CEPF SMALL GRANT FINAL PROJECT COMPLETION REPORT

I. BASIC DATA

Organization Legal Name: Nature's Valley Trust

Project Title (as stated in the grant agreement): Nature's Valley Water Opal Wetland Rehabilitation Project

Implementation Partners for This Project:

Project Dates (as stated in the grant agreement): November 1, 2006 – July 31, 2007

Date of Report (month/year): September 2007

II. OPENING REMARKS

Provide any opening remarks that may assist in the review of this report.
We have been extremely disappointed at our local Municipality's response to this project and hope, in time, that through further discussion, we will be able to create more understanding of the importance of this proposed project and its benefits to the local environment and its communities.

III. NARRATIVE QUESTIONS

1. What was the initial objective of this project?

The objectives of this project were two-fold:

a. To rehabilitate an existing small wetland site in order to assist in filtering storm water from a storm-water canal which feeds into the Groot River estuary;
b. To establish the site as an outdoor classroom for school groups and visitors to Nature's Valley.

2. Did the objectives of your project change during implementation? If so, please explain why and how.

Unfortunately, due to a decision made by our local Municipality, we have been unable to create the proposed wetland site. Despite this, the objectives of the project remain unchanged and it is hoped that we will, at a future date, be able to fulfill these objectives.

3. How was your project successful in achieving the expected objectives?

An educational resource and information board has been developed pertaining to wetlands in the area (see appendices 4 and 5). Unfortunately, and as mentioned, we have been unable to utilize the original site for this project. However the resources, will be applied to the Groot River estuary until this issue is resolved.

In addition to the above, although we have been unable to implement the project as planned, through lobbying our local community, we have created an in-depth understanding of the importance of wetlands and their functioning.

4. Did your team experience any disappointments or failures during implementation? If so, please explain and comment on how the team addressed these disappointments and/or failures.

Prior to submitting an application to CEPF for funding, the NVTrust contacted Bitou Municipality to obtain permission to undertake the project. Following a positive response telephonically, a letter and several e-mails were sent to Bitou Municipality (see appendix 1). No response was forthcoming until a public meeting was advertised to get inputs from the community and to address any possible concerns. No response to this invitation was received from the Municipality until ten minutes prior to the meeting beginning when we were advised that we should not continue with this as the Municipality had included the property into a land audit in order to decide on its future use.

The meeting was held and it was resolved that a background information document be produced and distributed to all the homeowners in Nature's Valley (see appendix 2). The response from homeowners was overwhelmingly in favour of the development of the wetland and this information was conveyed to Bitou Municipality, the land owners of the Public Open Space, at a meeting. Unfortunately, no formal response to our written or verbal submissions, despite the community's wishes, has been forthcoming, other than reference made to the Land Audit which they are presently undertaking.

Following a formal submission to the Municipal Council, a resolution was taken that the project should not continue until the land audit process has been finalized (see appendix 3)

The land audit document produced for Bitou Municipality is being undertaken to determine best use for unused Municipal properties. The original formal land audit document distributed for public comment excluded Erf 380 (the site for the proposed wetland rehabilitation). Bitou Municipality have informed us, verbally, that this was an error and that they intend to incorporate this into the land audit which may result in Erf 380 being rezoned, subdivided and sold for development.

5. Describe any positive or negative lessons learned from this project that would be useful to share with other organizations interested in implementing a similar project.

- Prior to submitting a funding application to implement a project on Municipal land (including Public Open Spaces) permission must be granted by the appropriate Municipality, in writing, for this to be implemented.
- Involving a community in discussions around a public open space can go a long way towards raising awareness and generating in-depth understanding of and participation in a particular environmental issue or concern.

6. Describe any follow-up activities related to this project.

- Ongoing discussions and negotiations will take place with the local Municipality regarding the proposed wetland development;
- The Wetland Resource has been developed to incorporate all wetland sites within Nature's Valley and will be utilized when and where possible;

7. Please provide any additional information to assist CEPF in understanding any other aspects of your completed project.

Activities Taken Towards the Implementation of the Water Opal Wetland Project:

- Site visits were undertaken by Cape Nature and South African National Parks specialists to determine the appropriate location for the wetland;

- A workshop with children was held in December and a draft resource booklet has been produced for future school groups visiting the site as an outdoor classroom**.** Posters and pictures produced at the workshop have been used to illustrate the resource.
- A wetland consultant was appointed, following a site visit, to draw up a report and design for the wetland (see attached Wetland Report: Appendix 6);
- Dumpy level surveys were undertaken to ground truth levels to ensure that seepage from the storm water canals into the wetland would suffice;
- Quotations were obtained to undertake the clearing of unsuitable vegetation (kikuyu grass, pioneer weeds, etc), dumped materials and excavation for the wetland site.
- A public meeting/workshop was held to address any concerns or queries that community members may have and to include any appropriate suggestions;
- A background information document and questionnaire was disseminated to all homeowners in Nature's Valley;
- Meetings were held with Bitou Municipality regarding the implementation of the project and this was followed up with written correspondence.

IV. ADDITIONAL FUNDING

Provide details of any additional donors who supported this project and any funding secured for the project as a result of the CEPF grant or success of the project.

Donor	Type of Funding*	Amount	Notes

Additional funding should be reported using the following categories:

A *Project co-financing (Other donors contribute to the direct costs of this CEPF project)*

B *Complementary funding (Other donors contribute to partner organizations that are working on a project linked with this CEPF project*

C *Grantee and Partner leveraging (Other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF project.)*

D *Regional/Portfolio leveraging (Other donors make large investments in a region because of CEPF investment or successes related to this project.)*

V. ADDITIONAL COMMENTS AND RECOMMENDATIONS

Appendices:

1. **Correspondence with Bitou Municipality**
2. **Background Information Document**
3. **Copy of Council Resolution**
4. **Wetland Educational Resource**
5. **Wetland Information Board**
6. **Wetland Report**
7. **Photo Gallery**

VI. INFORMATION SHARING

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned and results. One way we do this is by making programmatic project documents available on our Web site, www.cepf.net, and by marketing these in our newsletter and other communications.

These documents are accessed frequently by other CEPF grantees, potential partners, and the wider conservation community.

Please include your full contact details below:

Name: Julie Carlisle
Organization name: Nature's Valley Trust
Mailing address: PO Box 230, The Crags, 6602, South Africa
Tel: +27 44 531 6820
Fax: +27 44 531 6820
E-mail: nvalley@worldonline.co.za

FINANCIAL REPORT

Project Costs Against Budget

South African Rand and USD

DESCRIPTION	BUDGETED		ACTUAL TO DATE	
	EXPENSE (SA Rand) SUBTOTAL	(USD) 1USD = R7.40	EXPENSE (SA Rand) SUBTOTAL	(USD) 1USD = R7.40
Interpretive Signage	R3100	$418.92	R345.00	$46.62
Brochures	R2000	$270.27	R0.00	$0.00
Labour and Materials	R13 500	$1824.32	R0.00	$0.00
Consultation and wetland plants	R 5000	$675.68	R6662.50	$900.34
Survey	R3000	$405.41	R0.00 (included above)	$0.00
Administration of project (copies, postage, staff involvement, workshop)	R3000	$405.41	R595.00	$80.41
TOTAL	R 29 600	$ 4 000.01	R 7 602.50	$1 027.37

Appendix 1: Correspondence with Bitou Municipality

July 2007:

Nature's Valley Trust

In support of conservation

PO Box 230, The Crags, 6602
Telefax: (044) 531-6820
E-mail: nvalley@worldonline.co.za
(A Non Profit Organisation: registration number 025-306-NPO)

ERF 380 NATURE'S VALLEY

SUMMARY DOCUMENT

The Nature's Valley Trust has, over the past five years, focussed much attention on the development of the Open Spaces in Nature's Valley as viable conservation and education (outdoor classrooms) areas which benefit tourists, visitors and environmental education groups.

Through the strong partnership which has been forged with Tsitsikamma National Park, the Park now utilises the Outdoor Classrooms as part of its educational programme and the Tsitsikamma Eco Guides (a community owned business which was facilitated by the Nature's Valley Trust) take school groups through these areas. In 2006, Tsitsikamma National Park utilised the Tsitsikamma Eco Guides to run the Kids In Parks Programme (a national initiative between Pick 'n Pay and SANParks) and these were based out of Nature's Valley utilising the Outdoor Classrooms. Over 1 000 learners visited Nature's Valley last year.

As part of this educational initiative and in response to an identified environmental issue, the Nature's Valley Trust proposed the development of a small wetland area on Erf 380 which would function to partly filter water entering the Groot River estuary and as an Outdoor Classroom.

An initial contact was made with Bitou Municipality outlining the proposed project and requesting permission to undertake this project in March 2006 (Appendix 1). Following a verbal discussion with David Friedman in which he stated that he believed this to be a good project and one which indicated a community's willingness to resourcefully tackle an identified issue, a letter was submitted to George Seitisho (Municipal Manager) and copied to David Friedman. No response was received.

The Nature's Valley Trust submitted a funding application to the Critical Ecosystem Partnership Fund in the USA to implement this project. In October 2006 this application was approved. Ground work and investigations have taken place to date through the employment of Wetland Consultants, quotations have been obtained to develop the wetland and an environmental education resource book has been developed.

In April 2007 a meeting was advertised to take place in Nature's Valley to involve homeowners and stakeholders in a decision regarding the development of this erf. The Municipality (David Friedman) were invited to this verbally and via e-mail, but no response was received. Ten minutes prior to the meeting taking place, an e-mail was received from Carl Mattheus stating that

the meeting should not be held and the public not misinformed as Erf 380 was part of the Land Audit process (Appendix 2).

With this late notice it was decided to continue with the meeting but to inform participants of the e-mail received from Bitou.

Unfortunately, the meeting was not well attended and it was decided that a background document should be prepared and distributed to all homeowners in Nature's Valley requesting their development preferences for erf 380. This was done and responses were received from 70 homeowners, with an overwhelming majority in support of the development of a wetland area on Erf 380.

A funding extension for this project has been granted until the end of July 2007 and, if we are not able to implement this, the funds will need to be returned to the CEPF, together with a report.

The Nature's Valley Trust would request that Bitou Municipality grants permission to continue with this project.

Please refer to Appendix 3 which illustrates the area to be included within this project.

