reports incidents and accidents	Record all incident, accidents, and near misses to organisational standards
AR60	Prepare report and correspondence	Information required for legal designation of site
AF00/01	Financial planning and recording.	Prepare annual budget request and profile allocation
AF00/02	Financial planning and recording	Record all expenditure and income as required
AT00/01	Training and management-	Self. Maintain current skills and develop new skills
ATO0/02	Training and management	Staff. Maintain current skills and develop new skills
ATO0/03	Training and management -.	Volunteers. Maintain current skills and develop new skills
AE00/01	Employ staff	Recruit suitably skilled and motivated Omani staff to undertake site management and education services
AE00/02	Recruit volunteers	Recruit suitably skilled and motivated volunteers to undertake site management and education services

3.3 Five Year Plan

Project Divisions

Records (R)
 Management (M)
 Administration (A)

Priorities

1 High
 2 Medium
 3 Low

Project Code	Project Description	Year				
		2009	2010	2011	2012	2013
RV0*	Manage archive records.	1	2	3	3	3
RP03	Collect data, climatological .Monitor.	1	1	1	1	1
RP05	Collect data, climatological.	2	2	2	2	2
RP13/01	Collect data, hydrological. Monitor	1	1	1	1	1
RP13/02	Collect data, hydrological. Monitor.	2	2	2	2	2
RP14	Collect data, hydrological. Measure	2	2	2	2	2
RP20	Collect data, geological		2	2		
RP30	Collect data, geomorphological		2	2		
RP40	Collect data, pedological		2	2		
RP50	Collect data, landscape		2	2		
RF12	Collect data, trees/shrubs. Survey.	1	1	1	1	1
RF13	Collect data, trees/shrubs. Monitor	1	1	1	1	1
RF16	Collect data, trees/shrubs. List species	1	1	1	1	1
RF26	Collect data, other vascular plants.	1	1	1	1	1
RF43	Collect data, algae. Monitor	2	2	2	2	2
RF52	Collect data, lichens. Survey.	2	2	2	2	2
RF62	Collect data, fungi. Survey.	2	2	2	2	2
RA02	Collect data, mammals. Survey	1	1	1	1	1
RA03	Collect data, mammals. Monitor.	1	1	1	1	1
RA14	Collect data, birds. Count census.	1	1	1	1	1
RA13/01	Collect data, birds. Monitor.	1	1	1	1	1
RA16	Collect data, birds. List species	2	2	2	2	2
RA26	Collect data, herptiles. List species	1	2	2	2	2
RA23	Collect data, herptiles. Monitor	1	1	1	1	1
RA36	Collect data, fish. List species.	2	2	2	2	2
RA46	Collect data, Lepidoptera. List species.	2	2	2	2	2
RA43	Collect data, Lepidoptera. Monitor	1	1	2	2	2
RA56	Collect data, odonata. List species.	2	2	2	2	2
RA53	Collect data, odonata. Monitor.	1	1	2	2	2
RA66	Collect data, orthoptera. List species.	2	2	2	2	2
RA76	Collect data, other/general insects. List species.	3	3	3	3	3
RA80	Collect data, other/general invertebrates	3	3	3	3	3
RH02	Collect data, human impact. Monitor	1	1	1	1	1
RH07	Collect data, human impact, pollution.	1	1	1	1	1
RH35	Collect data, public use, Trespass /theft / damage	1	1	1	1	1
RH10	Collect data, land use history	2	2	3	3	3
RH21	Collect data, archaeological	2	2	3	3	3
RH31	Collect data, public use, education	1	1	1	1	1
RH32	Collect data, public use, demonstration	1	1	1	1	1

