

4. Fauna and Flora List

4.1 Appendix I. List of Plant Species Found in Spray Zone of Victoria Powerhouse

Family	Species	Common name	Life Form	Relative density (%)
Euphorbiaceae	<i>Flueggea leucopyrus</i>	Heen katu pila	Shrub	9.35
Rutaceae	<i>Glycosmis angustifolia</i>	Bol pana	Shrub	7.55
Euphorbiaceae	<i>Dimorphocalyx glabellus</i>	Weliwana	Shrub	7.19
Euphorbiaceae	<i>Croton laccifer</i>	Keppetiya	Tree	7.19
Euphorbiaceae	<i>Drypetes sepiaria</i>	Weera	Tree	5.76
Combretaceae	<i>Terminalia arjuna</i>	Kumbuk	Tree	4.68
Rubiaceae	<i>Ixora pavetta</i>	Rathmal	Shrub	4.32
Sterculiaceae	<i>Pterospermum suberifolium</i>	Welan	Tree	3.6
Ebenaceae	<i>Diospyros ebenum</i>	Kaluwara	Tree	3.24
Rhamnaceae	<i>Ziziphus lucida</i> * ^{CR}	Eraminiya	Liana	2.88
Moraceae	<i>Strblus taxoides</i>	Katupol	Shrub	2.52
Tiliaceae	<i>Grewia damini</i>	Damaniya	Tree	2.52
Anacardiaceae	<i>Nothopogia beddomei</i>	Bala	Tree	2.52
Hippocrateaceae	<i>Salacia reticulata</i>	Himbutu wel	Liana	2.16
Verbenaceae	<i>Vitex altissima</i>	Milla	Tree	2.16
Rubiaceae	<i>Ixora coccinea</i>	Rathmal	Shrub	1.8
Rubiaceae	<i>Haldina cordifolia</i>	Kolon	Tree	1.8
Sapotaceae	<i>Madhuca longifolia</i>	Mi	Tree	1.8
Verbinaceae	<i>Premna tomentosa</i>	Seru	Tree	1.8
Tiliaceae	<i>Grewia carpinifolia</i>		Liana	1.44
Ulmaceae	<i>Celtis trimorensis</i>	Gurenda	Shrub	1.44
Rutaceae	<i>Glycosmis pentaphylla</i>	Dodanpana	Shrub	1.44
Malvaceae	<i>Hibiscus erocarpus</i>		Shrub	1.44
Moraceae	<i>Streblus asper</i>	Gata nithul	Shrub	1.44
Fabaceae	<i>Cassia spectabilis</i>	Kahakona	Tree	1.44
Meliaceae	<i>Chukrasia tabularis</i>	Holan hik	Tree	1.44
Rubiaceae	<i>Mitragyna tubulosa</i>	Helaba	Tree	1.44
Malpighiaceae	<i>Hiptage benghalensis</i>	Puwakgediya wel	Liana	1.08
Clusiaceae	<i>Garcinia spicata</i>	Ela gokatu	Shrub	1.08
Loganiaceae	<i>Strychnos potatorum</i>	Ingin	Shrub	1.08
Boraginaceae	<i>Cordia sinensis</i>	Lolu	Tree	1.08
Ebenaceae	<i>Diospyros malabarica</i>	Thimbiri	Tree	1.08
Moraceae	<i>Ficus racemosa</i>	Attikka	Tree	1.08
Tiliaceae	<i>Muntingia calabura</i>	Jam	Tree	1.08
Sapindaceae	<i>Schleichera oleosa</i>	Kone	Tree	1.08
Ulmaceae	<i>Celtis philippensis</i>		Shrub	0.72
Rubiaceae	<i>Kanathium coramandalicum</i>	Kara	Shrub	0.72
Euphorbiaceae	<i>Phllanthus polypyllus</i>	Kuretiya	Shrub	0.72
Rutaceae	<i>Toddalia asiatica</i>	Kudumirissa	Liana	0.36
Astaraceae	<i>Vernonia zeylanica</i>		Liana	0.36

Family	Species	Common name	Life Form	Relative density (%)
Appendix I ctd.				
Apocynaceae	<i>Carissa spinarum</i>	Karaba	Shrub	0.36
Fabaceae	<i>Bauhinia racemosa</i>	Maila	Tree	0.36
Euphorbiaceae	<i>Bridelia retusa</i>	Ketakala	Tree	0.36
Rutaceae	<i>Chloroxylon swietenia</i>	Burutha	Tree	0.36
Flacourtiaceae	<i>Flacourtia indica</i>	Wal ugurassa	Tree	0.36
Apocynaceae	<i>Ochrosia oppositifolia</i>	Gonna	Tree	0.36

* Endemic species

CR Critically Endangered

4.2 Appendix II. List of Plant Species Recorded in Home Gardens

Family	Species	Common name	Life Form	Relative density (%)
Fabaceae	<i>Gliricidia sepium</i>	Ginisiriya	Tree	21.6
Marantaceae	<i>Thespesia populnea</i>	Gansooriya	Tree	5.8
Euphorbiaceae	<i>Jatropha curcas</i>	Wata endaru	Shrub	5.5
Arecaceae	<i>Cocos nucifera</i>	Pol	Tree	4.0
Sapindaceae	<i>Schleichera oleosa</i>	Kone	Tree	3.3
Loganiaceae	<i>Strychnos potatorum</i>	Ingin	Shrub	3.3
Arecaceae	<i>Caryota urens</i>	Kithul	Tree	2.8
Fabaceae	<i>Pongamia pinnata</i>	Karada	Tree	2.8
Tiliaceae	<i>Grewia damini</i>	Damaniya	Tree	2.5
Sapotaceae	<i>Madhuca longifolia</i>	Mi	Tree	2.5
Euphorbiaceae	<i>Flueggea leucopyrus</i>	Heen katu pila	Shrub	2.3
Sterculiaceae	<i>Pterospermum suberifolium</i>	Welan	Tree	2.3
Anacardiaceae	<i>Anacardium occidentale</i>	Kaju	Tree	1.8
Arecaceae	<i>Areca catechu</i>	Puwak	Tree	1.8
Rutaceae	<i>Chloroxylon swietenia</i>	Burutha	Tree	1.8
Rubiaceae	<i>Morinda umbellata</i>	Kiri wel	Liana	1.8
Anacardiaceae	<i>Mangifera indica</i>	Amba	Tree	1.5
Meliaceae	<i>Melia azedarach</i>	Lunumidella	Tree	1.5
Moringaceae	<i>Moringa oleifera</i>	Murunga	Tree	1.5
Fabaceae	<i>Sesbania grandiflora</i>	Kathuru murunga	Tree	1.5
Fabaceae	<i>Acacia caesia</i>	Hinguruwel	Liana	1.3
Sapindaceae	<i>Cardiospermum halicacabum</i>	Wal penela	Liana	1.3
Moraceae	<i>Ficus racemosa</i>	Attikka	Tree	1.3
Musaceae	<i>Musa paradisiaca</i>	Kesel	Shrub	1.3
Moraceae	<i>Streblus asper</i>	Gata nithul	Shrub	1.3
Convolvulaceae	<i>Argyreia populifolia</i>	Girithilla	Liana	1.0
Rutaceae	<i>Citrus aurantifolia</i>	Dehi	Shrub	1.0
Rubiaceae	<i>Coffea arabica</i>	Kopi	Tree	1.0
Euphorbiaceae	<i>Manihot glaziovii</i>	Gas manyokka	Shrub	1.0
Euphorbiaceae	<i>Phyllanthus polypyllus</i>	Kuretiya	Shrub	1.0
Moraceae	<i>Artocarpus heterophyllus</i>	Kos	Tree	0.8
Euphorbiaceae	<i>Bridelia retusa</i>	Ketakala	Tree	0.8
Fabaceae	<i>Cassia spectabilis</i>	Kahakona	Tree	0.8

Family	Species	Common name	Life Form	Relative density (%)
Sapindaceae	<i>Filicium decipiens</i>	Pehibiya	Tree	0.8
Rutaceae	<i>Atalantia ceylanica</i>	Yakinaran	Shrub	0.5
Moraceae	<i>Ficus hispida</i>	Kotadibula	Tree	0.5
Euphorbiaceae	<i>Meineckia parvifolia</i>		Shrub	0.5
Tiliaceae	<i>Muntingia calabura</i>	Jam	Tree	0.5
Lauraceae	<i>Persea americana</i>	Alipera	Tree	0.5
Araceae	<i>Pothos scandens</i>	Pota wal	Liana	0.5
Myrataceae	<i>Psidium guawa</i>	Pera	Tree	0.5
Fabaceae	<i>Samanea saman</i>	Pare mara	Tree	0.5
Appendix II ctd.				
Meliaceae	<i>Swietenia mahagoni</i>	Mahogani	Tree	0.5
Myrtaceae	<i>Syzygium caryophyllatum</i>	Dan	Tree	0.5
Bignoniaceae	<i>Tecoma stans</i>	Kalani thissa	Tree	0.5
Verbinaceae	<i>Tectona grandis</i>	Tekka	Tree	0.5
Meliaceae	<i>Toona ciliata</i>	Toona	Tree	0.5
Verbenaceae	<i>Vitex trifolia</i>	Nika	Tree	0.5
Annonaceae	<i>Annona reticulata</i>	Wali anoda	Tree	0.3
Fabaceae	<i>Bauhinia racemosa</i>	Maila	Tree	0.3
Cariaceae	<i>Carica papyra</i>	Papol	Tree	0.3
Apocynaceae	<i>Carissa spinarum</i>	Karaba	Shrub	0.3
Ulmaceae	<i>Celtis trimorensis</i>	Gurenda	Shrub	0.3
Meliaceae	<i>Cipadessa baccifera</i>	Halbemiya	Tree	0.3
Rutaceae	<i>Citrus grandis</i>	Jambola	Tree	0.3
Cucurbitaceae	<i>Coccinia grandis</i>	Kowakka	Liana	0.3
Fabaceae	<i>Dichrostachys cinerea</i>	Andara	Shrub	0.3
Euphorbiaceae	<i>Dimorphocalyx glabellus</i>	Weliwana	Shrub	0.3
Fabaceae	<i>Erythrina subumbrans</i>	Eramudu	Tree	0.3
Euphorbiaceae	<i>Euphorbia heterophylla</i>		Shrub	0.3
Tiliaceae	<i>Grewia helicterifolia</i>	Boradamaniya	Tree	0.3
Oleaceae	<i>Jasminum angustifolium</i>	Wal pichcha	Liana	0.3
Fabaceae	<i>Leucaena leucocephala</i>	Ipil ipil	Tree	0.3
Euphorbiaceae	<i>Macaranga peltata</i>	Kanda	Tree	0.3
Rubiaceae	<i>Mitragyna tubulosa</i>	Helaba	Tree	0.3
Rubiaceae	<i>Morinda coreia</i>	Ahu	Tree	0.3
Apocynaceae	<i>Ochrosia oppositifolia</i>	Gonna	Tree	0.3
Pandanaceae	<i>Pandanus odoratissimus</i>	Watakeiya	Shrub	0.3
Apocynaceae	<i>Plumeria rubra</i>	Araliya	Tree	0.3
Araliaceae	<i>Schefflera stellata</i>	Iththawal	Liana	0.3
Fabaceae	<i>Tamarindus indica</i>	Siyabala	Tree	0.3
Combretaceae	<i>Terminalia arjuna</i>	Kumbuk	Tree	0.3
Combretaceae	<i>Terminalia bellirica</i>	Bulu	Tree	0.3
Rutaceae	<i>Toddalia asiatica</i>	Kudumirissa	Liana	0.3
Verbenaceae	<i>Vitex altissima</i>	Milla	Tree	0.3
Rubiaceae	<i>Wendlandia bicuspidate</i>	Rawan idala	Tree	0.3
Rhamnaceae	<i>Ziziphus lucida</i> ^{*CR}	Eraminiya	Liana	0.3