March 2006:

Sub-**APPENDIX 1: SUBMISSION TO BITOU MUNICIPALITY: MARCH 2006**

From: Nature's Valley Trust
To: George Seitisho
Cc: David Friedman
Sent: Friday, March 31, 2006 9:54 AM
Subject: Wetland Rehabilitation - Nature's Valley

Dear Mr Seitisho

Attached is a project description for the rehabilitation of the wetland area in Nature's Valley on Erf 380. This is Public Open Space area, owned by Bitou Municipality. As you will note, we would like to rehabilitate this area in order to filter wastewater which enters the Groot River estuary via Erf 380. We have submitted a funding application for this work to the Critical Ecosystems Partnership Fund in the US and await their response.

As this is Municipally owned property, we would like to request permission to go ahead with this project.

Kind regards
Julie

Julie Carlisle
Project Manager
Nature's Valley Trust
PO Box 230, The Crags, 6602
Tel: +27 44 531 6820

In Support of Conservation

Nature's Valley Trust

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NATURE'S VALLEY WATER OPAL WETLAND

Nature's Valley

Nature's Valley is an isolated, coastal, holiday settlement, approximately 17 km east of Plettenberg Bay (35 km by road) on the Southern Cape's Garden Route in South Africa. It falls within the eastern portion of the Cape Floristic Region and is located on a low-lying, triangular wedge of land on the western side of the estuary of the Groot River, with the Salt River running to the west of the village. It is completely surrounded by the Tsitsikamma National Park and Tsitsikamma Marine Protected Area. Both the Salt and Groot Rivers have been identified as priority rivers in the

Garden Route Initiative (land consolidation project which falls under the banner of Cape Action for People and the Environment – C.A.P.E.). The area also supports diverse habitat types to include lowland and coastal dune fynbos, forest, riverine, estuarine, sandy shores and rocky shores.

Project Background

The Fynbos Reserve, located in the centre of Nature's Valley, has, for the past five years, been a focus project of the Nature's Valley Trust and involves the rehabilitation of coastal dune fynbos and reintroduction of the endangered Brenton Blue butterfly (*Orachrysops niobe)*. As part of this project, attention was drawn to an open erf neighbouring this property as, earlier studies indicated that this was an important flight path of the butterflies. Over time, this had become overgrown and has subsequently been cleared. A wetland area was located in the centre part of this erf but the construction of stormwater management canals diverted the flow of water from this area and the site has been used as a dumping area. As a result of this, water channeled through the stormwater canals and into the Groot River estuary is unable to go through any form of natural filtration before it enters the estuary. This entry point, through water tests conducted by the local Municipality, has been identified as a possible source of contamination of the estuary with ecoli.

Historical surveys of this wetland site also indicate that the wetland was the breeding area of two *Quintilia* species (Cicadas), still to be identified. It was also home to the Water Opal *(Chrysoitis palinus margueritae)* and it has been recommended that this butterfly's food plant, C*hrysanthemoides monilifera*, is replanted.

Being part of a series of open erven located in the centre of the village, the area also forms an important corridor between the forest and dune forest for wildlife (bushbuck, blue duiker, bushpig, etc).

Project Objectives

1. Rehabilitation of the wetland area

- This will be done in consultation with Working for Wetland experts in the area.
- Rehabilitation of the wetland will involve the removal of grass and plants which have grown up in the area (through illegal dumping of organic waste) using herbicides.
- The rubble which has been dumped on this site will also be removed and the area leveled to its former state.
- The section of the stormwater canal running alongside the wetland will be filled and the water diverted to run through the wetland before it re-enters the stormwater system and runs into the estuary.
- Appropriate water plant species (reeds, etc) will be planted and established to filter the water running through the wetland.

2. Environmental Education site

- The Nature's Valley Trust has, over the past few years, established several outdoor classrooms in the area as part of its environmental education focus. At present, these include classrooms in the forest, the fynbos, along the coast, the rivers, a botanical garden

and a shell midden site. The classrooms are utilized by local schools groups and visitors to the area.

- The wetland reserve would be established as another outdoor classroom and would establish an illustrative link between the river and estuarine classroom, highlighting the importance of wetlands, riverine and wetland vegetation, proper water management, etc.
- A resource booklet for learners will be developed, linked to information boards on site.

Project Deliverables

- A functioning wetland system which will filter polluted waste water entering the Groot River estuary.
- Re-establishment of suitable habitat for cicada species and the Water Opal (*Chrysoitis palinus margueritae).*
- An outdoor classroom with interpretive boards.
- An activity and information booklet for school groups.

Nature's Valley Trust

The Nature's Valley Trust (NVTrust) was established in December 2000. Since its establishment, the Trust has established itself as a credible conservation body in the area. Several projects have been undertaken which focus on conservation, research, environmental education and communities. These are briefly outlined as follows:

⇒ **Coastal Fynbos and the Brenton Blue Butterfly** (monitoring and research). Rehabilitation and management of a small area (1,2 hectares) of coastal dune fynbos within Nature's Valley. Through applying appropriate management techniques, the habitat has suitably recovered and critically endangered Brenton Blue butterfly larvae and eggs have been reintroduced onto the reserve.
Partnerships: Cape Nature, WWF-SA and the Green Trust, Dave Edge, Professor Roy Lubke, Bitou Municipality, South African National Parks (SANParks)

⇒ **The Phyl Martin Park** is a botanical garden established within Nature's Valley which includes an indigenous nursery has been developed by the NVTrust to include a self-guided trail, children's' treasure route and interpretive signage. During 2005 a small interpretive centre/museum was established.
Partnerships: WWF-SA, Bitou Municipality, Nature's Valley Ratepayers' Association

⇒ In collaboration with South African National Parks' Scientific Services, the Nature's Valley Trust facilitated and is partly funding a research and monitoring project of the **Groot River Estuary**.
Partnerships: South African National Parks, Bitou Municipality

⇒ **The Salt River** has been identified as a unique river system. Surveys undertaken between 2000 and 2004 found that the Salt River contains a rich diversity of aquatic insect species (with Gondwanan links), which include sixteen new species and four new genera, several of which are not yet described. Four projects have been developed focusing on the Salt River and include:

- ongoing research,

- Salt River outdoor classroom,
- involving local impoverished community members in an eco-guiding programme in collaboration with SANParks, CoastCare (Marine & Coastal Management) and Storms River Adventures
- a stakeholder engagement process with the aim of producing management guidelines for Salt River users.

Partnerships: IUCN Netherlands (International Union for the Conservation of Nature), CEPF (Critical Ecosystems Partnership Fund), South African National Parks, CoastCare, Albany Museum, Bitou Municipality, Salt River users, Cape Nature, Department of Water Affairs and Forestry, Willing Workers in South Africa

⇒ **Invasive Mussel Project:** The Nature's Valley Trust raised the necessary funds to undertake a study of the extent of invasion of alien (Mediterranean) mussels (*Mytilus galloprovincialis)* along our coast. Four sites were sampled. On average, the Mediterranean Mussels comprise about 74% of the total. Further research into this is being conducted by Rhodes University and monitoring of the coastline at Nature's Valley is ongoing.
Partnerships: South African National Parks, Aveng (funders), Rhodes University

⇒ **Community awareness projects** include the production of a quarterly newsletter, a comprehensive list of eco-guidelines and a status report which are disseminated to the Nature's Valley homeowners, associated organizations and interested individuals.
Partnerships: South African National Parks, Nature's Valley Ratepayers' Association, Botanical Society, Western Cape Nature Conservation Board

⇒ An **environmental education project** has been initiated in collaboration with existing education programs. Nature's Valley has been established as an outdoor classroom using five focus habitats incorporating the marine environment, fynbos, forest, culture and shell midden sites.
In addition to this, the Nature's Valley Trust has facilitated the establishment of an Eco-Schools node in Plettenberg Bay/Tsitsikamma.
The NVT and Tsitsikamma National Park are working in collaboration on the Adopt-a-Beach project which is being run by CoastCare (Marine & Coastal Management) and WESSA (Wildlife and Environment Society of South Africa).
Partnerships: South African National Parks, WESSA, Eco-Schools, WWF-SA, Garden Route Environmental Education Network, Southern Cape Herbarium

⇒ The Nature's Valley Trust has facilitated the establishment of Nature's Valley as an **Urban Conservancy**.
Partnerships: Cape Nature, Nature's Valley Ratepayers' Association

April 2007:

Sub- APPENDIX 2: E-MAIL FROM CARL MATTHEUS

----- Original Message -----
From: Natures Valley Trust
To: C Mattheus
Cc: George Seitisho ; lthibini@plett.gov.za
Sent: Wednesday, April 04, 2007 1:11 PM
Subject: Re: Workshop: Erf 380, Natures Valley

Dear Carl

Thank you for your e-mail. David Friedman, whom we understand to be the Director with responsibility in this regard, was contacted on the 27th March by e-mail and telephone (a message was left with his Secretary) inviting him to attend the Wetland Workshop. We have had no response from him, but would like to extend the invitation to you.

The aim of the workshop is to explore alternative options for this area which is zoned Open Space and for use by the community of Nature's Valley. Notices have been sent to all homeowners currently in Nature's Valley with the aim of ensuring an inclusive an open process.

Regards

Julie Carlisle
Nature's Valley Trust
PO Box 230, The Crags, 6602
Telefax: 044 531 6820
Cell: 082 322 2209
E-mail: nvalley@worldonline.co.za

----- Original Message -----
From: C Mattheus
To: Nature's Valley Trust
Cc: L Thibini ; G Seitisho
Sent: Wednesday, April 04, 2007 12:07 PM
Subject: Workshop: Erf 380, Natures Valley

Good morning.

It was with utter amazement that cognizance was taken of your proposed meeting regarding Erf 380,(Wetland Reserve)-(sic).

This matter was discussed at the meeting of Senior Managers with the MM (yesterday) and I was instructed to inform your good selves that the opinion is offered that the proposed meeting is deemed to be definitely premature simply because the future use of the relevant property has not been determined.

The future use of this property will be determined via the land audit process by the Municipal Council in due course. To attempt to pre-empt the future use of this property would be irresponsible because the full implications of, amongst others, the " BREAKING NEW GROUND " national policy, the "CAPE FOR ALL" provincial policy and the local "COMING TOGETHER URBAN INTEGRATION INITIATIVE" have not yet been revealed to your Trust.