RH33	Collect data, public use, recreation	1	1	1	1	1
RH34/01	Collect data, public use, count visitors	1	1	1	1	1
RH34/02	Collect data, public use, count visitors	1	1	1	1	1
RH80	Collect data, management, neighbours	2	2	2	2	2
RH90	Collect data, other activities neighbours	2	2	2	2	2
MI00/01	Inform public, offsite.	1	1	1	1	1
MI00/02	Inform public, offsite.		1	1	1	1
MI10/01	Inform visitors, general.	1	1	1	1	1
MI10/02	Inform visitors, general.		1	1	1	1
MI30	Inform visitors, specialist.	1	1	1	1	1
MI50/01	Provide interpretative material		1	1	1	1
MI50/02	Provide interpretative material		1	1	1	1
MI50/03	Provide interpretative material.			1	1	1
MI50/04	Provide interpretative material.			1	1	1
ML00/01	Liaise neighbours/others	1	1	1	1	1
ML00/02	Liaise neighbours/others	1	1	1	1	1
ML00/03	Liaise neighbours/others	1	1			
ML00/04	Liaise neighbours/others- Oman Botanic Gardens re partnership for education.	1	1	1	1	1
ML00/05	Liaise neighbours / others					
ML40	Liaise local , national authorities -	1	1	1	1	1
MP00/01	Patrol site - Site security	1	1	1	1	1
MP00/02	Patrol site - Species protection	1	1	1	1	1
MH51	Manage habitat, reed bed.	1	1	1	1	1
MH60/01	Manage habitat, open water by water level control.	1	1	1	1	1
MH60/02	Manage habitat, open water by water by water level control.	1	1	1	1	1
MH69	Manage habitat, open water by other activities	1	1	1	1	1
MH62	Manage habitat, open water by plant introduction.	1	1	1	1	1
MH64/01	Manage habitat, open water by re profiling.	1	1	1	1	1
MH64/02	Manage habitat, open water by re profiling.	1	1	1	1	1
MH64/03	Manage habitat, open water by profiling. Shallow pools		1	1	1	1
MH65	Manage habitat, lagoon margins	1	1	1	1	1
MH01	Manage habitat, woodland/ scrub by planting.	1	1	1	1	1
MH02	Manage habitat, woodland/scrub by managing dead wood	2	2	2	2	2
MH80	Manage habitat, open rocky, semi desert	2	2	2	2	2
MS00/01	Manage species, tree/shrub.	1	1	1	1	1
MS00/02	Manage species, tree/shrub.	2	2	2	2	2
MS00/03	Manage species, tree/shrub.	2	2	1	1	1
MS00/04	Manage species, tree/shrub.			2	2	2
MS10/01	Manage species, other vascular plant.	1	1	1	1	1
MS10/02	Manage species, other vascular plant.	2	2	2	2	2

MS10/03	Manage species, other vascular plants.	2	2	1	1	1
MS10/04	Manage species, other vascular plants.		1	1	1	1
MS10/05	Manage species, other vascular plant.			2	2	2
MS30/01	Manage species, mammal.	1	1	1	1	1
MS30/02	Manage species, mammal.			2	2	2
MS30/03	Manage species, mammal.		1	1	1	1
MS30/04	Manage species, mammal.		2	2	2	2
MS40/01	Manage species, bird.	1	1	1	1	1
MS40/02	Manage species, bird.		2	2	2	2
MS40/03	Manage species, bird.	1	1	1	1	1
MS41	Manage species, bird.	1	1	1	1	1
ME01	Manage estate fabric, boundary structures. Fences and gates.	1	1	1	1	1
ME04	Manage estate fabric, remove rubbish.	1	1	1	1	1
ME11	Manage estate fabric .Buildings	1	1	1	1	
ME12	Manage buildings	1	1	1	1	1
ME20	Comply with legal obligations	1	1	1	1	1
ME40/01	Provide/maintain paths/roads	1	1			
ME40/02	Provide/maintain paths/roads.			1	1	1
MM00	Manage estate, machinery	1	1	1	1	1
MM10	Manage estate, machinery.	1	1	1	1	1
AN01	Site notification.	1	1	1		
AN02	Site notification.	2	2	2	1	1
AA01	Site acquisition			1	1	1
AL00	Legal/land agency matters.	1	1	1	1	1
AP00	Prepare/revise legal site description	1	1			
AP22/01	Prepare/ revise plan Major projects	1	1	1		
AP22/02	Prepare/ revise plan Major projects. of visitor centre.	1	1			
AP00/03	Prepare/ revise plan Major projects	1	1	1	1	
AP20/01	Prepare/revise plan, management plan	2	2	2	2	1
AP20/02	Prepare/revise plan, reed bed management	1	1	2	2	2
AP20/03	Prepare/ revise plan, <i>Prosopis Juliflora</i> eradication program	1	1	2	2	2
AP20/04	Prepare/ revise plan, water hyacinth eradication program	1	1	2	2	2
AP20/05	Prepare /revise plan	1	2	2	2	2
AP20/06	Prepare /revise plan				1	1
AP50	Prepare/revise plan, safety	1	1	1	1	1
AS00	Protect site by enforcing laws.	1	1	1	1	1
AI0	Inspections and audits.	1	1	1	1	1
AR00	Prepare reports. Project recording.	1	1	1	1	1
AR10	Prepare reports incidents and accidents	1	1	1	1	1
AR60	Prepare report and correspondence for legal designation of site	1	1			
AF00/01	Financial planning and recording.	1	1	1	1	1
AF00/02	Financial planning and recording.	1	1	1	1	1
AT00/01	Training and management-Self	1	1	1	1	1