* Endemic species

CR Critically Endangered

4.3 Appendix III. List of Plant Species Recorded in Chenalands

Family	Species	Common name	Life Form	Relative density (%)
Moraceae	<i>Artocarpus heterophyllus</i>	Kos	Tree	12.0
Myrataceae	<i>Psidium guawa</i>	Pera	Tree	12.0
Ulmaceae	<i>Trema orientalis</i>	Gadumba	Tree	12.0
Rutaceae	<i>Chloroxylon swietenia</i>	Burutha	Tree	8.0
Moraceae	<i>Ficus hispida</i>	Kotadibula	Tree	8.0
Rubiaceae	<i>Haldina cordifolia</i>	Kolon	Tree	8.0
Meliaceae	<i>Melia azedarach</i>	Lunumidella	Tree	8.0
Astaraceae	<i>Tithonia diversifolia</i>	Wal sooriyakantha	Shrub	8.0
Fabaceae	<i>Adenanthera pavonina</i>	Madatiya	Tree	4.0
Euphorbiaceae	<i>Bridelia retusa</i>	Ketakala	Tree	4.0
Sterculiaceae	<i>Helicteres isora</i>	Lihiniya	Tree	4.0
Anacardiaceae	<i>Mangifera indica</i>	Amba	Tree	4.0
Marantaceae	<i>Thespesia populnea</i>	Gansooriya	Tree	4.0
Lythraceae	<i>Woodfordia fruticosa</i>	Malitta	Shrub	4.0

4.4 Appendix IV. List of Plant Species Recorded in Grasslands

Family	Species	Common name	Life Form	Relative density (%)
Astaraceae	<i>Eupatorium odoratum</i>	Podisinno	Shrub	25.3
Euphorbiaceae	<i>Drypetes sepiaria</i>	Weera	Tree	12.6
Rutaceae	<i>Chloroxylon swietenia</i>	Burutha	Tree	10.3
Euphorbiaceae	<i>Phyllanthus polypyllus</i>	Kuretiya	Shrub	10.3
Convolvulaceae	<i>Argyrea populifolia</i>	Girithilla	Liana	6.9
Euphorbiaceae	<i>Flueggea leucopyrus</i>	Heen katu pila	Shrub	6.9
Fabaceae	<i>Acacia caesia</i>	Hinguruwel	Liana	5.7
Hernandiaceae	<i>Gyrocarpus americanus</i>	Diya labu	Tree	3.4
Euphorbiaceae	<i>Meinekia parvifolia</i>		Shrub	2.3
Moraceae	<i>Streblus asper</i>	Gata nithul	Shrub	2.3
Verbenaceae	<i>Vitex altissima</i>	Milla	Tree	2.3
Apocynaceae	<i>Alstonia macrophylla</i>	Hawarinuga	Tree	1.1
Apocynaceae	<i>Alstonia scholaris</i>	Rukattana	Tree	1.1
Fabaceae	<i>Cassia spectabilis</i>	Kahakona	Tree	1.1
Cycadaceae	<i>Cycas circinalis</i>	Madu	Tree	1.1
Fabaceae	<i>Dalbergia pseudo</i>	Bambara wel	Liana	1.1
Tiliaceae	<i>Grewia orientalis</i>	Keliya	Liana	1.1
Meliaceae	<i>Melia azedarach</i>	Lunumidella	Tree	1.1
Rubiaceae	<i>Mitragyna tubulosa</i>	Helaba	Tree	1.1
Verbinaceae	<i>Premna tomentosa</i>	Seru	Tree	1.1
Myrataceae	<i>Syzygium assimile</i>	Wal jambu (Dambu)	Tree	1.1

4.5 Appendix V. List of Plant Species Recorded in Scrublands

Family	Species	Common name	Life Form	Relative density (%)
Fabaceae	<i>Flueggea leucopyrus</i>	Heen katu pila	Shrub	9.52
Apocynaceae	<i>Croton laccifer</i>	Keppetiya	Tree	6.80
Apocynaceae	<i>Toddalia asiatica</i>	Kudumirissa	Liana	4.98
Euphorbiaceae	<i>Chloroxylon swietenia</i>	Burutha	Tree	4.53
Moraceae	<i>Phllanthus polypyllus</i>	Kuretiya	Shrub	4.38
Euphorbiaceae	<i>Grewia damini</i>	Damaniya	Tree	3.93
Lauraceae	<i>Leucaena leucocephala</i>	Ipil ipil	Tree	3.78
Fabaceae	<i>Streblus asper</i>	Gata nithul	Shrub	3.78
Rhamnaceae	<i>Ziziphus lucida</i> ^{*CR}	Eraminiya	Liana	3.78
Asaparagaceae	<i>Pterospermum suberifolium</i>	Welan	Tree	3.63
Euphorbiaceae	<i>Gliricidia sepium</i>	Ginisiriya	Tree	2.72
Euphorbiaceae	<i>Drypetes sepiaria</i>	Weera	Tree	2.27
Anacardiaceae	<i>Glycosmis angustifolia</i>	Bol pana	Shrub	2.27
Apocynaceae	<i>Gyrocarpus americanus</i>	Diya labu	Tree	2.27
Anacardiaceae	<i>Eupatorium odoratum</i>	Podisinno	Shrub	1.96
Marantaceae	<i>Strblus taxoides</i>	Katupol	Shrub	1.96
Rubiaceae	<i>Thespesia populnea</i>	Gansooriya	Tree	1.66
Hippocrateaceae	<i>Morinda umbellata</i>	Kiri wel	Liana	1.51
Rutaceae	<i>Cipadessa baccifera</i>	Halbemiya	Tree	1.36
Annonaceae	<i>Hiptage benghalensis</i>	Puwakgediya wel	Liana	1.36
Lecythidaceae	<i>Micromelum minutum</i>	Wal karapincha	Tree	1.36
Fabaceae	<i>Strychnos potatorum</i>	Ingin	Shrub	1.36
Lauraceae	<i>Grewia orientalis</i>	Keliya	Liana	1.21
Euphorbiaceae	<i>Litsea glutinosa</i>	Bombu	Tree	1.21
Moraceae	<i>Ochna lanceolata</i>	Mal bo kera	Shrub	1.21
Rhamnaceae	<i>Tithonia diversifolia</i>	Wal sooriyakantha	Shrub	1.21
Pandanaceae	<i>Jatropha curcas</i>	Wata endaru	Shrub	1.06
Meliaceae	<i>Schleichera oleosa</i>	Kone	Tree	1.06
Meliaceae	<i>Derris parviflora</i>	Kalawel	Liana	0.91
Lauraceae	<i>Diospyros ebum</i>	Kaluwara	Tree	0.91
Myrataceae	<i>Meineckia parvifolia</i>		Shrub	0.91
Combretaceae	<i>Salacia reticulata</i>	Himbutu wel	Liana	0.91
Flacourtiaceae	<i>Acacia caesia</i>	Hinguruwel	Liana	0.76
Rutaceae	<i>Artocarpus heterophyllus</i>	Kos	Tree	0.76
Tiliaceae	<i>Bauhinia racemosa</i>	Maila	Tree	0.76
Hernandiaceae	<i>Carissa spinarum</i>	Karaba	Shrub	0.76
Araliaceae	<i>Nerium oleander</i>	Kaneru	Tree	0.76
Euphorbiaceae	<i>Euphorbia antiquorum</i>	Daluk	Tree	0.60
Loganiaceae	<i>Persea americana</i>	Alipera	Tree	0.60
Fabaceae	<i>Vernonia zeylanica</i>		Liana	0.60
Lythraceae	<i>Woodfordia fruticosa</i>	Malitta	Shrub	0.60
Euphorbiaceae	<i>Alstonia macrophylla</i>	Hawarinuga	Tree	0.45