It was furthermore resolved that your actions are seen to be sabotaging the transparent and inclusive process followed with the land audit.

You are therefore herewith kindly requested not to mislead the so-called invited “stakeholders” by misinformation or to even attempt to create an expectation that the property may be used to create a “Wetland Reserve”.

Lastly you are herewith reminded that Erf 380 is currently reserved as a public place to which your Trust has no direct or even indirect interest in.

Kind Regards.

Appendix 2: Background Information Document & Questionnaire

Erf 380

Nature's Valley

Background Information Document

& Request for Inputs

During April 2007, the Nature's Valley Trust arranged a workshop in Nature's Valley to brainstorm development options and ideas for Erf 380. The outcome from the workshop is included in this document and it was agreed that further inputs were required from homeowners in Nature's Valley.

This document contains background information to Erf 380, applicable legislation, notes from the workshop held in April and a questionnaire for suggestions for this erf.

Please read through the document and return the completed questionnaire to the Nature's Valley Trust by the 11th June: nvalley@worldonline.co.za / fax 044 531 6668 / PO Box 230, The Crags, 6602

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1. Introduction

Nature's Valley is an isolated, coastal, holiday settlement, approximately 17 km east of Plettenberg Bay (35 km by road) on the Southern Cape's Garden Route in South Africa. It falls within the eastern portion of the Cape Floristic Region and is located on a low-lying, triangular wedge of land on the western side of the estuary of the Groot River. Nature's Valley is surrounded by steep escarpments, at the top of which lies the coastal plateau.

The village is bounded by the Tsitsikamma National Park, including the Marine Protected Area, accentuating its spectacular and contained natural location. All the residential properties in Nature's Valley have been sold and there is therefore increasing pressure to rezone the open spaces in the Valley for residential use.

Map of Nature's Valley

2. Background to Erf 380

Brenton Complex:

The Brenton Reserve Complex

(a) The Fynbos Reserve – Erf 460
(b) The Wetland Reserve – Erf 380
(c) The Forest Reserve – Erf 381

Map of the Brenton Complex and wildlife/butterfly corridors

Background and conservation value

Erf 380 forms part of the Brenton Reserve Complex which represents three endangered biomes; wetlands (380), forest (381) and coastal dune fynbos (460). Investigation has shown that this area, as one unit, provides critical habitat for the Brenton Blue butterfly and at least 2 other high profile species, with varying degrees of endemism (the Blue Duiker and 2 Cicada species). The complex is centrally situated in the valley and acts as a corridor – linking forest to the north and dune thicket to the south. It thus facilitates the unrestricted free movement of wildlife through the valley.

The Fynbos Reserve (erf 460) was created when a large area zoned as a school site in the centre of the township was de-proclaimed and subsequently divided into smaller erven. The Community Hall was built where it presently stands - Erf 379. Telkom built a station on Erf 451, two portions were sold (Erven 470 and 471) and the remaining erven were left undeveloped and zoned as public place. Today under the current zoning scheme regulations they are zoned as open space 1.

At a stakeholder workshop involving interested and affected individuals and organizations, it was agreed that the intention for erf 460 was to conserve a representative example of unique coastal dune fynbos, which is not found elsewhere along the coast, from Plettenberg Bay to the eastern border of the Tsitsikamma National Park.

Erven 380 and 381 make up a natural low lying wetland area that becomes marshy and waterlogged during times of high rainfall making the area unsuitable for development. Erf 381 showcased (and still does) a stand of magnificent trees and the wetland was a valuable natural system for the purifying and control of storm water runoff from the western side of the valley.

The existing and potential conservation value of the Brenton Complex (Erven 460, 380 and 381) can be summarized as follows:

- Establishment of a resource to support and extend existing education initiatives for children;
- Provision of a nucleus for extension of educational potential through further compatible developments that may be wanted in the future (e.g. enlarged wetland, educational centre, information centre, etc).
- Further development of these erven as useful open spaces (pathways, benches, interpretive signage, etc);
- Maintenance of these open spaces as a wildlife corridor for the movement of wildlife through Nature's Valley;
- Conservation of these erven for the re-establishment of the Brenton Blue butterfly.

Conservation and Rehabilitation

In 2002 , at the request of the community, the Nature's Valley Ratepayers Association (NVRA) formed an Open Spaces Committee whose aim was to "*secure and manage the development and operation of the remaining ecologically sensitive open spaces in Nature's Valley for the benefit of the Nature's Valley community and surrounding area"*
Working closely with the Nature's Valley Trust (NVT), SANParks, Cape Nature Conservation, the Bitou Municipality, Environmental Education initiatives and the community a workshop was held in 2001 and management plans for the Fynbos Reserve within the Brenton Complex and the Phyl Martin Park were drawn up and are being implemented.
The first area of focus was the Fynbos Reserve. Since the discovery of the Brenton Blue butterfly in Nature's Valley in 1977 a second population was discovered in Brenton-on-Sea. A reserve has been established in Knysna and the Brenton Blue Trust is managed by butterfly researcher Dr Dave Edge. With the management plan we have in place for erf 460, Dr Edge believes that through a reintroduction programme Nature's Valley could once again support a population of Brenton Blue butterflies. Thanks

to support from WWF-SA the Fynbos Reserve has been rehabilitated. Dr Edge points out that the value of a second breeding colony of the Brenton Blue would be an inestimable contribution in keeping a species from the brink of extinction and serve as an indicator species as to the health of the Nature's Valley ecosystem. (Appendix 1 – letter by Dr Dave Edge) In anticipation of this and the fact that erf 380 was originally part of the butterfly's flight path and an important part of its lifecycle, the rehabilitation of erven 380 and 381 has been proposed. A very exciting development has been the discovery of 2 *Quintilia* species (cicadas)[3] on Erf 381 and 380 by Dr Ball. Dr Martin Villett of Rhodes University has been asked to come and identify and describe these species. (Appendix 2 – letter by Dr Ball)

Erf 380 is situated in the central and low-lying area of Nature's Valley and was originally part of the butterfly's flight path (identified by experts as being an important part of the butterfly's lifecycle) (Appendix 3). Historical reports and surveys by wetland consultants suggest that the area had been a wetland. Currently however, it does not function as a wetland, as the storm water that moved through the wetland was re-directed into a canal that was established on the south side of the wetland. Water from the canal, believed to contain some pollution at times, now moves directly into the estuary. Additionally, erf 380 has been used as a dumpsite for organic waste and building rubble. The NVTrust lodged a successful application to access funding for the rehabilitation of erf 380 in February 2006 through the CEPF (Critical Ecosystem Partnership Fund) in order to rehabilitate erf 380. Confirmation of funding was received in October 2006.

3. Wetlands

In physical geography, a wetland is described as an environment found "*at the interface between truly terrestrial (land) and truly aquatic (hydrological or water) ecosystems, making them different from each yet highly dependent on both*". In essence, wetlands are ecotones, defined as a transitional zone between two adjacent ecosystems or communities. An ecotone can appear on the ground as a gradual blending of the two communities across a broad area, or as a sharply defined boundary line.

Wetlands are typically highly productive habitats, often hosting considerable biodiversity and endemism (endemic or common plant and animal life). In many locations they are the subject of conservation efforts and Biodiversity Action Plans (Appendix 4: Background information on Wetlands).

Ecologically, wetlands act like a massive sponge by:

- preventing flooding by absorbing and holding water to keep river levels normal,
- filtering and purifying the surface waters and then once done,
- slowly releasing this into streams and rivers to assist maintain ecosystems further downstream.
- Wetlands also release vegetative matter that fish and other organisms feed on.

In terms of erf 380, in a report by a wetland consultant (Dr Pete Illgner) following a survey of the erf , the following "Opportunities" through the rehabilitation of Erf 380 as a wetland were outlined:

- Flood attenuation;
- Retention of sediments, nutrients and harmful compounds (which would, through the canal, enter the Groot River estuary);
- Habitat creation for aquatic flora and fauna as well as the Brenton Blue butterfly;
- Environmental education: the wetland will provide a good opportunity to educate the public about the ecological services and hence benefits provided by wetlands. The wetland will provide an opportunity to reach both scholars/learners and potentially influential land owners who reside within Nature's Valley or visit it on holiday.

4. Applicable Guidelines, Policy and Legislation

Wetlands are complex ecosystems that are among some of the nation's most valuable resources. They serve several ecological functions including improving water quality, controlling floods, diminishing droughts, and stabilizing shorelines. Home to many rare and endangered species of plants and animals, they not only serve the interests of natural ecosystems, but also serve hazard management and economic and commercial interests, such as coastal drilling for oil and natural gas.

a. The **Ramsar Convention** on Wetlands of International Importance Especially as Waterfowl Habitat, 1975 ("Ramsar Convention"), to which South Africa is a party states the following:

- States must designate wetlands for inclusion on the list.
  12 wetlands have been included on the list by South Africa

- Article 3.1 provides that:

  "the Contracting Parties shall formulate and implement their planning so as to promote…as far as possible the wise use of wetlands in their territory"

The thrust of the Convention is towards creating reserves but it makes allowance for use.

b. In terms of the **Convention on Biological Diversity**, to which Africa is also a party:

- the State has a duty to conserve wetlands and a duty to rehabilitate them.

- Article 8 provides that:

  "Each Contracting Party shall, as far as possible and as appropriate:
  (c) Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use;
  (f) Rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, inter alia, through the development and implementation of plans or other management strategies.
  (g) Develop or maintain necessary legislation and/or regulatory provisions for the protection of threatened species or populations.

c. The **Constitution of South Africa** also creates a duty on the State to conserve and rehabilitate wetlands

d. The **Bitou Municipality's SDF (Spatial Development Framework)** states the following:

- Section 3.2.4: Quality of Place:
  Quality of place is attained by embracing uniqueness as opposed to standardization. In terms of the natural environment it requires the identification, a response to and the emphasis of the distinguishing features and characteristics of landscape. Different natural landscapes suggest different responses. Accordingly, town design should respond to nature.

- Section 3.2.5: Sensory Qualities:

This section refers to the need for the urban poor to have access to Open Spaces to enhance quality of life. Erf 380 is currently utilized as an Outdoor Classroom for schools from Kurland Village, Coldstream and other visiting educational groups. The educational/ edutainment potential of this site could be enhanced for such groups.