ATO0/02	Training and management-Staff	1	1	1	1	1
ATO0/03	Training and management - Volunteers.	1	1	1	1	1
AE00/01	Employ staff	1	1	1	1	1
AE00/02	Recruit volunteers	1	1	1	1	1

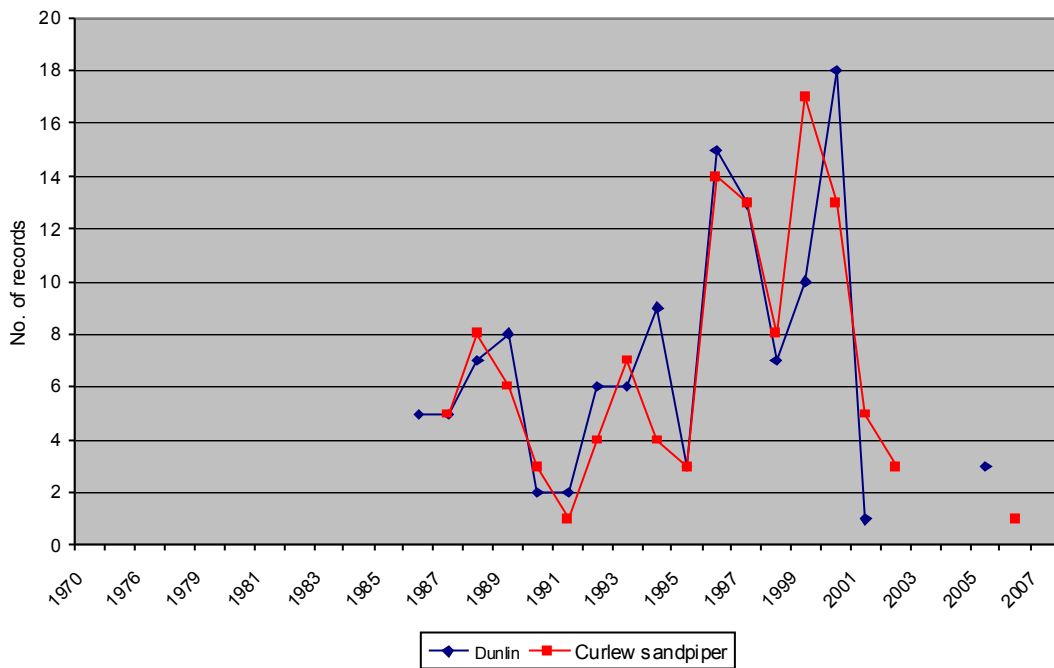
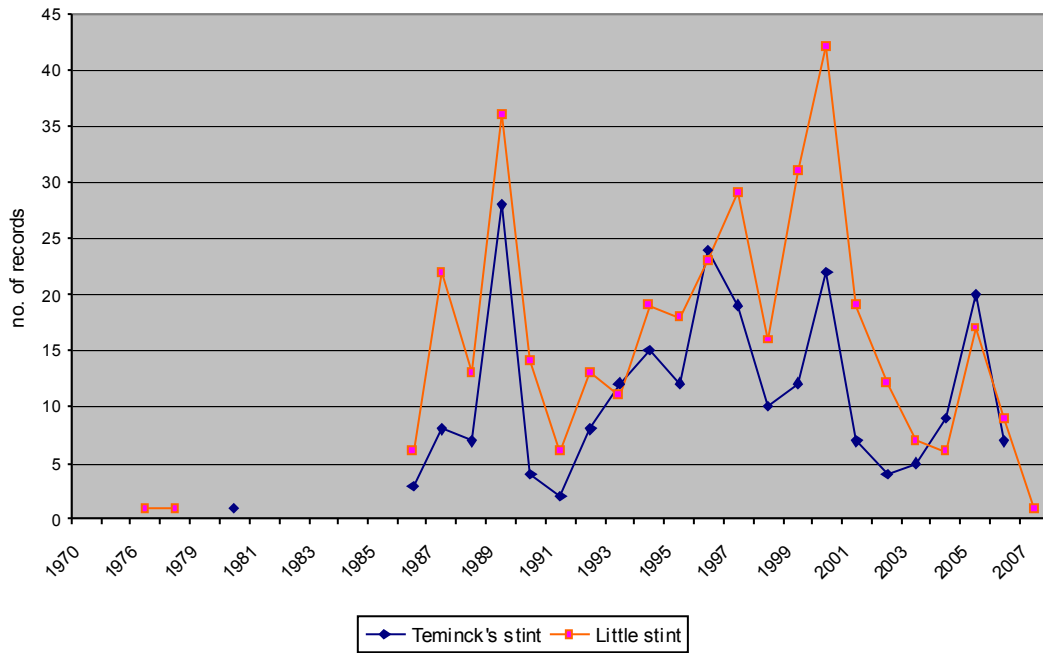
4. References