Family	Species	Common name	Life Form	Relative density (%)
Appendix V ctd.				
Rutaceae	<i>Asparagus racemosus</i>	Hathawariya W	Liana	0.45
Tiliaceae	<i>Bridelia retusa</i>	Ketakala	Tree	0.45
Sterculiaceae	<i>Chukrasia tabularis</i>	Holan hik	Tree	0.45
Rutaceae	<i>Dimorphocalyx glabellus</i>	Weliwanna	Shrub	0.45
Meliaceae	<i>Euphorbia heterophylla</i>		Shrub	0.45
Euphorbiaceae	<i>Neolitsia cassia</i>	Kududawla	Tree	0.45
Cycadaceae	<i>Premna tomentosa</i>	Seru	Tree	0.45
Datisceae	<i>Schefflera stellata</i>	Iththawal	Liana	0.45
Sapindaceae	<i>Syzygium caryophyllatum</i>	Dan	Tree	0.45
Fabaceae	<i>Trema orientalis</i>	Gadumba	Tree	0.45
Verbenaceae	<i>Ventilago madraspatana</i>	Yakadawel	Liana	0.45
Meliaceae	<i>Atalantia ceylanica</i>	Yakinaran	Shrub	0.30
Ebenaceae	<i>Careya arborea</i>	Kahata	Tree	0.30
Malpighiaceae	<i>Cordia sinensis</i>	Lolu	Tree	0.30
Rutaceae	<i>Ficus racemosa</i>	Attikka	Tree	0.30
Boraginaceae	<i>Filicium decipiens</i>	Pehibiya	Tree	0.30
Rubiaceae	<i>Gmelina asiatica</i>	Demata	Tree	0.30
Anacardiaceae	<i>Haldina cordifolia</i>	Kolon	Tree	0.30
Ochnaceae	<i>Helicteres isora</i>	Lihiniya	Tree	0.30
Euphorbiaceae	<i>Limonia acidissima</i>	Diwul	Tree	0.30
Verbinaceae	<i>Mangifera indica</i>	Amba	Tree	0.30
Sterculiaceae	<i>Mitragyna tubulosa</i>	Helaba	Tree	0.30
Astaraceae	<i>Tectona grandis</i>	Tekka	Tree	0.30
Astaraceae	<i>Tricalysia dalzellii</i>		Shrub	0.30
Moraceae	<i>Vitex altissima</i>	Milla	Tree	0.30
Sapindaceae	<i>Abrus precatorius</i>	Olinda	Liana	0.15
Euphorbiaceae	<i>Anacardium occidentale</i>	Kaju	Tree	0.15
Fabaceae	<i>Annona reticulata</i>	Wali anoda	Tree	0.15
Verbenaceae	<i>Azadirachta indica</i>	Kohoba	Tree	0.15
Rubiaceae	<i>Cassia spectabilis</i>	Kahakona	Tree	0.15
Euphorbiaceae	<i>Cycas circinalis</i>	Madu	Tree	0.15
Rubiaceae	<i>Flacourtia indica</i>	Wal ugurassa	Tree	0.15
Astaraceae	<i>Macaranga peltata</i>	Kanda	Tree	0.15
Euphorbiaceae	<i>Melia azedarach</i>	Lunumidella	Tree	0.15
Sapindaceae	<i>Nothopegia beddomei</i>	Bala	Tree	0.15
Moraceae	<i>Pandanus odoratissimus</i>	Watakeiya	Shrub	0.15
Myrtaceae	<i>Phllanthus emblica</i>	Nelli	Tree	0.15
Verbinaceae	<i>Psidium guawa</i>	Pera	Tree	0.15
Rutaceae	<i>Terminalia bellirica</i>	Bulu	Tree	0.15
Ulmaceae	<i>Tetrameles nudiflora</i>	Gira gas	Tree	0.15
Verbenaceae	<i>Vitex trifolia</i>	Nika	Tree	0.15

* Endemic species

CR Critically Endangered

4.6 Appendix VI. List of Plant Species Recorded in Secondary Forests

Family	Species	Common name	Life Form	Relative Density (%)
Fabaceae	<i>Derris parviflora</i>	Kalawel	Liana	7.7
Verbinaceae	<i>Premna tomentosa</i>	Seru	Tree	7.1
Euphorbiaceae	<i>Flueggea leucopyrus</i>	Heen katu pila	Shrub	6.1
Rutaceae	<i>Aegle marmelos</i>	Beli	Tree	5.6
Meliaceae	<i>Cipadessa baccifera</i>	Halbembiya	Tree	5.6
Tiliaceae	<i>Grewia damini</i>	Damaniya	Tree	5.6
Lauraceae	<i>Litsea glutinosa</i>	Bombu	Tree	5.1
Fabaceae	<i>Gliricidia sepium</i>	Ginisiriya	Tree	4.6
Euphorbiaceae	<i>Croton laccifer</i>	Keppetiya	Tree	4.1
Hippocrateaceae	<i>Salacia reticulata</i>	Himbutu wel	Liana	4.1
Rutaceae	<i>Chloroxylon swietenia</i>	Burutha	Tree	3.6
Euphorbiaceae	<i>Dimorphocalyx glabellus</i>	Weliwana	Shrub	3.6
Sterculiaceae	<i>Pterospermum suberifolium</i>	Welan	Tree	3.6
Euphorbiaceae	<i>Phyllanthus polypyllus</i>	Kuretiya	Shrub	3.1
Rutaceae	<i>Toddalia asiatica</i>	Kudumirissa	Liana	3.1
Malpighiaceae	<i>Hiptage benghalensis</i>	Puwakgediya wel	Liana	2.6
Moraceae	<i>Artocarpus heterophyllus</i>	Kos	Tree	2.0
Rubiaceae	<i>Haldina cordifolia</i>	Kolon	Tree	2.0
Meliaceae	<i>Melia azedarach</i>	Lunumidella	Tree	2.0
Tiliaceae	<i>Grewia helicterifolia</i>	Boradamaniya	Tree	1.5
Moraceae	<i>Streblus asper</i>	Gata nithul	Shrub	1.5
Ulmaceae	<i>Trema orientalis</i>	Gadumba	Tree	1.5
Fabaceae	<i>Cassia siamea</i>	Wa	Tree	1.0
Meliaceae	<i>Chukrasia tabularis</i>	Holan hik	Tree	1.0
Boraginaceae	<i>Cordia sinensis</i>	Lolu	Tree	1.0
Euphorbiaceae	<i>Drypetes sepiaria</i>	Weera	Tree	1.0
Sapindaceae	<i>Filicium decipiens</i>	Pehimbiya	Tree	1.0
Rutaceae	<i>Glycosmis angustifolia</i>	Bol pana	Shrub	1.0
Malvaceae	<i>Hibiscus erocarpus</i>		Shrub	1.0
Rutaceae	<i>Micromelum minutum</i>	Wal karapincha	Tree	1.0
Lauraceae	<i>Neolitsia cassia</i>	Kududawla	Tree	1.0
Anacardiaceae	<i>Nothopegia beddomei</i>	Bala	Tree	1.0
Sapindaceae	<i>Schleichera oleosa</i>	Kone	Tree	1.0
Fabaceae	<i>Tamarindus indica</i>	Siyabala	Tree	1.0
Rubiaceae	<i>Canthium coramandalicum</i>	Kara	Shrub	0.5
Moraceae	<i>Ficus hispida</i>	Kotadibula	Tree	0.5
Anacardiaceae	<i>Mangifera indica</i>	Amba	Tree	0.5
Verbenaceae	<i>Vitex altissima</i>	Milla	Tree	0.5

4.7 Appendix VII. List of Plant Species Recorded in Stream Bank Vegetation

Family	Species	Common name	Life Form	Relative density (%)
Sterculiaceae	<i>Pterospermum suberifolium</i>	Welan	Tree	13.9
Hippocrateaceae	<i>Salacia reticulata</i>	Himbutu wel	Liana	10.1
Euphorbiaceae	<i>Mallotus philippensis</i>	Hamparila	Shrub	9.38
Euphorbiaceae	<i>Croton laccifer</i>	Keppetiya	Tree	5.9
Euphorbiaceae	<i>Phllanthus polypyllus</i>	Kuretiya	Shrub	4.86
Euphorbiaceae	<i>Flueggea leucopyrus</i>	Heen katu pila	Shrub	4.17
Moraceae	<i>Strblus taxoides</i>	Katupol	Shrub	4.17
Malpighiaceae	<i>Hiptage benghalensis</i>	Puwakgediya wel	Liana	3.47
Anacardiaceae	<i>Nothopogia beddomei</i>	Bala	Tree	2.78
Fabaceae	<i>Acacia caesia</i>	Hinguruwel	Liana	2.43
Annonaceae	<i>Milusa indica</i>	Kekili messa	Shrub	2.08
Fabaceae	<i>Pongamia pinnata</i>	Karada	Tree	2.08
Rubiaceae	<i>Morinda umbellata</i>	Kiri wel	Liana	1.74
Rhamnaceae	<i>Ziziphus lucida</i> ^{*CR}	Eraminiya	Liana	1.74
Sapindaceae	<i>Schleichera oleosa</i>	Kone	Tree	1.74
Fabaceae	<i>Derris parviflora</i>	Kalawel	Liana	1.39
Rutaceae	<i>Atalantia ceylanica</i>	Yakinaran	Shrub	1.39
Apocynaceae	<i>Carissa spinarum</i>	Karaba	Shrub	1.39
Moraceae	<i>Ficus racemosa</i>	Attikka	Tree	1.39
Tiliaceae	<i>Grewia damini</i>	Damaniya	Tree	1.39
Myrtaceae	<i>Psidium guawa</i>	Pera	Tree	1.39
Loganiaceae	<i>Strychnos trichocalyx</i>	Gon karaba	Tree	1.39
Combretaceae	<i>Terminalia bellirica</i>	Bulu	Tree	1.39
Convolvulaceae	<i>Argyreia populifolia</i>	Girithilla	Liana	1.04
Rutaceae	<i>Toddalia asiatica</i>	Kudumirissa	Liana	1.04
Euphorbiaceae	<i>Dimorphocalyx glabellus</i>	Weliwanna	Shrub	1.04
Euphorbiaceae	<i>Drypetes sepiaria</i>	Weera	Tree	1.04
Sapotaceae	<i>Madhuca longifolia</i>	Mi	Tree	1.04
Myrtaceae	<i>Syzygium caryophyllatum</i>	Dan	Tree	1.04
Tiliaceae	<i>Grewia carpinifolia</i>		Liana	0.69
Rubiaceae	<i>Tricalysia dalzellii</i>		Shrub	0.69
Apocynaceae	<i>Alstonia scholaris</i>	Rukattana	Tree	0.69
Meliaceae	<i>Cipadessa baccifera</i>	Halbemiya	Tree	0.69
Sapindaceae	<i>Dimocarpus longan</i>	Mora	Tree	0.69
Moraceae	<i>Ficus hispida</i>	Kotadibula	Tree	0.69
Sapindaceae	<i>Filicium decipiens</i>	Pehibiya	Tree	0.69
Rutaceae	<i>Glycosmis mauritiana</i>		Tree	0.69
Rutaceae	<i>Micromelum minutum</i>	Wal karapincha	Tree	0.69
Lauraceae	<i>Neolitsia cassia</i>	Kududawla	Tree	0.69
Apocynaceae	<i>Ochrosia oppositifolia</i>	Gonna	Tree	0.69
Flacourtiaceae	<i>Scolopia pusilla</i>	Katu keera	Tree	0.69
Combretaceae	<i>Terminalia arjuna</i>	Kumbuk	Tree	0.69
Appendix VIIctd.				
Rhamnaceae	<i>Ventilago madraspatana</i>	Yakadawel	Liana	0.35
Astaraceae	<i>Tithonia diversifolia</i>	Wal sooriyanantha	Shrub	0.35