- Section 3.2.6: Sustainability:
  Two issues are central to achieving environmental sustainability: The first is the need to work harmoniously with the natural landscape, rather than causing breakdowns in natural systems, such as filling in wetlands to obtain developable land rather then developing higher-lying ground.

e. The **National Water Act** includes the following definition of a wetland:

(xxix)``wetland" means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

For further information on policy and legislation pertaining to wetlands, visit the following websites:

- www.info.gov.za/acts/1998/a36-98.pdf
- www.environment.gov.za
- www.dwaf.gov.za/wfw/legal
- www.ramsar.org

5. Current Status of Erf 380

Zoning Scheme: The 3 zoning schemes that are applicable in Nature's Valley are the Guide Plan, The Structure Plan and the Spatial Development Framework. We await confirmation from Bitou Municipality on the definitions for Open Spaces within these guide plans and the prioritization of these.

At the moment erf 380 is zoned as follows:

Under the Guide Plan as Open Space 1
Under the Structure Plan as Public Place
Under the SDF (we await confirmation from Bitou Municipality)

6. Available Funds

The potential educational value, ecological value, plant and animal diversity of erf 380 provides motivation to protect Erf 380. In August 2006 a funding appeal was send out to various funding organizations. In October 2006 funding was received from CEPF (Critical Ecosystem Partnership Fund) for Erf 380. The budget included a wetland survey of the area, a dumpy level survey, a workshop and rehabilitation of the wetland.

7. Wetland Consultants Report Summary

The suggestion that erf 380 was historically a wetland required confirmation by wetland specialists who were appointed to conduct a survey of erf 380. In November 2006 Dr P.M. Illgner and Dr Japie Buckle from Working for Wetlands visited Nature's Valley and Dr. Illgner prepared a report on Erf 380. According to his report erf 380 is located in a low-lying position and the erf is underlain by unconsolidated sediments of unknown an origin.
"Elevations on the erf range from 8,6m to 6,8m above mean sea level. The eastern end of the furrow represents the lowest point on the property …. The storm water in the furrow appears to discharge into a drainage line that leads down to the Groot River estuary … A small volume of water was flowing into the furrow at the time of the visit and also two small excavations on the erf had water present, indicating the probable presence of a shallow water table. This is consistent with what one with expect to see in a wetland."
As part of the report a number of possible wetland designs were included:

1. **Scalloped furrow wall-** Constructing scallops on the northern wall of the furrow increasing the volume of the furrow at these points. However, potential problems include sedimentation in the furrow and the invasion of the furrow by aquatic plants.
2. **Pond fed by groundwater –** An underlined pond constructed at the lowest point of the site, namely the southeastern corner.
3. **Off-channel flood-fed pond –** More of less the same as option 2, except water would be discharged into the pond from the furrow via a flood overflow structure.
4. **Overbank flood channel –** This option is a variation to option 3. In this instance the pond would have an entry and exit point allowing flood water associated with storm events to flow through the pond. The potential problems with option 2, 3 and 4 include eutrophication as a result of septic tanks, potential problem biota like mosquitoes and frogs and also it could be a safety hazard for small children.
5. **Inpounded furrow** – The furrow could be impounded to a shallow depth in order to allow water to pond behind the impeding structure. Storm flows would then still be confined to the furrow. The walls of the furrow at the impeding feature could be sloped in order to increase the potential storage volume behind the structure. Problems with the option are back flooding, sedimentation taking place in the furrow, eutrophication, potential problem biota and also safety for children.

In terms of the results, the overbank flood channel was regarded as the best option by the consultants (The report is available at the Nature's Valley Trust Office). A dumpy level survey was done in February 2007 and the results of the survey led to believe that the overbank flood channel is the best option (Appendix 5: A map of the proposed option for Erf 380 by the consultants).

8. Workshop Notes

An information workshop was organized by the Nature's Valley Trust. The aim of the workshop was to involve Nature's Valley homeowners, the NVRA and Bitou Municipality in work-shopping 'development' ideas for Erf 380.

A few minutes prior to the start of the meeting the Nature's Valley Trust received an e-mail from one of the Municipal officers stating that they would not support the meeting and advised the NVTrust that Erf 380 is currently included in a land audit process which will decide the use/future development of the erf. Due to the short notice of this e-mail and the fact that a Bitou Municipality representative had been invited to the workshop (but had not responded), the meeting continued.

At the start of the Workshop some background information to erf 380 was presented (see below). Following this, the strengths and weaknesses of Erf 380 were brainstormed and various options for the use of the erf were listed and prioritized.

1. Strengths and Weaknesses

Strength	Weaknesses
Home of Eco significant species	Degraded dumpsite
Open Space	Open Space
Still open for use	Uncertain Development status
Remnant of an eco-tone not protected elsewhere in NV.	Frogs (noise) and Mosquitoes
Could provide filtration & flood retention for storm water	Closed/Inaccessible to people
Forms part of eco-corridor – ecological continuum between forest biome and coastal fynbos	

2. Development Options

Option		Preferred option
A	Recreational sports – tennis, bowls	
B	Wetland +	1
C	Small Clinic, library	4
D	Develop – Residential	
E	Organic/Other dumpsite	
F	Educational centre	3
G	Drainage Centre/ Storm water	2

A: One of the suggestions for erf 380 was to construct sport facilities (such as a tennis court or bowling greens).
B: Option B is to develop a small wetland area (pond) with an environmental trail for adults and children through the wetland and possibly include picnic / seating areas.
C:. Erect a small building (small footprint) on erf 380 that can be used as a centre for the people of Nature's Valley to house a library and possibly a clinic.
D: A suggestion that was discussed at the meeting was to use erf 380 for residential development.
E: Nature's Valley residents have problems with waste management. The everyday waste is dumped at the dumpsite in Nature's Valley. However organic waste is taken to Plettenberg Bay and this has resulted in people dumping their organic waste on erf 380 or elsewhere in and around Nature's Valley.
F: One of the options was to create an educational centre with a small footprint which could also be used to house a clinic and library..
G: During the floods of 2006 the lower lying areas in the Valley were flooded. Therefore, it was suggested that erf 380 being used as a drainage site for the Valley through the establishment of a wetland.

3. Discussion

It was suggested that the option best suited to Erf 380 and Nature's Valley would be the development of a small wetland (pond) with pathways, benches and possibly picnic tables, signage and an educational trail for school children. The preferred option, for the longer term, was the inclusion to the above of an educational centre (with a small development footprint) that could also be used as a library or clinic. The wetland area may also aid in mitigating flooding impact, although it was agreed that this would be slight.

It was suggested that a document (mini ROD) be put together by the Nature's Valley Trust with all the background information, maps, applicable legislation, options and other needed information and sent out to all home owners for comment.

9. Questionnaire

Name: _____ Erf _____

Postal Address: _____

_____

_____

Tel no: _____ __ Cell: _____

E-mail address: _____

The questions below are to assist us in reaching a decision on the preferred development option for Erf 380.

1. In April this year, various development options were discussed at a public workshop in Nature's Valley. The options were:

   - Recreational development – tennis, bowls, etc.
   - Wetland + (Small wetland / pond with an educational centre and trails)
   - Small Clinic/Library
   - Residential development
   - Organic or other dumpsite
   - Educational Centre
   - Drainage centre/Storm Water

   The NVTrust has accessed funding for the rehabilitation of erf 380 as a small wetland and outdoor classroom. In view of this, please can you indicate by ticking the appropriate space whether you would support such a development or prefer an alternative option for this erf:

Wetland rehabilitation with educational opportunities, pathways, benches and signage (possible long-term addition of an educational/information centre)	
Other	

2. Do you have any other ideas or suggestions that you feel should be considered? If so, please list and explain:

3. Would you like to be kept updated on the progresses on Erf 380?

Yes	

Can you please e-mail or fax the complete form back to the Nature's Valley Trust at nvalley@worldonline.co.za or 044 531 6668.

Sub- APPENDICES

Sub-Appendix 1: Letter from Dave Edge

The Chairperson
Nature's Valley Ratepayers Association
PO Box 222
The Crags
6602

Dear Sir

RE: RE-INTRODUCTION OF THE BRENTON BLUE BUTTERFLY TO NATURE'S VALLEY

During a recent visit to Nature's Valley with members of CapeNature, the Nature's Valley Trust and the Brenton Blue management committee, it was agreed that the re-introduction of the Brenton Blue butterfly to Nature's Valley should go ahead, with the aim of re-establishing a second population of these critically endangered butterflies. At present, the butterflies are only found on the Brenton Blue Butterfly Reserve near Knysna (see Appendix).

The Brenton Blue butterfly occurred, up to the late 1970's, on erven 380, 381 and 460 at Nature's Valley (Ball 1997). It is believed that the lack of management of the scarce type of coastal fynbos found on this site, and disturbance from developments around the Fynbos Reserve (erf 460) resulted in the butterflies becoming extinct from the area.

In order to safeguard the Brenton Blue butterfly from extinction as a species, it is extremely important that further populations be established. Re-introduction to its former haunts at Nature's Valley is judged to be the most viable option for establishing a second population. However, sensitive management of certain remaining areas of public open space (erven 380, 381 and 460) in Nature's Valley is vital for the success of the re-introduction, and for the future sustainability of such a population.

I have been informed that there is a possibility that erven 380 and 381 could be rezoned, sub-divided and sold for development. This would seriously compromise the environmental integrity of the area and render it impossible to re-establish a Brenton Blue population.

Quite apart from butterfly conservation concerns, the erven 380, 381 and 460, form a vital corridor linking the indigenous forest to the north of the Nature's Valley to the dune thickets. Erven 380 and 381 in particular are utilised by Bushbuck, Bushpig and other locally found fauna. These play an important role in the ecology of the habitat, maintaining a balance between woody and herbaceous plant species that is essential for the continued abundance of host plant of the Brenton Blue butterfly, the *Indigofera erecta.*

In view of the above, I would strongly urge that the erven 460 (the Fynbos Reserve), 380 and 381, making up the original Brenton Blue habitat, are kept as public open spaces and managed to conserve the flora and fauna of Nature's Valley, which give it so much of its special character and appeal for residents.

Yours sincerely

Dave Edge
Lepidopterists' Society of South Africa

EXTRACT FROM SOUTH AFRICAN RED DATA LIST - BUTTERFLIES
Orachrysops niobe (Trimen, 1862)

CRITICALLY ENDANGERED

Lycaena niobe Trimen, 1862. *Transactions of the Entomological Society London* **3(1)**: 282.