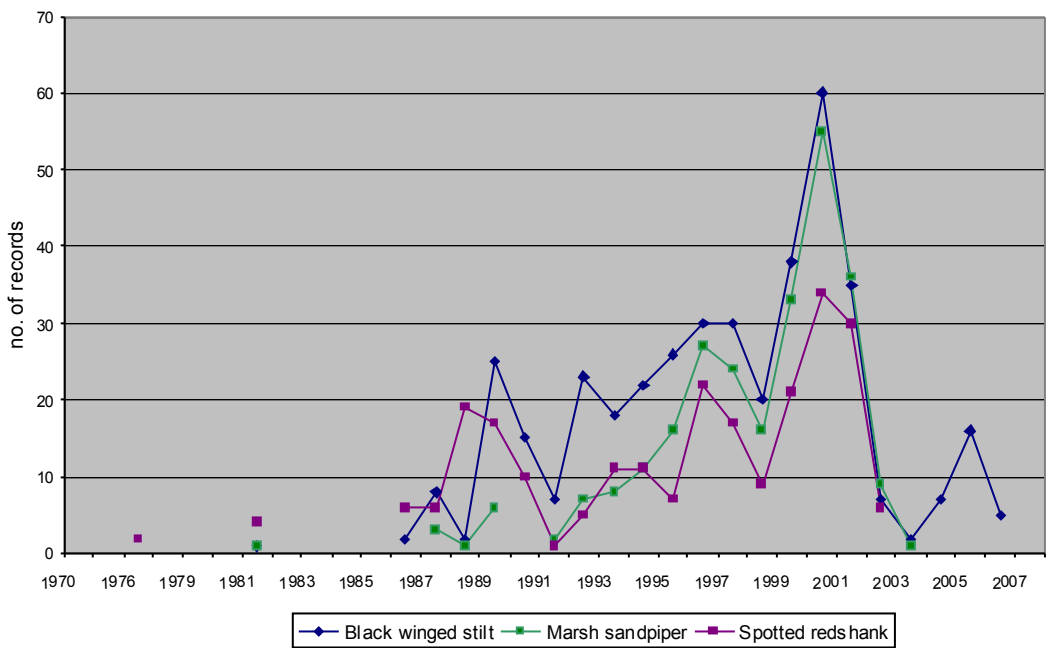
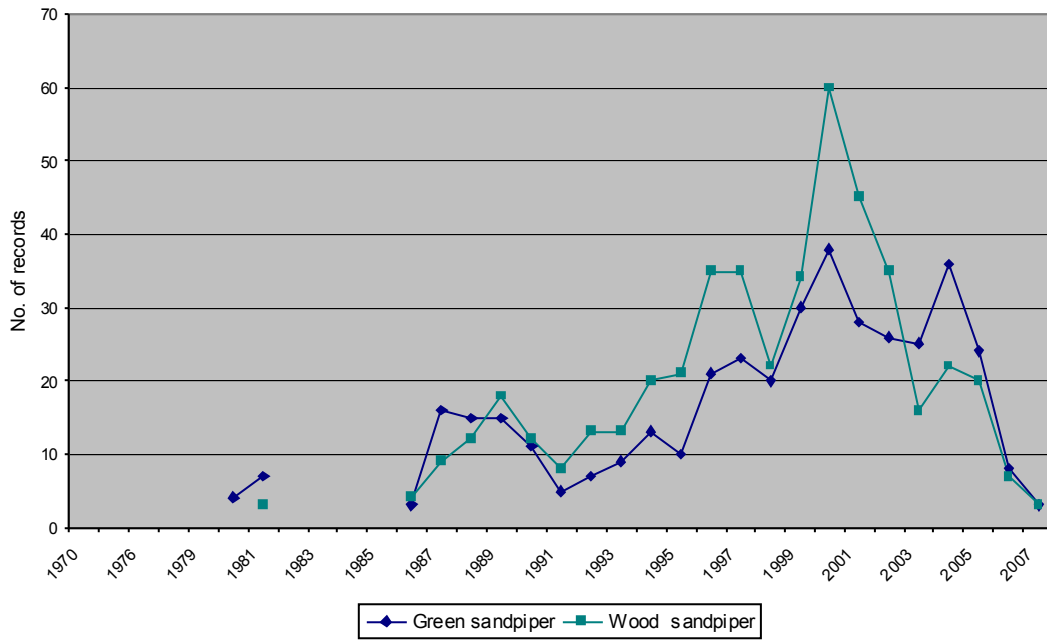
Mott MacDonald (2007) Al Ansab Lagoons Feasibility Study in the Creation of Wetland Habitats for Bird Conservation Final Report for Oman Wastewater Services Company