Family	Species	Common name	Life Form	Relative density (%)
Euphorbiaceae	<i>Bridelia retusa</i>	Ketakala	Tree	0.35
Meliaceae	<i>Chukrasia tabularis</i>	Holan hik	Tree	0.35
Moraceae	<i>Ficus amplissima</i>	Ela nuga	Tree	0.35
Moraceae	<i>Ficus bengalensis</i>	Maha nuga	Tree	0.35
Meliaceae	<i>Melia azedarach</i>	Lunumidella	Tree	0.35
Flacourtiaceae	<i>Scolopia acuminata</i>	Katu Kurundu	Tree	0.35
Verbenaceae	<i>Vitex altissima</i>	Milla	Tree	0.35

4.8 Appendix VIII. List of Fauna Recorded during Sampling in the Study Area

a. Butterflies

Family	Species	Common name	HG	Chena	GL	SF	SeF	SB
Danaidae	<i>Danaus Chrysippus</i>	Plain Tiger	+	+	+	+	+	+
Danaidae	<i>Danaus genutia</i>	Common Tiger	+	-	-	+	+	+
Danaidae	<i>Parantica aglea</i>	Glassy Tiger	+	+	+	+	+	+
Danaidae	<i>Tirumala limniace</i>	Blue Tiger	-	+	-	-	-	+
Danaidae	<i>Euploea core</i>	Common Indian Crow	+	+	+	+	+	+
Lycaenidae	<i>Catochysops strabo</i>	Foget- me- not	+	-	-	+	-	-
Lycaenidae	<i>Castalius rosimon</i>	Common Pierrot	+	+	-	+	-	-
Nymphalidae	<i>junonina iphita</i>	Chocolate Solidier	+	+	+	+	+	+
Nymphalidae	<i>Neptis hylas</i>	Common Sailer	+	+	-	+	+	+
Nymphalidae	<i>Phalanta phalantha</i>	Common leopard	+	+	+	+	+	+
Nymphalidae	<i>Hypolimnas bolina</i>	The great Egg Fly	-	+	+	-	+	+
Nymphalidae	<i>Euthalia aconthea</i>	The baron	+	-	-	+	-	-
Nymphalidae	<i>Neptis jumbah</i>	The Common Sailer	-	+	-	+	-	+
Nymphalidae	<i>Junonina lemonias</i>	The Lemon Pansy	+	+	+	+	+	+
Papilionidae	<i>Graphium agamemnon</i>	Tailed Jay	+	+	+	+	+	+
Papilionidae	<i>Pachliopta aristolochiae</i>	Common Rose	+	+	+	+	+	+
Papilionidae	<i>Pachliopta hector</i>	Crimson Rose	+	+	+	+	+	+
Papilionidae	<i>Paoilio polytes</i>	Common Mormon	+	+	-	+	+	+
Papilionidae	<i>Papilio polymnestor</i>	Blue Mormon	+	-	+	+	+	+
Papilionidae	<i>Troides darsius</i> * ^{NT}	Common Birdwing	+	-	-	-	+	+
Papilionidae	<i>Graphium sarpendon</i>	The common blue bottle	+	+	-	-	+	-
Papilionidae	<i>Papilio demoleus</i>	The Lime butterfly	+	+	-	+	+	+
Pieridae	<i>Catopsilia crocale</i>	Common Emigrant	+	-	-	+	-	-
Pieridae	<i>Catopsilia Pomona</i>	Lemon Emigrant	+	+	+	+	+	+
Pieridae	<i>Delias eucharis</i>	Common Jezebel	+	+	-	+	+	+
Pieridae	<i>Eurema brigitta</i>	Small Grass Yellow	+	+	+	+	+	+
Pieridae	<i>Eurema hecabe</i>	Common Grass Yellow	+	+	+	+	+	+
Pieridae	<i>Leptosia nina</i>	Psyche	+	+	-	+	+	-
Pieridae	<i>Eurema blanda</i>	Three spot Grass Yellow	+	-	-	+	-	+
Pieridae	<i>Appias albina</i>	The common albat rose	+	+	+	+	+	+
Satyridae	<i>Ypthima ceylonica</i>	White Four Ring	+	+	+	+	+	+
Satyridae	<i>Melanitis phedima</i>	Dark Evening Brown	+	+	-	-	+	-
Satyridae	<i>Orsotriena medues</i>	The nigger	+	-	-	+	+	+

b. Land snails

Family	Species	HG	Chena	SF	SeF	SB
Achatinoidae	<i>Lissachatina fulica</i>	+	+	+	+	-
Ariophantidae	<i>Cryptozona bistrialis</i>	+	+	+	+	-
Cyclophoridae	<i>Cyclophorus ceylanicus</i> * ^{NT}	-	-	-	-	+

c. Amphibians

Family	Species	Common name	HG	SF	SeF	SB
Bufoidea	<i>Duttaphrynus melanostictus</i> *	Common house toad	+	+	-	-
Nyctibatrachidae	<i>Lankanectes corrugatus</i> *	Corrugated water frog	-	-	-	+
Dicroglossidae	<i>Fejervarya kirtisinghei</i> *	Mountain paddy field frog	-	-	-	+
Dicroglossidae	<i>Fejervarya limnocharis</i>	Common paddy field frog	-	-	-	+
Ranidae	<i>Hylarana tempolaris</i>	Bronzed frog	-	-	-	+

d. Reptiles

Family	Species	Common name	HG	Chena	GL	SF	SeF	SB
Agamidae	<i>Calotes calotes</i>	Green Forest Lizard	+	+	-	+	+	+
Agamidae	<i>Calotes versicolor</i>	Garden Lizard	+	+	+	+	+	+
Colubridae	<i>Ptyas mucosa</i>	Rat Snake	+	+	-	+	+	-
Colubridae	<i>Coelognathus Helena</i>	Trinket Snake	+	+	-	+	-	-
Colubridae	<i>Ahaetulla nasuta</i>	Green Vine Snake	+	-	-	+	+	+
Colubridae	<i>Atrietium schistosum</i>	Olive Keelback Water Snake	-	-	-	-	-	+
Colubridae	<i>Chrysopelea taprobanica</i> * ^{VU}	Sri lankan Flying Snake	-	-	-	+	-	-
Elapidae	<i>Bungarus ceylonicus</i> * ^{NT}	Sri lankan Krait	+	+	-	+	-	-
Elapidae	<i>Naja naja</i>	Spectacled Cobra	+	+	-	+	-	-
Scincidae	<i>Mabuya macularia</i>	Rock Skink	+	+	-	+	+	+
Scincidae	<i>Mabuya Carinata</i>	Common Skink	+	+	-	+	+	-
Varanidae	<i>Varanus bengalensis</i>	Land Monitor	+	+	+	+	+	+
Viperidae	<i>Trimeresurus trigonocephala</i> *	Green Pit-Viper	-	+	-	-	+	-
Viperidae	<i>Hypnale hypnale</i>	Hump-nosed Pit Viper	+	+	-	-	+	-

e. Birds

Family	Species	Common name	HG	Chena	GL	SF	SeF	SB
Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied Fish Eagle	+	-	+	-	-	+
Accipitridae	<i>Spizaetus cirrhatus</i>	Changeable Hawk Eagle	+	-	+	+	+	+
Accipitridae	<i>Spilornis cheela</i>	Crested Serpent Eagle	+	-	-	+	+	+
Accipitridae	<i>Elanus caeruleus</i>	Black Winged Kite	-	-	+	+	-	+
Accipitridae	<i>Haliastur indus</i>	Brahminy Kite	-	+	-	+	+	+
Accipitridae	<i>Ictinaetus malayensis</i>	Black Eagle	+	-	-	+	+	+
Alaudidae	<i>Alauda gulgula</i>	Oriental Sky Lark	+	-	+	-	+	+
Alcedinidae	<i>Halcyon capensis</i>	Stalk-billed Kingfisher	-	-	-	-	-	+
Alcedinidae	<i>Alcedo atthis</i>	Common Kingfisher	-	-	-	+	+	+
Alcedinidae	<i>halcyon smyrnensis</i>	White-throated kingfisher	+	-	-	+	+	+
Bucerotidae	<i>Ocyeros gigalensis</i> *	Sri Lanka Grey Hornbill	+	-	-	-	+	+
Capitonidae	<i>Megalaima zelanica</i>	Brown-headed Barbet	+	+	-	+	+	+
Columbidae	<i>Chalcophaps indica</i>	Emerald Dove	+	-	-	-	+	-
Columbidae	<i>Streptopelia chinensis</i>	Spotted Dove	+	+	-	+	+	+
Corvidae	<i>Corvus macrorhynchos</i>	Large-billed Crow	+	+	-	+	-	+