Type locality: Knysna, South Africa.

Distribution: Brenton-on-Sea, near Knysna and an extinct colony at Nature's Valley.

Ecology: Inhabits fairly steep south facing slopes overlooking the sea at an altitude of 95 – 120m above sea level. The underlying geology is Pleistocene aeolionite palaeodunes which form several dune cordons parallel to the coast between Brenton and Wilderness. The locality at Nature's Valley has a similar geology but the dunes are not as extensive and are lower. The vegetation is a mosaic of asteraceous coastal fynbos and coastal thicket (Vlok & Euston-Brown 2002, Lubke *et al.* 2003, Edge 2005). *Orachrysops niobe* inhabits the ecotone between the two vegetation types. The dominant plant species are *Pteridium aquilinum* (in disturbed areas which *O. niobe* seems to prefer), *Pterocelastrus tricuspidatus, Tarchonanthus littoralis* and *Rhus lucida* (in the thicket patches) and *Ficinia ramosissima, Helichrysum petiolare, Erica speciosa* and *Helichrysum cymosum* (in the fynbos areas).
Early stages: Ball, cited by Henning and Henning, 1989. Williams, 1996. Edge & Pringle, 1996. Edge 2002, 2005. Larval food: *Indigofera erecta* Thunberg. Larvae feed on leaves in earlier instars and on the rootstock in later instars (Edge 2005). The ant association is predominantly with *Camponotus baynei* Arnold (Edge 2005), but also sometimes with *Camponotus* undescribed species near *berichti* (Edge 2005). Butterfly is bivoltine, with October-November and January-February broods.
Conservation: The colony at Brenton-on-Sea has been secured, after a prolonged campaign, by proclamation of a 1.4 hectare Special Nature Reserve managed by Western Cape Nature Conservation Board. The colony is stable and the population of adults per brood is approximately 150.
A small fynbos reserve (0.5 hectare) has been established at the original site where *O. niobe* was breeding at Nature's Valley. In recent years the reserve has been actively managed and there is now a good population of host plants, *I. erecta.* Re-introduction of *O. niobe* will be attempted during 2005.

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Sub-Appendix 2: Letter from Dr Johathan Ball

----- Original Message -----
From: Jonathan Ball Family
To: nvalley@worldonline.co.za
Sent: Thursday, May 12, 2005 7:52 AM
Subject: Insects at Nature's Valley

11 Maryland Avenue,
Tokai, Cape Town 7945
12th May 2005

To the Nature's Valley Trust.

Re: Future "development" at Nature's Valley of erven on the Northern and north-western side of the NG church Hall in Nature's Valley.

For the record, I am not a landowner in Nature's Valley. I have however been visiting Nature's Valley and the adjacent Cape Coast from Port Elizabeth to Mossel Bay, since 1974. I rediscovered the Brenton Blue butterfly at both Nature's Valley and near Brenton-on-Sea. I was a co-author of the authoritative book "Pennington's Butterflies of Southern Africa" published by Struik-Winchester in 1994. I have a BSc (Hons) (cum laude) in Nature Conservation from Stellenbosch University, and have just completed a MSc thesis in Conservation Ecology (also from Stellenbosch University). I am the chairperson of the W. Cape Branch of the Lepidopterists' Society of Africa. I received the Stevenson-Hamilton Silver medal for outstanding zoological contribution in South Africa, from the Zoological Society of South Africa, in Pietersburg in 1999.

South Africa was a co-signatory of the 1991 Convention of Biodiversity in Rio de Janiero. We legally agreed to protect our biodiversity.

Firstly, as regards the relocation of the Brenton Blue (Orachrysops niobe) to Nature's Valley. This is a highly desired endeavor. The whole thrust of the management of rare and endangered fauna and flora supports the preferred state of threatened species being found in more than one, protected site. Fires, local habitat destruction, disease and other stochastic factors can cause local extinction.

The Brenton Blue used to occur at Nature's Valley. This was on the site of the present church hall, the present reserve south, east and south-west of the church hall, the coastal fynbos ridge west of the fynbos reserve as well as on the wetland immediately north of the tarred road where the church hall presently is. This latter site was illegally used as a dump, and the vegetation is very overgrown. This site was an important nectaring / flight area for the Brenton Blue.

If the Brenton Blue is reintroduced to its past habitat, it is vital that the remaining sites of its former (now restricted) habitat be both preserved and managed. The habitat south, south-east and east of the NG Church Hall is the best it has been for 20 years apropos the requirements of the Brenton Blue butterfly. Its larval food plant and associated mutualistic ants both appear in adequate numbers. I cannot read the erf numbers of a map sent to me, but the reintroduction of the Brenton Blue would be given a significantly better chance if the erf (former wetland) between the NG church hall and Forest Drive was NOT developed. This habitat needs to have the dumped debris removed/levelled. The vegetation centrally in it needs to be removed and periodically cut (not between September and April – Brenton Blues flight period). Some nectaring plants including Geranium incanum need to be reintroduced to the restored dumpsite. A "hole" in the tall vegetation on the south-east side of this erf (immediately north of the eastern side of the NG Church Hall) needs to be made (at least 20 meters long). This is so the adult butterflies can get to the nectaring site. Speed humps should be placed in the tarred road on either side of the "hole" in the present "hedge" mentioned above, to minimize vehicular mortality of butterflies crossing the road.

Chrysanthemoides monilifera should be planted in the periphery of the "dumpsite", as this was an area where the water opal Copper (Chrysoritis palmus margueritae) used to breed (together with the property

just to the west of the “nectaring site” to the west of the small dirt road). This latter butterfly has also not been seen in the area for 15 years.

The latter erf (wetland), also has a small remaining grove of trees where an as yet unidentified Quintilia cicada species breeds. It would be foolish to destroy this habitat without knowing the nature and species mix of the fauna and flora on it.

With kind regards,
Dr. Jonathan B. Ball (MBChB; M.Med (Rad. D.); BSc (Hons.) (Nat. Cons.))

Sub-Appendix 3: Map of Fynbos Reserve Showing Brenton Blue flight path [no map visible]

Sub-Appendix 4: Background information on Wetlands

Importance of Wetlands

Introduction

Almost without exception, **life** on our planet Earth requires **light**, **oxygen**, **water** and **nutritious food** in order to **grow**, **remain healthy** and to **replicate**. The essential requirements found on Earth are very much affected by how humankind impacts on and treats the environment. Even a flourishing area can be turned into an unhealthy dying wasteland if existing water supplies are permitted to be changed – either by diversion or contamination.

Vegetation, especially when in dense growth areas like forests and greenbelts, plays a key role in contributing to and maintaining a healthy ecosystem by

- absorbing CO2
- producing Oxygen,
- providing a source of food to other animal life, and
- preventing soil erosion

An equally important contribution to a healthy environment is that made by wetlands. These act just like a massive sponge by

- preventing flooding by absorbing and holding water to keep river levels normal,
- filtering and purifying the surface waters and then once done,
- slowly releasing this into streams and rivers to assist maintain ecosystems further downstream.
- Wetlands also release vegetative matter that fish and other life forms feed on.

Trees and greenbelts are frequently described as '**the lungs'** of an ecosystem with **wetland systems** portrayed as '**the kidneys'**. While wetlands are truly unique, both the 'lungs' and 'kidneys' are equally important to the health of all other biomes and to wildlife and humans everywhere.

Most people are familiar with wetlands in some shape or form. These can be as small as the pond in the park or a local stream to as large as the estuaries found at the Groot River mouth in Nature's Valley, at the confluence and back-waters of the Keurbooms and Bitou river's, or the Garden Route's Lakes District near Sedgefield and Wilderness.

Whether small or large, wetlands are always a good source of food, shelter and other resources for animals and plants alike. Often wetlands are the only source of valued resources for common and/or endangered plant, animal and bird species.

Wetlands also provide humans with diverse resources such as clean water, food, flood control, recreation facilities as well as the potential of employment and income generation through the use of these for sport and leisure, fishing, eco-tourism, to name a few.

Defining a 'Wetland'

In physical geography, a wetland is described as an environment found "at the interface between truly terrestrial (land) and truly aquatic (hydrological or water) ecosystems, making them different from each yet highly dependent on both". In essence, wetlands are ecotones, defined as a transitional zone between two adjacent ecosystems or communities. An ecotone can appear on the ground as a gradual blending of the two communities across a broad area, or as a sharply defined boundary line.

Wetlands are typically highly productive habitats, often hosting considerable biodiversity and endemism (endemic or common plant and animal life). In many locations they are the subject of conservation efforts and Biodiversity Action Plans.

Characteristics

Wetlands are found under a wide range of **hydrological** (water) conditions, but for at least some of the time, water saturates the soil. The result is a **hydric** soil - a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop **anaerobic** (depleted oxygen) conditions in the upper part. This characteristic absence of free oxygen for some or all of the time is called a "**reducing environment**." Wetland plants (called **hydrophytes**) specifically adapted to the reducing conditions presented by such soils can survive in these conditions, whereas species intolerant of the absence of soil oxygen (called "**upland**" plants) die. Adaptations to low soil oxygen characterize many wetland species.

Wetland types

There are generally three types of wetlands – **Natural, Tidal** and **Enhanced**.
Natural wetlands would include those swamps, bogs and marshes that occur naturally within a stream and river system flowing from the watershed to the sea. These wetlands can be fresh, brackish and salty water.

Enhanced wetlands is the term applied to land areas that have historically been wetlands but have changed due to some outside influence such as draining the area for farming and development. It is possible to restore these wetlands by leaving them undrained, a process that usually involves plugging the draining systems and ditches or removing man-made piping leading to the drain system.

Note that a **constructed wetland** is artificially created, and intended to absorb flash floods, clean sewage, enhance wildlife or for some other human reason.

Wetland functions

By absorbing the forces of excessive water levels, strong tides and high winds, wetlands protect the **terrestrial** (land) areas adjoining them from flood, tidal and storm damage. Fresh-water marshes are frequently found on river floodplains (large open areas). Surplus waters that cover these are lost through run-off or evaporation.

Wetland plants help to filter pollutants in the water, thus making it easier for vegetation to become established.