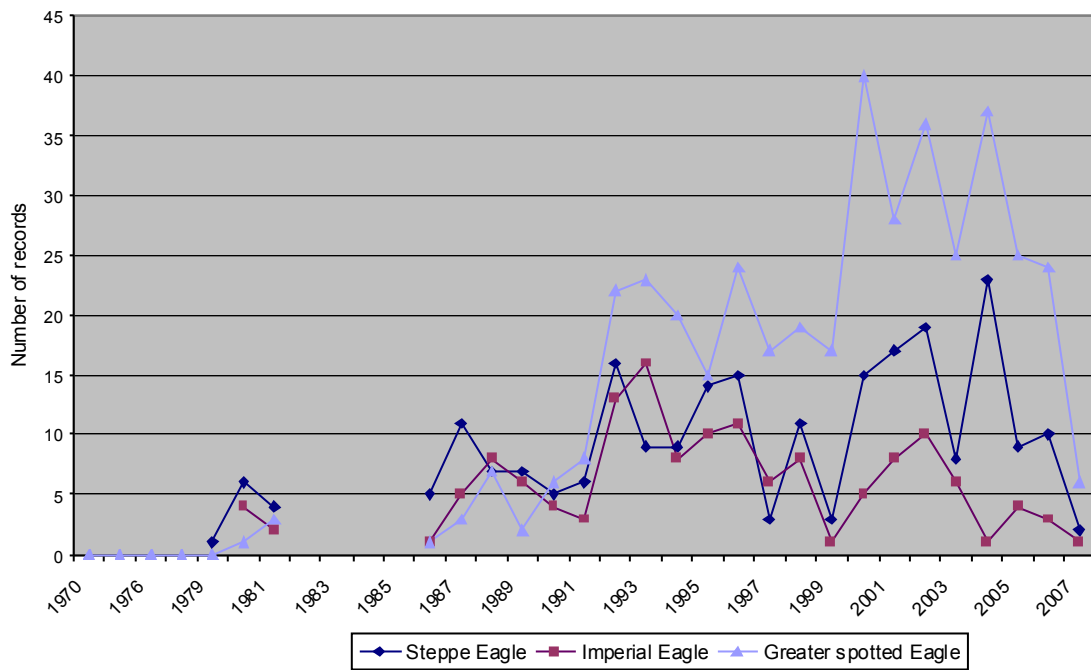
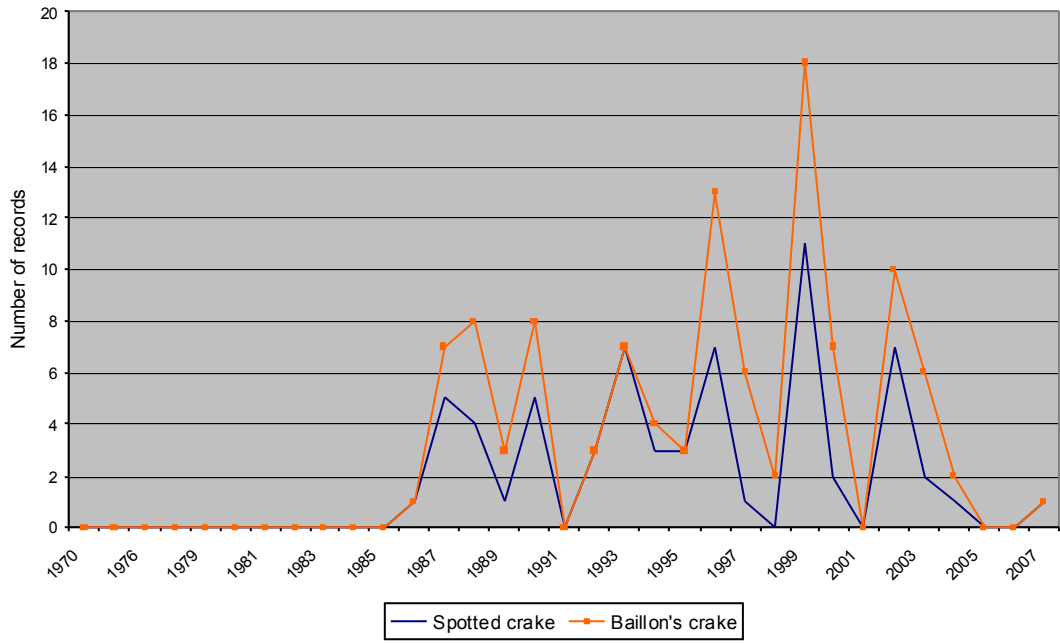
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Appendices