Family	Species	Common name	HG	Chena	GL	SF	SeF	SB
Cuculidae	<i>Rhopodytes viridirostris</i>	Blue-faced Malkoha	-	-	-	+	-	-
Cuculidae	<i>Centropus sinensis</i>	Greater coucal	+	+	-	+	+	+
Dicruridae	<i>Dicrurus caerulescens</i>	White-bellied Drongo	+	-	--	-	+	-
Estrildidae	<i>Lonchura malacca</i>	Black headed munia	+	+	-	+	-	+
Estrildidae	<i>Lonchura punctulata</i>	Scaly Breasted munia	-	-	-	+	-	-
Hirundinidae	<i>Hirundo daurica</i>	Red-rumped Swallow	-	-	-	+	+	+
Irenidae	<i>Aegithina tiphia</i>	Common Iora	+	-	-	+	+	-
Irenidae	<i>Chloropsis cochinchinensis</i>	Jerdon's Leafbird	-	-	-	+	-	-
Meropidae	<i>Merops orientalis</i>	Green bee-eater	-	+	-	+	-	+
Monarchidae	<i>Rhipidura aureola</i>	white-Browed fantail	+	+	-	+	-	-
Monarchidae	<i>Terpsiphone paradisi</i>	Asian Paradise-flycatcher	+	+	-	+	-	+
Motacillidae	<i>Motacilla cinerea</i>	Gray wag tail	-	-	-	-	+	+
Nectariniidae	<i>Nectarinia lotenia</i>	Long-billed Sunbird	+	+	-	+	-	+
Nectariniidae	<i>Nectarinia Zelonica</i>	Purple-rumped Sunbird	-	-	-	+	+	-
Phasianidae	<i>Gallus lafayettii</i> *	Sri Lanka Jungle fowl	+	-	-	+	+	+
Picidae	<i>Dinopium benghalense</i>	Red backed woodpecker	+	-	-	-	+	+
Picidae	<i>Picoides moluccensis</i>	Brown-capped Woodpecker	-	-	-	+	-	-
Psittacidae	<i>Psittacula eupatria</i>	Alexandrine Parakeet	+	-	-	+	-	+
Psittacidae	<i>Loriculus beryllinus</i> *	Sri Lanka Hanging Parrot	+	-	-	+	+	-
Psittacidae	<i>Psittacula cyanocephala</i>	Plum-headed Parakeet	+	-	-	+	-	+
Pycnonotidae	<i>Pycnonotus cafer</i>	Red-vented Bulbul	+	+	+	+	+	+
Strigidae	<i>Bubo zeylonensis</i>	Brown Fish Owl	-	-	-	-	+	-
Sturnidae	<i>Acridotheres tristis</i>	Common Myna	+	-	-	+	-	+
Sylviidae	<i>Prinia socialis</i>	Ashy Prinia	+	+	-	-	+	-
Sylviidae	<i>Orthotomus sutorius</i>	Common Tailorbird	+	+	-	+	-	-
Timaliidae	<i>Pellorneum fuscicapillum</i> * ^{NT}	Brown-capped Babbler	-	-	-	-	+	-
Timaliidae	<i>Turdoides affinis</i>	Yellow-billed Babbler	+	-	-	+	-	-
Turdidae	<i>Copsychus saularis</i>	Oriental Magpie Robin	+	+	--	+	-	+
Appendix....Ctd								
Turdidae	<i>Saxicoloides fulicata</i>	Black-back Robin	+	+	-	+	+	-
Turnicidae	<i>Turnix suscitator</i>	Barred Buttonquail	-	-	-	-	+	-
Zosteropidae	<i>Zosterops palpebrosa</i>	Oriental White-eye	+	-	-	+	-	+

f. Mammals

Family	Species	Common name	HG	Chena	GL	SF	SeF	SB
Canidae	<i>Canis aureus</i>	Ceylon Jackal	-	-	-	-	+	-
Cercopithecidae	<i>Macaca sinica</i> * ^{NT}	Toque monkey	+	-	-	+	+	+
Cercopithecidae	<i>Semnopithecus priam</i> ^{NT}	Grey Langur	+	-	-	+	+	+
Cervidae	<i>Axis asix</i>	Spotted Deer	-	-	-	-	+	+
Cervidae	<i>Cervus unicolor</i>	Sambhur Deer	-	-	-	-	+	-
Cervidae	<i>Muntiacus muntjak</i>	Barkin Deer	-	-	-	+	+	+
Elephantidae	<i>Elephas maximus</i>	Elephant	-	-	-	-	+	-
Hystericidae	<i>Hystrix indica</i>	Indian Porcupine	+	-	-	+	+	+
Leporidae	<i>Lepus nigricolis</i>	Indian Hare	+	+	+	+	+	+
Manidae	<i>Manis crassicaudata</i> ^{NT}	Indian Pangolins	-	-	+	-	-	-
Scuridae	<i>Funambulus palmarum</i>	Palm Squirrel	+	+	+	+	+	+
Suidae	<i>Sus scrofa cristatus</i>	Indian Wild Boar	+	+	-	+	+	+
Viverridae	<i>Herpestes fuscus</i>	Brown mongoose	+	+	-	+	-	+
Viverridae	<i>Herpestes edwardsi</i>	Grey mongoose	+	-	-	-	-	-

Family	Species	Common name	HG	Chena	GL	SF	SeF	SB
Viverridae	<i>Viverricula indica</i>	Small Civet Cat	+	+	-	+	-	-
Viverridae	<i>Paradoxurus hermaphroditus</i>	Palm cat	+	-	-	-	-	-
Viverridae	<i>Herpestes vitticollis</i>	Striped necked Mongoose	+	+	-	+	-	-
Viverridae	<i>Herpestes smithii</i>	Sri Lanka Ruddy Mongoose	+	+	+	-	-	+

Conservation Status:

NT-Near Threatened / VU-Vulnerable / EN-Endangered / CR-Critically Endangered

**-Endemic Species*

Fauna Group	Total no of Species	No of Endemic Species	No of Threatened Species
Butterflies	34	01	01(NT)
Land Mollusca	03	01	01(NT)
Amphibia	05	03	0
Reptiles	14	02	01(VU)
Birds	46	04	01(NT)
Mammles	18	01	02(NT)

5. Ecological Survey of Proposed Tunnel Waste Dumping Sites

5.1 Dumping Site 01: Near Victoria Powerhouse

This area has been used as a tunnel waste dumping site during the construction of Victoria Dam and the Power station. The site has very little vegetation cover (**Figure 5-1**) as ground is still covered with rocks and sand and remain as a bare patch. The ground surface is presently covered with *Panicum* grass (*Panicum maximum*). In areas where the surface soil layer has exposed fast colonizing species such as *Leucaena leucocephala* and *Memecylon rostratum* has established in patches (**Figure 5-2**). CEB has planted some tree species such as *Bauhinia racemosa*, *Tamarindus indica*, and *Filicium decipiens* in an attempt to re-vegetate the area (**Table 5-1**). The planted species has shown poor growth due to the rocky nature of the substrate. The area now supports about 12 species of trees and one shrub species. *Memecylon rostratum* which is an early colonizing species in disturbed sites is the most abundant species in the site. Since the site is still at the early stage of succession (scrubland vegetation) butterflies and birds are common found than the other animal groups. Elephants have been occasionally recorded in the area (**Table 5-2**).

The site is still in degraded condition and has a poor growth of vegetation. Therefore, it is suitable for tunnel waste dumping.

Table 5-1 List of Plant Species Recorded from the Proposed Dumping Site 1

Family	Species	Common name	Life form	Relative density (%)
Melastomataceae	<i>Phyllanthus polyphyllus</i>	Kuretiya	Shrub	19.0
Fabaceae	<i>Bauhinia racemosa</i>	Maila	Tree	14.3
Myrtaceae	<i>Syzygium caryophyllatum</i>	Dan	Tree	14.3
Euphorbiaceae	<i>Bridelia retusa</i>	Ketakela	Tree	9.5
Apocynaceae	<i>Alstonia scholaris</i>	Rukaththana	Tree	4.8
Fabaceae	<i>Tamarindus indica</i>	Siyabala	Tree	4.8
Hernandiaceae	<i>Gyrocarpus americanus</i>	Diya labu	Tree	4.8
Rubiaceae	<i>Haldina cordifolia</i>	Kolon	Tree	4.8
Sapindaceae	<i>Schleichera oleosa</i>	Kone	Tree	4.8
Sapindaceae	<i>Sapindua trifoliata</i>	Kahapenela	Tree	4.8
Sapindaceae	<i>Filicium decipiens</i>	Pehibiya	Tree	4.8
Sapotaceae	<i>Madhuka longifolia</i>	Mee	Tree	4.8
Tiliaceae	<i>Grewia damini</i>	Damaniya	Tree	4.8

* endemic species



Figure 5-1 Bare Ground in the site near Powerstation



Figure 5-2 Colonization of the Site by *Leucaena leucocephala*

Table 5-2 Summary of Fauna Recorded in the Site 1

Faunal Group	No. of Families	No. of Species	No. of Endemic Species
Butterflies	05	24	00
Amphibians	01	01	00
Reptiles	04	09	00
Birds	24	36	02
Mammals	07	10	01
Land Snails	02	02	00

5.2 Dumping Site 02: near Hakuruthale Police Point

This is also a tunnel waste dumping site during the Victoria project (Phase I). Tunnel waste have been compacted and leveled off from the surface so that site has an appearance of a playground, with very little grass cover (**Figure 5-3**). Riverward slope of the ground has washed way exposing the remains of the previously dumped tunnel waste (**Figure 5-4**).

Leucaena leucocephala which is an introduced rapidly colonizing tree species in open up sites has established on the exposed slopes of the site (Figure 5-4). Most of the tree species found in the site is early colonizers. A few economically important species such as *Chloroxylon swietenia* are found in very low abundance in the site. In all 12 tree species, 03 shrub species, 03 liana species and 01 herb species have been recorded from the site (Table 5-3).

Butterfly and bird diversity is high in this site too (Table 5-4). Thirty species of butterflies and 45 species of birds have been recorded from the site during the survey. Abundance of plant species such as *Lantana camara* and *Muntingia calabura* which serve as preferred food plants for variety of butterflies and birds has attracted many butterflies and birds to the site.