What wetlands do to contain flooding and erosion control

In the past, even healthy and flourishing wetlands were often regarded as 'wastelands'. Not fully understanding the important role that wetlands play, people drained and reclaimed these to reduce the incidence of mosquito-borne malaria, or for use for agriculture or development. These actions increased unchecked water run-off and the loss of the highly absorbent 'sponge effect' that wetlands exert made adjacent developments vulnerable to flooding, material damage and loss of life.

Any examination of a river's delta system reveals the numerous sand-bars and small islands formed by the deposits of sediment carried in the river waters. In the majority of cases, this sediment is valuable top-soil plus other earth that has been eroded and washed away. The additional mass of silted soil deposits in a water system raises the river bed-level as well as restricts water flow, thereby making more of the adjacent terrestrial areas vulnerable to flooding. Some wetlands can retain as much as 94% of the sediment (dirt) and thus play a critical role in containing erosion.

As the running water enters a wetland, the water-flow rate slows and the sediments settle out. Clean sediments are important because they contain air pockets that aquatic life depend upon to exist. These spaces provide habitat for aquatic organisms to lay their eggs and also contribute oxygen that is essential for their survival.

Emergent plants ("emergents") is the term used to describe aquatic plants that establish their roots in the muddy bottoms of water systems but have long stalks that rise to and above the water surface. Emergents act as a counter to the erosive forces of water as they radically slow the flow of water moving along the edges of rolling agricultural lands, rivers and lakes. Erosion control efforts in aquatic areas often include the planting of wetlands plants.

What wetlands do to improve water quality

Wetlands **improve water quality** by **filtering out** decomposing vegetative matter and **pollutants** such as **nutrients** and **sediments. Nutrients** such as **nitrogen** and **phosphorus** from **chemical fertilizers** used in agriculture, contribute a large amount of pollution to water systems. **Excess nutrients** contribute to **increased algae growth**, which in turn leads to **a reduction in oxygen levels** in water. Wetlands can filter and absorb as much as 91% of the phosphorus and 86% of the nitrogen without any adverse effects.

The ability of wetlands to recycle heavy metals from industrial waste, excess nutrients such as man-made nitrogen and phosphorus fertilizer runoff and even sewage, makes them critical in the overall functioning of our Earth, and no other ecosystem is as productive, nor as unique in this conversion process. In some places artificial wetlands have been developed solely for the purpose of water purification.

Wetland fauna

Wetlands are a productive habitat for diverse insect life plus a variety of reptiles and amphibians that depend on insect-based food webs. Many species of turtles, snakes, frogs and toads live in and rely upon wetlands.

Many varieties of water birds depend on wetlands for feeding and resting areas during their spring and autumn migrations. Resident birds rely on them for nesting and as primary feeding areas.

In addition, animals that live in other habitats use wetlands for migration or reproduction. A good example are the heron's that nest in large old trees but need shallow water areas in which to wade and hunt for fish and aquatic life. Amphibians often forage in upland areas but return to water to mate and breed. Other wildlife, such as the otter, also rely on wetlands.

Wetlands are vital to the survival of various plants and animals, including threatened and endangered species. Many threatened and endangered plants and animals are, as a result of diminishing habitats due to reclamation or degradation, wetland species.

Wetlands and human interaction

Many recreational activities involve wetlands. People enjoy wetlands for hiking, bird watching and photography whilst fishing for wetland dependent species is a major recreational activity. Fully integrated catchment and education management programmes help to change public perceptions and foster support for the active preservation and rehabilitation of wetlands. This includes the provision of protective boardwalk access to designated areas to minimise damage plus the restriction of access to vulnerable areas – all designed to help counter-balance negative human impact on rivers by rejuvenating them and surrounding ecosystems.

A system without wetlands is like a human body without kidney's – it is doomed!

Appendix 3: Copy of Council Resolution

18/380/NV J Prinsloo 20 September 2007

TO WHOM IT MAY CONCERN

EXTRACT FROM THE CONFIRMED MINUTES OF THE MAYORAL COMMITTEE MEETING OF BITOU LOCAL MUNICIPALITY HELD IN THE COUNCIL CHAMBER, MUNICIPAL OFFICES, SEWELL STREET, PLETTENBERG BAY ON WEDNESDAY, 29 AUGUST 2007 AT 9h06

"

ITEM M/400/08/07

NATURES VALLEY TRUST: DEVELOPMENT OF ERF 380, NATURES VALLEY

Resolution by the Executive Mayor

That the application of the NVT, supported by the NVRA, to develop a small wetland area on Erf 380, Natures Valley, not be considered until the Land Audit Report is finalized."

CERTIFIED AS A TRUE COPY

C F B MATTHEUS
HEAD CORPORATE SERVICES

Appendix 4: Wetland Resource Booklet

Appendix 5: Information Board

Appendix 6: Wetland Report

(Excluding pictures)

A BRIEF OVERVIEW OF THE OPPORTUNITIES AND CONSTRAINTS ASSOCIATED WITH THE CONSTRUCTION OF A SMALL WETLAND AT NATURE'S VALLEY (WESTERN CAPE)

Short Report for the Nature's Valley Trust

Peter M. Illgner

December 2006

Further enquiries:

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Tel./Fax.: +27 (41) 360 1192
Cell: 083 296 4256
Email: pete-illgner@telkomsa.net

Front cover: A view of a small pond constructed on a property (Erf 263) adjacent to the furrow at Nature's Valley.

Acknowledgements:

The author would like to thank the Nature's Valley Trust and Bethany Hansen for the opportunity to do this work and my colleague (Japie Buckle) for his company and insight in the field.

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1. Introduction

The author was requested by Bethany Hansen, of the Nature's Valley Trust, to provide input into the design of a small wetland at Nature's Valley. The trust plans to manage the construction of the wetland on public land, namely Erf 380 (the study area) (Figure 1), a well vegetated property traversed by a stormwater furrow (Figure 2). The stormwater furrow is orientated west to east and lies parallel to the road that runs along the southern border of the property (Figure 1). Water flows in the same direction down the furrow towards the Groot River estuary. It has been assumed for the purposes of this report that a connection exists between the furrow and the estuary, as this was not verified during the site visit on the 6 November 2006. This erf is located in very close proximity to another property (Figure 1 and Figure 3) that is being investigated as a potential site for the reintroduction of the Brenton Blue butterfly (*Orachrysops niobe*).

This report provides a very brief overview of the environment in which the erf is situated, identifies issues or aspects that are likely to constrain the design and/or establishment of the wetland, highlights some of the opportunities the construction of the wetland may provide and briefly discusses some possible *conceptual* designs for the wetland itself. The document does not provide detailed construction/implementation guidelines, a management plan for the wetland or negate the need for engineering input.

Figure 1. A view of Erf 380 and the surrounding area. The white line overlies the furrow on Erf 380, while the yellow dot highlights the area of open ground identified as a possible site for the reintroduction of the Brenton Blue butterfly (*Orachrysops niobe*). A view from west to east down the length of this ridge is presented in Figure 3. The view of the stormwater furrow in Figure 2 was taken looking upstream from the distal (eastern) end of the furrow near the red roofed house (visible near the centre of the figure). Source of the image = Google Earth.

Figure 2. A view of the furrow from its distal (eastern) end, at the border between Erf 380 and Erf 263.

Figure 3. A view across the open ground selected as a site for the possible reintroduction of the Brenton Blue butterfly (*Orachrysops niobe*).

2. Overview of the Environment

2.1. Geology and Geomorphology

The erf is located in a low-lying position (< 20 m above mean sea level) at the foot of a west-east trending ridge, which exceeds 100 m in height (1: 50 000 topographical map 3323DC 3423BA). Elevations on the erf range from 8.6 m to 6.8 m above mean sea level. The distal (eastern) end of the furrow represents the lowest point on the property. Spoil heaps provide some localized relief on the otherwise gently sloping ground.

Erf 380 is underlain by unconsolidated sediments of unknown origin. These sediments may represent colluvial material associated with the ridge north of the site, a palaeobeach-aeolian dune deposit or a combination of the aforementioned. These unconsolidated sediments overlie rocks of the Cape Supergroup. In terms of the latter, the 1:250 000 geological map for the area (viz. 3322 Oudtshoorn) indicates that these are likely to be the shales and siltstones of the Gydo Formation (Bokkeveld Group).

2.2. Climate and Hydrology

The study area falls within quaternary catchment K70A. Mean Annual Precipitation is 920.1 mm per annum and Potential Evaporation 250.1 mm. The percentage of this rainfall that enters the furrow as runoff is unknown, but is assumed to be greater than would be the case in the undisturbed state. This could be attributed to the increase in the spatial extent of impervious surfaces, such as roofs and tarred roads, in the catchment above the furrow.

The stormwater in the furrow appears to discharge into a drainage line that may lead down to the Groot River estuary. These linkages are speculative as they were not assessed during the site visit. The nature of the hydrological regime associated with the furrow is unknown. A small volume of water was flowing in the furrow at the time of the site visit. Two small excavations on the erf had water present, indicating the probable presence of a shallow water table. This is consistent with what one would expect to find in a wetland. As the furrow is probably deeper than the elevation of this water level, it may be effectively draining adjacent areas. The origin of the high water table on the erf is unknown, but may be associated with its close proximity to the ridge to the north of the site. For example, seeps can be found at inflection points at the base of slopes, where the groundwater table is intersected by the topographic surface.

2.3. Vegetation

In terms of the Subtropical Thicket Ecosystem Planning (STEP) project, the erf lies astride the boundary between Knysna Afromontane Forest and Tsitsikamma Plateau Fynbos. The boundary between these two vegetation types runs parallel to, but only a short distance within, the northern boundary of the erf. Pierce (2003) listed the conservation status of the forest as Critically Endangered and the fynbos as Vulnerable. However, it would appear that the entire site was formerly covered by forest in its undisturbed (i.e. reference) state.

2.4. Notable Fauna

No faunal species of special concern are known to utilise the site. If the Brenton Blue butterfly (*Orachrysops niobe*) is reintroduced to the fynbos area nearby, adults may forage within Erf 380. The presence in the study area of the

larval host plant (*Indigofera erecta*) and ant species (*Camponotus baynei*), with which this butterfly is known to have an association, is unknown.

3. Constraints

3.1. Policy and Legal Framework

As South Africa is a Contracting Party to the Convention on Wetlands (Ramsar, 1971), recommendations within any wetland related document should be consistent with the principle of "wise use", as defined by the convention and be guided by current national legislation with regard to wetlands. Wise use is defined in Handbook 1 as "…their sustainable utilization for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem" (Ramsar Convention Secretariat, 2004). Sustainable utilization is defined in the same document as the "human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations".