A1 Graphs showing trends in recorded populations of key bird species







A.2 Feasibility study into a long term ringing project at Al Ansab Wetland

1. Introduction

Valuable bird records from the Oman Bird Group have indicated the importance of Al Ansab Wetland for migrating birds. In addition to migrating passerines Al Ansab is also host to a variety of wintering waterfowl, summering shorebirds and large numbers of passage raptors, with more than 280 different species already recorded.

2. Outline

2.1 Purpose of the Document

Between 15th and 17th November 2008 an initial assessment of the suitability of Al Ansab Wetland as a location for a long-term bird ringing project was conducted. Bird ringing is part of a global initiative monitoring and recording bird migration, populations and environmental change. The following document contains the findings of this assessment.

2.2 Benefits

The benefits of a long-term ringing programme would start to be seen upon completion of the first full year of operation, these would include:

- Identification of key species using Al Ansab Wetland on migration.
- Identification of key breeding species using Al Ansab Wetland.
- Evidence to justify National designation as a wildlife reserve.
- Evidence to justify the designation of Al Ansab Wetland as an Important Bird Area (IBA) by Birdlife International.
- An interactive platform to deliver educational programs.
- A platform for the training of Omani's by a skilled ornithologist to continue ringing and monitoring projects into the future.

By identifying the key species using Al Ansab as a breeding ground and as a migration stopover site, provisions can be made as part of the Site Management Plan to optimise habitat requirements for these species. These key species would also provide supporting evidence to recommend to Birdlife International that Al Ansab be classified as an IBA, bringing international recognition to the site.

The completion of further years of monitoring would increase confidence in the data provided by year one, as well as allowing the continuation of an interpretive educational programme.

2.3 Justification

There are currently 33 sites in Oman designated as Important Bird Area's by Birdlife International. Al Ansab has previously been unconsidered. With the data that a long-term ringing project would provide, and in addition to existing bird records an application should be made to gain designation for Al Ansab as an IBA. A justified application to Birdlife International would warrant the consideration of Al Ansab on a national level, as a nature reserve or ornithological reserve. These two applications would build on recently established relations with Birdlife Middle East, as well as establishing a relationship with the Ministry of Environment and Climate Affairs.

With international designation comes the increased exposure to the global bird-watching community and an increase in the number of international birding tourists is likely to be observed. This is in addition to the volunteer ringers that would be recruited to assist during migration seasons, who would take advantage of the other pristine bird-watching sites that Oman has to offer.

2.4 Relationship to Other Plans

A long-term ringing program at Al Ansab would provide the necessary data that once interpreted, would support the Site Management Plan. Once key species are identified, and their habitat requirements, the management plan can be adapted to provide these. This would link in with an application to Birdlife International for IBA status, based upon these key species.