Table 5-3 List of Plant Species Recorded from the Proposed Dumping Site 2

Family	Species	Common name	Life form	Relative density (%)
Fabaceae	<i>Leucaena leucocephala</i>	Ipil ipil	Tree	25.8
Rutaceae	<i>Toddalia asiatica</i>	Kudumiris	Liana	15.7
Tiliaceae	<i>Grewia damini</i>	Damaniya	Tree	7.9
Moraceae	<i>Ficus racemosa</i>	Attikka	Tree	7.9
Euphorbiaceae	<i>Flueggea leucopyrus</i>	Katupila	Shrub	7.9
Melastomataceae	<i>Phyllanthus polyphyllus</i>	Kuretiya	Shrub	6.7
Fabaceae	<i>Acacia caesia</i>	Hinguru wel	Liana	4.5
Sterculiaceae	<i>Helicteres isora</i>	Lihiniya	Tree	3.4
Boraginaceae	<i>Cordia dichotoma</i>	Lolu	Tree	3.4
Verbenaceae	<i>Vitex altissima</i>	Milla	Tree	2.2
Tiliaceae	<i>Muntingia calabura</i>	Jam	Tree	2.2
Rhamnaceae	<i>Ziziphus lucida*</i>	Eraminiya	Liana	2.2
Marantaceae	<i>Thespesia populnea</i>	Gansooriya	Tree	2.2
Capparidaceae	<i>Capparis sp</i>	Wellangiriya	Shrub	2.2
Streculaceae	<i>Melochia nodiflora</i>		Herb	1.1
Sapindaceae	<i>Sapindua emarginata</i>		Tree	1.1
Rutaceae	<i>Chloroxylon swietenia</i>	Burutha	Tree	1.1
Myrtaceae	<i>Syzygium caryophyllatum</i>	Dan	Tree	1.1
Hernandiaceae	<i>Gyrocarpus americanus</i>	Diya labu	Tree	1.1



Figure 5-3 Bare Ground at the Dumping Site 02 near Hakuruthale Police point



Figure 5-4 Washed-off Sides Colonized by *Leucaena leucocephala* Proposed Dumping

Table 5-4 Summary of Fauna at Hakuruthale Site

Faunal Group	No. of Families	No. of Species	No. of Endemic Species
Butterflies	05	30	00
Amphibians	03	03	01
Reptiles	07	12	01
Birds	27	45	03
Mammals	08	13	01
Land Snails	02	02	00

5.3 Dumping Site 03: Kohobagana

This site comprises of two main habitat types: a paddy field and an abandoned chena (sifting cultivation) lands. Paddy fields are cultivated once a year (Maha season) during November – April, using rain water. During rest of the year in vegetable crops are cultivated in some parts of these fields (**Figure 5-5**). Nine households are located bordering the paddy fields. The lands are

owned by the people living in Kohombagana village. The other part of the area surveyed comprises of abandoned chena fields (**Figure 5-6**). The chena cultivations in the area have been abandoned by the villagers sometimes back due to regular crop damage by the elephants. The farmers have now moved toward the main Kandy – Randenigala road and have started some vegetable farming. The survey conducted on the abandoned chena fields and adjoining scrublands has resulted in recorded 32 tree species, 10 shrub species and 08 lina species (**Table 5-5**). The paddy fields generally supported some grass species.

The area shows a rich faunal diversity (**Table 5-6**). Elephants frequently roam in this area. Other large mammals such as spotted deer (*Axix axis*), Sambar (*Cervus unicolor*) of are also found in considerable number in the area.

Selecting this site for tunnel waste dumping will lead to many problems. The fertile paddy fields will be lost and the farmers will have to be resettled. This area also falls within the Victoria-Randenigala-Rantanme (VRR) wildlife sanctuary and permission will have to be obtained in order the use this site for the proposed activity. Considering all these factors it could be concluded that this site is not suitable for selecting as a tunnel waste dumping site.

Table 5-5 List of Plant Species Recorded from the Proposed Dumping Site 3

Family	Species	Common name	Life form	Relative density (%)
Moraceae	<i>Streblus asper</i>	Nithul	Tree	14.8
Fabaceae	<i>Tamarindus indica</i>	Siyambala	Tree	6.6
Fabaceae	<i>Acacia caesia</i>	Hinguru wel	Liana	5.9
Sterculiaceae	<i>Helicteres isora</i>	Lihiniya	Tree	5.9
Rhamnaceae	<i>Ziziphus lucida*</i>	Eraminiya	Liana	4.8
Verbenaceae	<i>Vitex trifolia</i>	Nika	Shrub	4.8
Apocynaceae	<i>Carissa spinarum</i>	Karaba	Shrub	3.8
Hippocrateaceae	<i>Salacia reticulata</i>	Himbutu	Liana	3.8
Moraceae	<i>Strblus taxoides</i>	Katu pol	Shrub	3.1
Euphorbiaceae	<i>Drypetes sepiaria</i>	Weera	Tree	2.8
Fabaceae	<i>Gliricidia sepium</i>	Ginisiriya	Tree	2.4
Melastomataceae	<i>Phyllanthus polyphyllus</i>	Kuretiya	Shrub	2.4
Myrtaceae	<i>Syzygium caryophyllatum</i>	Dan	Tree	2.4
Rutaceae	<i>Chloroxylon swietenia</i>	Burutha	Tree	2.4
Rutaceae	<i>Toddalia asiatica</i>	Kudumiris	Liana	2.4
Rubiaceae	<i>Haldina cordifolia</i>	Kolon	Tree	2.1
Fabaceae	<i>Pongamia pinnata</i>	Karanda	Tree	1.7
Moraceae	<i>Ficus racemosa</i>	Attikka	Tree	1.7
Tiliaceae	<i>Griwia orientalis</i>	Keliya	Liana	1.7
Tiliaceae	<i>Griwia carpinifolia</i>		Tree	1.7
Euphorbiaceae	<i>Flueggea leucopyrus</i>	Katupila	Shrub	1.4
Fabaceae	<i>Abrus precatorius</i>	Olinda	Liana	1.4
Rubiaceae	<i>Mitragyna tubulosa</i>	Halaba	Tree	1.4
Sterculiaceae	<i>Pterospermum suberifolium</i>	Welan	Tree	1.4
Boraginaceae	<i>Cordia dichotoma</i>	Lolu	Tree	1

Family	Species	Common name	Life form	Relative density (%)
Combretaceae	<i>Terminalia arjuna</i>	Kumbuk	Tree	1
Euphorbiaceae	<i>Dimorphocalyx glabellus</i>	Waliwenna	Shrub	1
Fabaceae	<i>Derris parviflora</i> *	Kalawel	Liana	1
Fabaceae	<i>Bauhinia racemosa</i>	Maila	Tree	1
Hernandiaceae	<i>Gyrocarpus americanus</i>	Diya labu	Tree	1
Malpighiaceae	<i>Hiptage bengalensis</i>		Liana	1
Moraceae	<i>Ficus molis</i>	Nuga	Tree	1
Sterculiaceae	<i>Sterculis foetida</i>	Thelabu	Tree	1
Tiliaceae	<i>Grewia damini</i>	Damaniya	Tree	1
Apocynaceae	<i>Ochrosia oppositifolia</i>	Gonna	Tree	0.7
Meliaceae	<i>Cipadessa baccifera</i>	Halbembiya	Shrub	0.7
Rhamnaceae	<i>Glycosmis pentaphyla</i>	Dodan pana	Shrub	0.7
Sapindaceae	<i>Schleichera oleosa</i>	Kone	Tree	0.7
Verbenaceae	<i>Vitex altissima</i>	Milla	Tree	0.7
Euphorbiaceae	<i>Bridelia retusa</i>	Ketakela	Tree	0.3
Fabaceae	<i>Cassia spectabilis</i>	Kahakona	Tree	0.3
Flacourtiaceae	<i>Hydnocarpus venenata</i> *	Makulu	Tree	0.3
Loganiaceae	<i>Strychnos potatorum</i>	Ingini	Tree	0.3
Loganiaceae	<i>Strychnos wallichiana</i>	Wal beli	Tree	0.3
Meliaceae	<i>Chukrasia tabularis</i>	Hik	Tree	0.3
Meliaceae	<i>Melia azedarach</i>	Lunumidella	Tree	0.3
Rubiaceae	<i>Canthium coramandalicum</i>	Kara	Shrub	0.3
Ulmaceae	<i>Trema orientalis</i>	Gadumba	Tree	0.3
Verbinaceae	<i>Premna tomentosa</i>	Seru	Tree	0.3



Figure 5-5 Paddy Fields at Kokombagana (in fallow stage)



Figure 5-6 Abandoned Chena Lands at Kohobagana

Table 5-6 Summary of the Faunal Recorded at Kohombagana Site.

Faunal Group	No. of Families	No. of Species	No. of Endemic Species
Butterflies	05	29	01
Amphibians	01	01	00
Reptiles	06	11	01
Birds	28	48	03
Mammals	08	13	01
Land Snails	02	02	00

5.4 Dumping Site 04: Serge Chamber

Compared to all the sites surveyed, this site is very small in extent. The area has been used for some temporary buildings during the Victoria project. Since the original vegetation in the site has been cleared previously, the area is at presently colonized by the number of shrub and herb species. Invasive shrub *Lantana camara* occupies most of the landscape in the site (**Table 5-7**). *Leucaena leucocephala* is the dominant tree species in the area (**Figure 5-7**). On the slopes facing the Randenigala road, some recent encroachments could be seen (**Figure 5-8**). A single family is living in this area. This family has to be evacuated and resettled before dumping the tunnel waste to the site.

Faunal diversity is comparatively low in this site (**Table 5-8**). Lack of ground cover and open tracts of land has made this site a less preferable for species such as amphibians and mammals. Due to the availability of food plants such as *Lantana camara* considerable number of butterflies and birds has been observed in the site.