In terms of the Ramsar Convention on Wetlands (Iran, 1971) "…wetlands include a wide variety of habitats such as marshes, peatlands, floodplains, rivers and lakes, and coastal areas such as salt marshes, mangroves, and seagrass beds, but also coral reefs and other marine areas no deeper than six metres at low tide, as well as human-made wetlands such as waste-water treatment ponds and reservoirs" (Ramsar Convention Secretariat, 2004).

In South Africa, wetlands are defined as "…land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil" (National Water Act, Act No. 36 of 1998) (NWA). Wetlands are also included in the definition of a watercourse within the NWA, which implies that whatever legislation refers to the aforementioned will also be applicable to wetlands. The types of features included within the definition of a watercourse include:

- "…a river or spring…"
- "…a natural channel in which water flows regularly or intermittently…"
- "…a wetland, lake or dam into which, or from which, water flows…"
- "…any collection of water which the Minister may, by notice in the *Gazette*, declare to be a watercourse…"

In addition, the NWA stipulates that "…reference to a watercourse includes, where relevant, its bed and banks…". This has important implications for the management of wetland areas and encroachment on their boundaries.

In terms of the latest wetland delineation document (DWAF, 2005) available from DWAF "wetlands must have one of the following attributes:

- **Wetland (hydromorphic) soils** that display characteristics resulting from prolonged saturation
- The presence, at least occasionally, of **water loving plants (hydrophytes)**
- A **high water table** that results in saturation at or near the surface, leading to anaerobic conditions developing in the top 50 cm of the soil." (DWAF, 2005, p.4)

As no intensive field work was carried out on the erf during the site visit it is difficult to assess the extent to which the conditions on Erf 380 currently meet these criteria. Typical signs of wetness would include the development of mottles in most soils and organic streaking in sandy soils.

Wetlands are reputed to inter alia:

- Attenuate floods;
- Retain contaminants, nutrients and sediments;
- To facilitate the recharge of groundwater resources;
- Provide an important habitat for aquatic fauna and flora; and
- Provide food, building and other materials for a variety of uses.

In South Africa, their importance has been recognised in Chapter 1 (National Environmental Management Principles) of the National Environment Management Act (Act No. 107 of 1998), which states that, "sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure".

In terms of Government Notice No. 26187 (Government Gazette, 26 March 2004) "…'**altering the bed, banks or characteristics of a watercourse**' means the temporary or permanent alteration of a watercourse for-

a) prospecting, mining and quarrying;
b) agriculture;
c) management of waste disposal sites including landfills; and
d) construction and maintenance purposes of infrastructure such as-
    i) railways, roads, footpaths, bridges, culverts, and other access routes;
    ii) artificial recharge structures;
    iii) boreholes and well-points;
    iv) structures for water abstraction;
    v) structures for routing water supply and other pipelines and conveyors;
    vi) structures for creation of pools, bays and peninsulas;
    vii) telecommunication or power cables;
    viii) recreational camp sites, mooring sites, other anchorage facilities and slipways; or
    ix) structures for slope stabilization and erosion protection,

but excludes any structure built for the purpose of storing water in terms of the Schedule to Government Notice R.1191 published in Government Gazette No. 20526, dated 8 October 1999 and as may be amended from time to time;…"

The following needs to be noted by land managers (as reported in Government Notice No. 26187 [Government Gazette, 26 March 2004]):

"2.7. (1) A person who –

(a) owns or lawfully occupies property registered at the Deeds Office as at the date of this notice;
(b) lawfully occupies or uses land that is not registered or surveyed; or
(c) lawfully has access to land on which the use of water takes place,

may on that property or land alter the bed, banks or characteristics of a watercourse, if–

(i) the alteration-
    (aa) does not impact on a water resource or on another person's water use, property or land; and
    (bb) is not detrimental to the health and safety of the public in the vicinity of the activity;
(ii) the natural migration patterns of aquatic biota and the sustainable ecological functioning of the system are interfered with;

(iii) the alteration activity does not extend for more than **50 metres** continuously or a cumulative distance of **100 metres** on that property or land, measured along the watercourse;
(iv) the volume of flow is not reduced except for natural evaporative losses;
(v) strict erosion control measures are to be taken during and after construction to ensure no erosion of the bed and banks of the river takes place.;
(vi) the water quality is not detrimentally affected; and
(vii) all necessary measures are taken to stabilize the structure and surrounding area. This will include:-
(aa) rehabilitation of the riparian habitat integrity by ensuring that during re-habilitation only indigenous shrubs and grasses are used in restoring the bio-diversity;
(bb) rehabilitation of disturbed and degraded riparian areas to restore and upgrade the riparian habitat integrity to sustain a bio-diverse riparian ecosystem;
(cc) removal of alien vegetation and all new alien vegetation recruitment must be controlled; and
(dd) annual habitat assessment must be carried out to monitor the suatainability of the diversion and compliance with the above conditions. Action must be taken to rectify any impacts
(viii) any structure built fully or partially in or across a watercourse does note exceed-
(aa) a height of **10 metres**, measured from the natural level of the bed of the watercourse on the downstream face of the structure to the crest of the structure;
(bb) a width of **10 metres**, measured at the widest part of the structure; or
(cc) a length of **50 metres**, measured from one edge of the watercourse to the other; or
(dd) occur within a distance of **500 metres** upstream or downstream of another structure that alters the bed, banks or characteristics of the same watercourse, measured along the watercourse.

2.7.(2) A department of state in the national, provincial or local sphere of government may, for its own purpose and within its jurisdiction, alter the bed, banks or characteristics of a watercourse subject to the conditions set out under paragraph 2.7(1) above for-

(a) control of Stormwater;
(b) construction, maintenance and development of infrastructure;
(c) canalization and dredging of a watercourse;
(d) removal of alien vegetation;
(e) ensuring the safety of the public, livestock and property;
(f) hydrological monitoring; or
(g) flood management and potential damage.

2.8.(1) A person who uses water in terms of this authorization must submit a registration form for the registration of the water use if the alteration involves mining related activities or occurs within a distance of 1000 metres from any other alteration, measured along the water course."

Most importantly authorization is not applicable to:

"…any wetland or any water resource within a distance of 500 metres upstream or downstream from the boundary of any wetland…"

In terms of the Conservation of Agricultural Resources Act (Act of 1983) the following management actions are applicable:

- Removal of Category 1 plants by land users regardless of where they occur on their property,
- Removal of all Category 2 and 3 plants by land users from within a 30 m buffer of the 1:50 year water level of the wetland and within the wetland itself.

In terms of the Subtropical Thicket Ecosystem Planning (STEP) project wetlands and Knysna Afromontane Forest are regarded as Critically Endangered and Tsitsikamma Plateau Fynbos as Vulnerable. The following restrictions apply to Critically Endangered and Vulnerable areas:

Critically Endangered

Restrictions => “No further loss of natural areas and no further impacts should be allowed. Any disturbance of this Class I area should be allowed only on condition that there are net gains for the natural environment (e.g. in the portion which will remain undeveloped, restoration[5] and its proclamation/management as a nature reserve area).”

Vulnerable

Restrictions => “1. In general, Class III land can withstand only limited loss of natural area or limited disturbance through human activities and developments 2. Proposed disturbance or developments should preferably take place on sites which have undergone disturbance or impacts[3] rather than on sites that are undisturbed. 3. In general, Class IV land should be developed in preference to Class III land.”

It is very important from a planning perspective that those responsible for implementing the project have written permission to go ahead with the project from the relevant government authorities. These authorities include the Department of Water Affairs and Forestry, the authorities administering Environmental Impact Assessments in the province and the local municipality.

3.2. Public Infrastructure

- Mobilisation of sediment during the construction phase could lead to the blocking of the pipe at the distal end of the furrow.
- Any structures placed within the furrow may cause water to flood back far enough to hinder the functioning of the furrow during stormflows or cause ponded water to flood out onto the adjacent road and properties. This is a particularly important consideration given the very flat gradient associated with the furrow.

3.3. Water Quality

- Runoff from roads, roofs and other impervious surfaces present in urban areas may be contaminated and have a negative impact on biota present within the wetland.
- Fertilizers and biocides applied in domestic gardens may contaminate surface and groundwater discharged into the wetland.
- Faecal coliforms emanating from septic tanks may contaminate groundwater discharged into the wetland and hence pose a risk to children utilizing the wetland for educational purposes.
- Similarly, groundwater enriched with nitrates and phosphates emanating from septic tanks may be discharged into the wetland, leading to eutrophication of the water body.

3.4. Proximity to Suburban Homesteads

- The possible local elevation of the water table as a result of the establishment of a wetland may cause problems for land owners in close proximity to the wetland. This may include localized flooding, rising damp or die-off of plant species poorly adapted to prolonged exposure to saturated soils.

3.5. Potential Problem Fauna

- Mosquitoes may breed in the wetland and become a nuisance for people living on the properties adjacent to the wetland. If a pond is built, this problem could be offset with the introduction of indigenous fish that may feed on mosquito larvae. Frogs and birds are also likely to prey on the larvae present.
- Calling frogs may annoy the inhabitants of households located close to the wetland.

3.6. Public Safety

- Permanent water features may represent a safety hazard (i.e. drowning risk) for small children. This risk may be lowered by ensuring the edges of the wetland are gently sloped, that there are no sharp drop-offs in the wetland or pond and by keeping most of it relatively shallow (e.g. < 50 cm deep).

4. Opportunities

4.1. Flood Attenuation

- The wetland should help attenuate floodwaters if linked to the furrow as the capacity and roughness of the furrow may be effectively increased as a result of the establishment of the wetland.

4.2. Retention of Sediments, Nutrients and Harmful Compounds

- The wetland should trap sediments, nutrients and some harmful organic compounds.