A long-term ringing program would also provide opportunities for an interpretative education program that would be accessible to members of the public, students and youth groups.

3. Feasibility Assessment

3.1 Assessment

During the course of the feasibility study, extensive surveys were completed at the site to identify areas that would be considered to be suitable for the long-term location of mist nets. To meet this requirement, there would need to be suitable cover to ensure that the nets are effective in terms of catch rate, as well as suitable habitat for birds to be found at that location. Due to the climate of Oman, considerations were also made for exposure to direct sunlight and for that reason, a recommendation is made that the net locations are within a relatively close proximity the ringing location, that they can be checked at least every twenty to thirty minutes.

3.2 Results

Two key habitat types were identified during the course of the site assessment; these were reed bed and wadi. There are suitable locations within proximity of the site office that meet the requirements of cover, shading and accessibility. The wadi bed adjacent to the site office would provide adequate locations for netting, as would the reed bed to the fore of the site office. By utilizing these two sites, maximum habitat coverage is gained, with a suitable proximity to the site office that a ringing operation could be sustained effectively.

4 Proposed System

4.1 Description of Proposed System

The most important factor in long-term monitoring projects is to limit key variables. Following a model set in place by the Canadian Migration Monitoring Network (CMMN), it is proposed to put in place a programme of standardised trapping. This involves the operational time of the nets to remain constant on a day-to-day basis over the monitoring period. By controlling the number of nets used, their location and the number of hours at a set time of day, the value of the data increases. This ringing data is used in conjunction with observational data and daily estimated totals to give an overall idea of migratory volume through Al Ansab Lagoons. When these limitations are put in place, the data from one year to the next is compared with greater value giving a truer assessment of the migration densities through the site.

It is proposed that starting in early 2009, a long-term ringing program is initiated at Al Ansab Wetland. This would involve a mist-netting program that covered the key habitat types found at Al Ansab. Net locations would be identified from the outset as these would need to remain constant from the start of the project.

The migration monitoring periods would be mid-February until mid-May and the beginning of September until mid-November. During this time, standardised mist-netting would be carried out by a fully-trained ringer with experience of managing long-term ringing projects. During migration monitoring periods, ringing would run from dawn for a period of five hours, after that, a daily census compiled and daily estimated totals completed with data being input daily.

Outside of monitoring periods, breeding bird surveys would be completed to quantify the diversity and volume of birds using Al Ansab as a breeding ground. At this point, focus would be on key indicator species as previously mentioned, to incorporate into IBA application and the Site Management Plan.

The training of Omani's would initiate outside of migration monitoring times but would later be integrated into migration monitoring periods, to gain experience needed to complete the program in future years.

8.2 Requirements

To complete the initial year of the long-term ringing program an experienced ringer would be required on a full-time basis. The candidate would require a minimum of two years experience in running a bird observatory or long-term ringing project and hold the required license in their home country, allowing them to mist net and ring passerines, shorebirds, raptors and waterfowl. The candidate should also be experienced in training individuals with little or no experience of handling and identifying birds. Experience in education is required as there will be an element of providing educational programs to visitors to Al Ansab. A background in Ecology would be preferable, ideally up to degree standard.

To assist with the day-to-day running of the migration monitoring, volunteers from overseas would be recruited, these would be required to hold a permit allowing them to ring alone in their country of residence.

8.3 Outcomes

Upon completion of the initial year of ringing, the project would be able to provide the following:

- Ringing data covering two migration periods (spring and autumn)
- Ringing data covering interim periods – breeding birds/wintering birds/residents
- The initiation of comprehensive training of field assistants to conduct bird census/ringing duties.
- Developed an education program to present to educational groups/students/public.
- Identified the key species for Al Ansab Lagoons and incorporate these requirements into site management plan.
- Applied for designation as an Important Bird Area as specified by Birdlife International, under sections A1, B1i, B2 and B3.
- Justification for national designation as a protected area/nature reserve.

10 Recommendations

This report recommends that a long-term ringing project at Al Ansab is viable and beneficial to the long-term management of Al Ansab. A ringing project of this sort would meet the mandate of the Oman Waste Water Services Company.

This report also recommends that the long-term ringing project at Al Ansab be initiated in early 2009 so that ringing operations can begin by mid-February.