Table 5-7
List of Plant Species Recorded from the Proposed Dumping Site 4 near Surge Chamber

Family	Species	Common name	Life form	Relative density (%)
Verbenaceae	<i>Lantana camara</i>	Gandapana	Shrub	28.8
Fabaceae	<i>Leucaena leucocephala</i>	Ipil ipil	Tree	19.5
Streculaceae	<i>Melochia nodiflora</i>		Herb	13.3
Melastomataceae	<i>Phyllanthus polyphyllus</i>	Kuretiya	Shrub	8.6
Boraginaceae	<i>Heliotropium indicum</i>		Shrub	7.8
Moraceae	<i>Streblus asper</i>	Nithul	Shrub	7.0
Solanaceae	<i>Solanum seaforthianum</i>		Liana	6.3
Rutaceae	<i>Toddalia asiatica</i>	Kudumiris	Liana	5.5
Apocynaceae	<i>Allamanda cathartica</i>	Wal rukaththana	Liana	4.7
Euphorbiaceae	<i>Ricinus communis</i>	Endaru	Tree	3.9
Convolvulaceae	<i>Argyreia populifolia*</i>	Girithilla	Liana	3.9
Astaraceae	<i>Vernonia zeylanica</i>		Liana	3.9
Euphorbiaceae	<i>Flueggea leucopyrus</i>	Katupila	Shrub	3.1
Meliaceae	<i>Azadirachta indica</i>	Kohomba	Tree	2.3
Amaranthaceae	<i>Aerva javanica</i>	Polpala	Herb	1.6
Menispermaceae	<i>Pachygone ovata</i>		Liana	1.6
Loganiaceae	<i>Strychnos potatorum</i>	Ingin	Tree	1.6
Verbinaceae	<i>Premna tomentosa</i>	Seru	Tree	0.8
Sterculiaceae	<i>Pterospermum suberifolium</i>	Welan	Tree	0.8
Rubiaceae	<i>Nauclea orientalis</i>		Shrub	0.8
Rhamnaceae	<i>Ziziphus lucida*</i>	Eraminiya	Liana	0.8
Moraceae	<i>Ficus racemosa</i>	Attikka	Tree	0.8
Moraceae	<i>Artocarpus heterophyllus</i>	Kos	Tree	0.8
Moraceae	<i>Ficus hispida</i>	Kotadimbula	Tree	0.8



Figure 5-7 Scrub Vegetation near Serge Chamber



Figure 5-8 Encroachment on the slopes near Serge chamber

Table 5-8 Summary of the Faunal Recorded near Surge Chamber

Faunal Group	No. of Families	No. of Species	No. of Endemic Species
Butterflies	05	25	01
Reptiles	05	07	00
Birds	24	37	03
Mammals	06	08	01

5.5 Dumping Site 05: Additional Intake

This has been a tunnel waste dumping site during the Victoria project. Vegetation in the area is sparse, and mainly dominated by shrub species and some pioneer tree species such as *Grewia damini* (Figure 5-9 & Figure 5-10). Tree species diversity is low in the site and only nine species of trees were recorded during the survey (Table 5-9).

The site is frequently visited by the large herbivores such as elephant and the sambar to feed on the grasses and herbs growing in the open patches. Lack of thick vegetation cover in the site has made it less favorable for faunal groups such as butterflies, amphibians, and birds (Table 5-10).

**Table 5-9
List of Plant Species Recorded from the Proposed Dumping Site 5 near Additional Intake**

Family	Species	Common name	Life form	Relative density (%)
Tiliaceae	<i>Grewia damini</i>	Damaniya	Tree	18.5
Apocynaceae	<i>Alstonia scholaris</i>	Rukaththana	Tree	14.8
Melastomataceae	<i>Phyllanthus polyphyllus</i>	Kuretiya	Shrub	14.8
Moraceae	<i>Streblus asper</i>	Nithul	Shrub	14.8
Rutaceae	<i>Chloroxylon swietenia</i>	Burutha	Tree	7.4
Ulmaceae	<i>Trema orientalis</i>	Gadumba	Tree	7.4
Asclepiadaceae	<i>Calotropis gigantia</i>	Wara	Shrub	3.7
Meliaceae	<i>Chukrasia tabularis</i>	Hik	Tree	3.7

Family	Species	Common name	Life form	Relative density (%)
Moraceae	<i>Ficus racemosa</i>	Attikka	Tree	3.7
Rubiaceae	<i>Haldina cordifolia</i>	Kolon	Tree	3.7
Sapindaceae	<i>Sapindua trifoliata</i>	Kahapenela	Tree	3.7
Sapotaceae	<i>Madhuka longifolia</i>	Mee	Tree	3.7



Figure 5-9 Additional Intake site

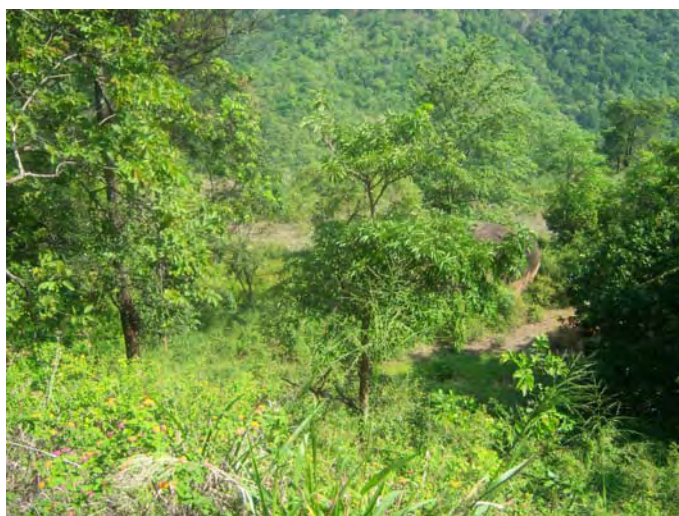


Figure 5-10 Sparse Vegetation near Additional Intake Site

Table 5-10 Summary of the Faunal Recorded near Additional Intake

Faunal Group	No. of Families	No. of Species	No. of Endemic Species
Butterflies	05	22	01
Amphibians	01	01	00
Reptiles	05	06	00
Birds	18	23	02
Mammals	08	11	01
Land Snails	01	01	01

5.6 Dumping Site 06: Quarry Site

Very little plant growth was observed inside the quarry as it has no soil substratum so support the growth plants. A part of the floor is filled with water (**Figure 5-11** & **Figure 5-12**). In this site the vegetation bordering the quarry was surveyed. In the site herbs, shrubs and lianas are more abundant than the tree species (**Table 5-11**). Faunal diversity is very poor at the quarry. The site does not provide suitable habitat for animals groups such as butterflies, mammals and birds. Mammal diversity is extremely low in the site (**Table 5-12**).

Table 5-11
List of Plant Species Recorded from the Proposed Dumping Site 6-old Quarry Site

Family	Species	Common name	Life form	Abundance*
Anacardiaceae	<i>Mangifera indica</i>	Amba	Tree	+
Apocynaceae	<i>Alstonia scholaris</i>	Rukaththana	Tree	+
Apocynaceae	<i>Alstonia macrophylla</i>	Hawarinuga	Tree	+
Asclepiadaceae	<i>Calotropis gigantea</i>	Wara	Shrub	+
Astaraceae	<i>Vernonia zeylanica</i>		Liana	+
Astaraceae	<i>Eupatorium odoratum</i>	Podisinno	Shrub	++
Astaraceae	<i>Tithonia diversifolia</i>	Wal sooriyakantha	Shrub	+
Astaraceae	<i>Gynuralycopersicifolia</i>	Holanthala	Herb	+
Combretaceae	<i>Terminalia arjuna</i>	Kumbuk	Tree	+
Combretaceae	<i>Terminalia bellirica</i>	Bulu	Tree	+
Convolvulaceae	<i>Argyreia populifolia</i> *	Girithilla	Liana	+++
Dichapetalaceae	<i>Dichapetalum gelonioides</i>	Balunakuta	Shrub	+++
Euphorbiaceae	<i>Flueggea leucopyrus</i>	Katupila	Shrub	+
Fabaceae	<i>Acacia caesia</i>	Hinguru wel	Liana	+
Fabaceae	<i>Cassia spectabilis</i>	Kahakona	Tree	+
Fabaceae	<i>Clitoria laurifolia</i>	Adanahiriya	Herb	+
Lamiaceae	<i>Ocimum tenuiflorum</i>	Maduruthala	Herb	+
Melastomataceae	<i>Phyllanthus polyphyllus</i>	Kuretiya	Shrub	+
Meliaceae	<i>Melia azedarach</i>	Lunumidella	Tree	+
Meliaceae	<i>Cipadessa baccifera</i>	Halbembiya	Shrub	+
Moraceae	<i>Streblus asper</i>	Nithul	Shrub	+
Myrtaceae	<i>Syzygium caryophyllatum</i>	Dan	Tree	+
Poaceae	<i>Panicum maximum</i>	Gini thana	Grass	++++
Rhamnaceae	<i>Ziziphus lucida</i> *	Eraminiya	Liana	+
Rutaceae	<i>Toddalia asiatica</i>	Kudumiris	Liana	+
Santalaceae	<i>Santalum album</i>	Sudu hadun	Tree	+
Sapindaceae	<i>Schleichera oleosa</i>	Kone	Tree	+
Sterculiaceae	<i>Helicteres isora</i>	Lihiniya	Tree	+
Sterculiaceae	<i>Pterospermum suberifolium</i>	Welan	Tree	+
Tiliaceae	<i>Grewia damini</i>	Damaniya	Tree	+
Verbenaceae	<i>Lantana camara</i>	Gandapana	Shrub	+++

* Abundance: + Present (< 25%), ++ (25 -50%), +++ (50 -70%), ++++ (>75%)



Figure 5-11 Dumping Site 06 – Quarry



Figure 5-12 Dumping Site 06 – Quarry

Table 5-12 Summary of the Faunal Recorded at the Quarry

Faunal Group	No. of Families	No. of Species	No. of Endemic Species
Butterflies	05	22	00
Amphibians	01	01	00
Reptiles	05	06	00
Birds	17	21	00
Mammals	02	02	00

5.7 Dumping Site 07: Shooting Gallery

The site has been used for various activities during the Victoria project and hence devoid of vegetation (**Figure 5-13**). Fast growing species such as *Leucaena leucocephala* and *Cassia spectabilis* has established well in the area bordering the site (**Table 5-13**).

Few remaining buildings near the site are presently occupied by the Sri Lanka army personnel.

Proposed site for tunnel waste dumping is at present used by the army as a “shooting practice area” for the new recruits and is under the control of the army. Therefore, permission has to be obtained from the Sri Lanka army to use this area for tunnel waste dumping.

This site is poorly colonized by animals (**Table 5-14**). The site is continuously being cleared and used by the army and hence the heavy disturbance has made this a least favorable site for many animal groups.