4.3. Habitat Creation

- The wetland will provide habitat for aquatic flora and fauna. Some important elements to consider from a habitat perspective include:
    - The type of edging used (e.g. rock, cobbles/gravel and sand) as different species will have different substrate preferences.
    - The gradient at the edge of the wetland. A gentler gradient will be associated with broader hydric zones (e.g. permanent, seasonal and temporary) and hence create more habitat for plants and animals utilizing these zones.
    - The range of indigenous plant species to be established in the wetland (e.g. submerged macrophytes, floating-leaved macrophytes and marginal vegetation). The types of plant selected can be important as they help protect wetlands/ponds from erosion (wave or current), can assist with oxygenation and the uptake of nutrients and unwanted chemical compounds. In addition, plants provide habitat and food for biota residing within the wetland. For example, in ponds fish may take refuge below water lilies or within marginal vegetation. Submerged macrophytes e.g. Broad-leaved Pondweed (*Potamogeton schweinfurthii*), floating-leaved macrophytes e.g. Water Lilies (*Nymphaea nouchali*) and marginal species e.g. Reeds (*Phragmites australis*), Bulrushes (*Typha capensis*) and Arum Lilies (*Zantedeschia aethiopica*). Nurseries my be approached to obtain a list of indigenous plant species available for sale.
    - If large enough an island should be considered for the wetland as birds could use it for breeding purposes.
    - Dead trees could also be placed in the wetland (upright or down) for use as bird perches.
    - Additional features to consider may include bird nest boxes and feeding stations.
- The erf may represent additional habitat for the Brenton Blue butterfly (*Orachrysops niobe*).

4.4. Environmental Education

- The wetland will provide a good opportunity to educate the public about the ecological services and hence benefits provided by wetlands, as it is located within an urban area. The wetland will provide an opportunity to reach both scholars/learners and potentially influential land owners who reside within Nature's Valley or visit it on holiday.

4.5. Subtropical Thicket Ecosystem Planning (STEP) Project

In terms of the Subtropical Thicket Ecosystem Planning (STEP) project Critically Endangered and Vulnerable habitats provide the following opportunities:

Critically Endangered

Opportunities => “This Class I land may be suitable for eco-friendly, nature-based activities with almost no impacts[3] such as responsible ecotourism (hiking trails etc). In those areas which have undergone severe impacts[3], this Class I land presents opportunities for IDP projects for restoration.”

Vulnerable

Opportunities => “Depending on constraints (such as avoidance of spoiling scenery or wilderness, or infrastructure limitations), Class III land can withstand a limited loss of, or disturbance to, natural areas.Within the constraints, this class may be suitable for a moderate range of activities that are either compatible with the natural environment (e.g. sustainable stock-farming, ecotourism, game farming and wilderness) or of limited extent (e.g. small-scale housing or urban development, small-scale cultivation).”

5. Wetland Design

A number of possible wetland designs could be considered for implementation on Erf 380, five of these have been selected for consideration below. These designs are not necessarily mutually exclusive, but have been described and assessed separately in order to facilitate the comparisons.

5.1. Option 1 – Scalloped furrow wall

Design

Scallops could be constructed in the northern wall of the furrow effectively increasing the volume of the furrow at these points. The more gentle the slope of these scallops, the greater will be the increase in area of the furrow cross-section at these points. Consequently, the gentler the slope, the greater will be the area of potentially saturated soil available for the establishment of wetland plants. Scalloping of the southern wall of the furrow could impinge on the road reserve flanking the furrow.

Potential Problems

- Sedimentation in the furrow and blocking of the outfall pipe at the distal (eastern) end of the furrow during the construction phase.
- Invasion of the furrow by aquatic plants.

5.2. Option 2 – Pond fed by groundwater

Design

An unlined pond could be constructed at the lowest point on the erf, namely the southeastern corner. The pond would have to be deep enough to intersect the water table over a significant percentage of its area. The pond would not be solely dependent on groundwater, but would also receive rain water and surface runoff from adjoining slopes. The water supply to the wetland could be augmented by rainwater harvested from the roof of the neighbouring residential house on Erf 263.

Potential Problems

- Eutrophication as a result of septic tank discharges.
- Contamination with faecal coliforms emanating from septic tanks.
- Provision of habitat for potential problem biota such as mosquitoes and frogs.
- A potential safety hazard for small children.

5.3. Option 3 – Off-channel flood-fed pond

Design

This design would be the same as Option 2, except water would also be discharged into the pond from the furrow via a flood overflow structure. Water could be directed into the pond through a scallop in the furrow or a small channel.

Potential Problems

- Sedimentation within the pond and hence loss of volume.
- Eutrophication as a result of septic tank discharges.
- Contamination with faecal coliforms emanating from septic tanks.
- Provision of habitat for potential problem biota such as mosquitoes and frogs.
- A potential safety hazard for small children.

5.4. Option 4 – Overbank flood channel

Design

This design would be a variation of Option 3. In this instance the pond would have an entry and exit point allowing flood waters associated with storm events to flow through the pond.

Potential Problems

- Erosion of the pond during high flows and the potential development of a headcut at the point of re-entry into the furrow. Development of a headcut could (if left unattended) be associated with upstream propagation of the headcut and hence channel incision, loss of part or all of the pond function and damage to the furrow.
- Sedimentation within the pond and hence loss of volume.
- Eutrophication as a result of septic tank discharges.
- Contamination with faecal coliforms emanating from septic tanks.
- Provision of habitat for potential problem biota such as mosquitoes and frogs.
- A potential safety hazard for small children.

5.5. Option 5 – Impounded furrow

Design

The furrow could be impounded to a shallow depth (< 20 cm) in order to allow water to pond behind the impeding structure. Stormflows should then still be confined to the furrow. The walls of the furrow at the impeding feature could be sloped in order to increase the potential storage volume behind the structure. The impoundment could be constructed out of concrete or rock filled gabion baskets. However, it would probably be preferable in the short term to construct the impoundment out of hay bale gabions in order to identify any problems associated with this approach to wetland construction. To make the gabions, hay bales could be wrapped in "chicken-mesh" and staked in place with iron standards. If problems are associated with the structure it can then be easily removed.

Potential Problems

- Back flooding behind the impoundment and reduced efficacy of the stormwater furrow for the management of runoff. This may be mitigated to a limited extent by keeping the wall of the impoundment very low (e.g. < 20 cm). An accurate survey will have to be carried out of the channel slope in order to determine the height of the wall. For example, there only appears to be a 20 cm difference in height between the proximal and distal ends of the furrow.
- Sedimentation within the furrow and hence loss of volume. A loss of volume would increase the potential for bank overtopping during storm events and hence increase the flood risk to the adjacent road and properties.
- Eutrophication as a result of septic tank discharges at low flows
- Contamination with faecal coliforms emanating from septic tanks at low flows
- Provision of habitat for potential problem biota such as mosquitoes and frogs.
- A potential safety hazard for small children.

5.6. Comparison of Alternatives

A qualitative assessment of the favourability of the different options in relation to selected considerations for the design of the wetland has been presented in Table 1 below. In terms of the results, the overbank flood channel should be regarded as the most favourable option and the groundwater fed pond the least favourable option for implementation.

Table 1. A qualitative assessment of the favourability of the different options in relation to selected considerations for the design of the wetland (Favourability: very low = 0, low = 1, moderate = 2 or high = 3).

	Option 1	Option 2	Option 3	Option 4	Option 5
	Scalloped Furrow wall	**Groundwater fed pond**	**Off-channel flood-fed pond**	**Overbank flood channel**	**Impounded modified furrow**
Flood attenuation	1	0	1	2	2
Sediment retention	1	0	1	2	2
Habitat creation	1	3	3	3	3
Problem biota	3	1	1	2	2
Flood risk to infrastructure	3	3	3	3	2
Public safety	3	1	1	1	1
TOTAL	**12**	**8**	**10**	**13**	**12**

6. Conclusions

"Often, restoration projects break new ground in the understanding of ecosystem processes, and in almost all cases restoration projects should be considered experimental in nature. Therefore, both revision of original goals, objectives, and performance standards and remedial action should be seen as a necessary part of the restoration process rather than as signs of failure." (Ramsar Handbook 8, p.57).

- The Nature's Valley Trust plans to manage the construction of the wetland on public land, namely Erf 380 (the study area), a well vegetated property traversed by a stormwater furrow.
- The stormwater furrow is orientated west to east and lies parallel to the road that runs along the southern border of the property.
- Water flows on a gentle gradient from west to east down the furrow.
- The erf is located in a low-lying position (< 20 m above mean sea level) at the foot of a west-east trending ridge.
- Elevations on the erf range from 8.6 m to 6.8 m above mean sea level. The distal (eastern) end of the furrow represents the lowest point on the property. Spoil heaps provide some localized relief on the otherwise gently sloping ground.
- Erf 380 is underlain by unconsolidated sediments of unknown origin. These sediments may represent colluvial material associated with the ridge north of the site, a palaeobeach-aeolian dune deposit or a combination of the aforementioned. These unconsolidated sediments overlie rocks of the Cape Supergroup.
- The study area falls within quaternary catchment K70A. Mean Annual Precipitation is 920.1 mm per annum and Potential Evaporation 250.1 mm.
- The percentage of this rainfall that enters the furrow as runoff is unknown, but is assumed to be greater than would be the case in the undisturbed state. This could be attributed to the increase in the spatial extent of impervious surfaces, such as roofs and tarred roads, in the catchment above the furrow.
- The origin of the high water table on the erf is unknown, but may be associated with its close proximity to the ridge to the north of the site. For example, seeps can be found at inflection points at the base of slopes, where the groundwater table is intersected by the topographic surface.
- In terms of the Subtropical Thicket Ecosystem Planning (STEP) project, the erf lies astride the boundary between Knysna Afromontane Forest and Tsitsikamma Plateau Fynbos. The boundary between these two

vegetation types runs parallel to, but only a short distance within, the northern boundary of the erf. Pierce (2003) listed the conservation status of the forest as Critically Endangered and the fynbos as Vulnerable. However, it would appear that the entire site was formerly covered by forest in its undisturbed (i.e. reference) state.

- No faunal species of special concern are known to utilise the site.
- The establishment of a wetland on the erf would be associated with a number of opportunities and constraints. Arguably the most significant of these aspects will be the opportunity to educate the public about the ecological services and benefits provided by wetlands in the landscape.
- Of the five proposed possible wetland design concepts, the overbank flood channel should be regarded as the most favourable option and the groundwater fed pond the least favourable option for implementation.
- Written permission needs to be obtained from the relevant government authorities for the implementation of the project (i.e. construction of the wetland).

7. References and Further Reading

(Copies of the publications marked with an asterisk are provided as supplementary material that accompanies this report. See enclosed CD.)

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Appendix 7: Photo Gallery