Table 5-13
List of Plant Species Recorded from the Proposed Dumping Site 7- Shooting Gallery

Family	Species	Common name	Life form	Abundance
Anacardiaceae	<i>Mangifera indica</i>	Amba	Tree	+
Astaraceae	<i>Eupatorium odoratum</i>	Podisinno	Shrub	+
Fabaceae	<i>Gliricidia sepium</i>	Ginisiriya	Tree	+
Fabaceae	<i>Leucaena leucocephala</i>	Ipil ipil	Tree	+++
Fabaceae	<i>Cassia spectabilis</i>	Kahakona	Tree	++
Moraceae	<i>Ficus racemosa</i>	Attikka	Tree	+
Moraceae	<i>Artocarpus heterophyllus</i>	Kos	Tree	+
Moraceae	<i>Ficus relegeosa</i>	Bo	Tree	+
Myrtaceae	<i>Eucalyptus Grandis</i>	Eucalyptus	Tree	+
Sterculiaceae	<i>Pterospermum suberifolium</i>	Welan	Tree	+++
Poaceae	<i>Panicum maximum</i>	Gini thana	Grass	++++
Tiliaceae	<i>Muntingia calabura</i>	Jam	Tree	+

* Abundance: + Present (< 25%), ++ (25 -50%), +++ (50 -70%), ++++ (>75%)

Table 5-14 Summary of the Faunal Recorded at the Shooting Gallery

Faunal Group	No. of Families	No. of Species	No. of Endemic Species
Butterflies	05	19	00
Reptiles	04	04	00
Birds	08	10	00
Mammals	05	05	01



Figure 5-13 Bare Ground at Shooting Gallery



Figure 5-14 Vegetation Bordering Shooting Gallery

5.8 Dumping Site 08: Adikarigama

The site is located near the junction bordering the road to Victoria dam. A Garment factory is also located within the close proximity to the site. This site has also been used for some activities during the Victoria project and hence as very little natural vegetation. The site is now colonized by some planted species such as *Nerium oleander* and *Cassia spectabilis* (Table 5-15). Information gathered during the survey indicates that this site is reserved for some building construction for CEB in the future. Therefore, CEB has to be consulted before selecting this site for tunnel waste disposing.

Faunal diversity of this site is also very poor (Table 5-16). The site is surrounded by households and a garment factory and also has very little ground cover. Thus the site is poorly colonized by ,any animal groups.

Table 5-15 List of Plant Species Recorded from the Proposed Dumping Site at Adikarigama

Family	Species	Common name	Life form	Abundance
Apocynaceae	<i>Alstonia scholaris</i>	Rukaththana	Tree	++
Apocynaceae	<i>Alstonia macrophylla</i>	Hawarinuga	Tree	+
Apocynaceae	<i>Nerium oleander</i>	Kaneru	Tree	+++
Asteraceae	<i>Eupatorium odoratum</i>	Podisinno	Shrub	+
Dichapetalaceae	<i>Dichapetalum gelonioides</i>	Balunakuta	Herb	+
Elaeocarpaceae	<i>Elaeocarpus serratus</i>	Weralu	Tree	+
Euphorbiaceae	<i>Ricinus communis</i>	Endaru	Tree	+
Euphorbiaceae	<i>Bridelia retusa</i>	Ketakela	Tree	+
Euphorbiaceae	<i>Croton laccifer</i>	Keppetiya	Tree	+
Euphorbiaceae	<i>Flueggea leucopyrus</i>	Katupila	Shrub	+
Fabaceae	<i>Gliricidia sepium</i>	Ginisiriya	Tree	+
Fabaceae	<i>Leucaena leucocephala</i>	Ipil ipil	Tree	+
Fabaceae	<i>Cassia spectabilis</i>	Kahakona	Tree	+++
Fabaceae	<i>Bauhinia racemosa</i>	Maila	Tree	+
Fabaceae	<i>Tamarindus indica</i>	Siyabala	Tree	+

Family	Species	Common name	Life form	Abundance
Hernandiaceae	<i>Gyrocarpus americanus</i>	Diya labu	Tree	+
Melastomataceae	<i>Memecylon rostratum*</i>	Kuretiya	Shrub	+
Meliaceae	<i>Azadirachta indica</i>	Kohomba	Tree	+
Meliaceae	<i>Melia azedarach</i>	Lunumidella	Tree	+
Moraceae	<i>Ficus racemosa</i>	Attikka	Tree	+
Moraceae	<i>Artocarpus heterophyllus</i>	Kos	Tree	+
Moraceae	<i>Ficus relegeosa</i>	Bo	Tree	+
Moringaceae	<i>Moringa oleifera</i>	Murunga	Tree	+
Poaceae	<i>Panicum maximum</i>	Gini thana	Grass	+
Rhamnaceae	<i>Ziziphus lucida*</i>	Eraminiya	Liana	+
Rutaceae	<i>Chloroxylon swietenia</i>	Burutha	Tree	+
Verbenaceae	<i>Lantana camara</i>	Gandapana	Shrub	++
Santalaceae	<i>Santalum album</i>	Sudu hadun	Tree	+



Figure 5-15 Adikarigama Site

Table 5-16 Summary of the Faunal Recorded at Adikarigama Site

Faunal Group	No. of Families	No. of Species	No. of Endemic Species
Butterflies	05	24	00
Amphibians	01	01	00
Reptiles	06	09	00
Birds	15	19	01
Mammals	05	08	01

Recommendations

Looking at the present ecological statuses of the sites examined four sites namely Power Station, Hakuruthale, Additional Intake, and Quarry are highly suitable for tunnel waste dumping. Site near the surge chamber could also be used if the encroachment is removed from the vicinity (Here the safety of the villager has to be taken into consideration). Although the “shooting gallery” is a possible candidate, it is now being used by the different stakeholder for a different purpose. This

has to be discussed with the relevant authority (Sri Lanka Army). Kohombagana site will not be suitable for the purpose as this will involve relocation, resettlement and payment of compensation to the displaced families. Wildlife Department consent will also have to be obtained to use the site. Adikarigama site will also not be suitable as this is located in the centre of commercial area. Further, CEB has made plans to use this site in the future to construct some buildings.

5.9 Proposed Sand Mining Site at Maha Oya, Adikarigama

This report provides an ecological analysis of the proposed sand mining site at Maha Oya, Adikarigama.

The proposed sand mining site is the exposed bed of Maha Oya (river), before it reaches the Victoria reservoir (**Figure 5-16 & Figure 5-17**). The extent of the exposed sand deposit is about 24 haters and extend from the Maha Oya bridge (culvert No 4/3) on the Kandy – Randenigala road to the Victoria reservoir. When the Victoria reservoir is filled to the capacity, the area concerned will be submerged completely. Ecologically this is a temporary habitat which is formed between the high and low water levels of the Victoria reservoir.

Since this is a temporary habitat the site is colonized by some herb and liana species only. No large tree species were recorded from the site (**Table 5-17**). At present about 90% of the site is covered by the invasive (problem) shrub species namely *Mimosa pigra* (**Figure 5-18**). Beneath the ground vegetation cover a thick layer of sand could be seen (**Figure 5-19**).

Table 5-17 List of Plant Species Recorded from the Proposed Sand Mining Site

Family	Species	Common name	Life form
Amaranthaceae	<i>Amaranthus spinosus</i>	Katu keera	Herb
Boraginaceae	<i>Heliotropium indicum</i>	Eth honda	Herb
Convolvulaceae	<i>Cuscuta chinensis</i>	Agamula nathi wal	Liana
Fabaceae	<i>Mimosa pigra</i>	Yoda nidikumba	Shrub
Fabaceae	<i>Cassia auriculata</i>	Ranawara	Liana
Malpighiaceae	<i>Hiptage bengalensis</i>	Puwakgediya wel	Liana
Malvaceae	<i>Hibiscus lobatus</i>		Herb
Onagaraceae	<i>Ludwigia hyssopifolia</i>	Diyaniilla	Herb
Papaveraceae	<i>Argemone mexicana</i>		Herb
Passifloraceae	<i>Passiflora foetida</i>		Liana
Sapindaceae	<i>Cardiospermum halicacabum</i>	Walpenela	Liana



Figure 5-16 Map of Proposed Sand Mining Area



Figure 5-17 Exposed River Bed



Figure 5-18 Mimosa Covered dry River Bed



Figure 5-19 Exposed Sand Layer of the Dry River Bed

Faunal diversity of this area is also very low (**Table 5-18**). During the dry period the exposed river bed provide a grazing ground for domestic livestock, especially the cattle and buffaloes. The other faunal groups occupying the areas are opportunistic species such as small mammals and some birds. The invasive plant *Mimosa pigra* (flowers) attract some butterflies to the area. Human disturbance to the area is very high. During some dry periods the villagers in surrounding areas use this site for vegetable cultivation.

Activities such as sand mining in this area are banded by the Mahaweli Authority. Permission has to be obtained from the Mahaweli Authority to do the sand mining in this area.

Table 5-18 Summary of the Faunal Richness in the area.

Faunal Group	No. of Families	No. of Species	No. of Endemic Species
Butterflies	05	24	00
Fish	02	02	00
Amphibians	02	02	01
Reptiles	03	03	00
Birds	16	20	01
Mammals	04	04	00

Appendix 1. Fauna Recorded at the Proposed Sand Mining Site

	Family	Scientific name	Common name
Butterflies	Danaidae	<i>Danaus Chrysippus</i>	Plain Tiger
	Danaidae	<i>Danaus genutia</i>	Common Tiger
	Danaidae	<i>Parantica aglea</i>	Glassy Tiger
	Danaidae	<i>Tirumala limniace</i>	Blue Tiger
	Danaidae	<i>Euploea core</i>	Common Indian Crow
	Nymphalidae	<i>junonina iphita</i>	Chocolate Solidier
	Nymphalidae	<i>Neptis hylas</i>	Common Sailer
	Nymphalidae	<i>Phalanta phalantha</i>	Common leopard
	Nymphalidae	<i>Hypolimnas bolina</i>	The great Egg Fly
	Nymphalidae	<i>Euthalia aconthea</i>	The baron
	Nymphalidae	<i>Junonina lemonias</i>	The Lemon Pansy
	Papilionidae	<i>Graphium agamemnon</i>	Tailed Jay
	Papilionidae	<i>Pachliopta aristolochiae</i>	Common Rose
	Papilionidae	<i>Pachliopta hector</i>	Crimson Rose
	Papilionidae	<i>Paoilio polytes</i>	Common Mormon
	Papilionidae	<i>Papilio polymnestor</i>	Blue Mormon
	Papilionidae	<i>Graphium sarpendon</i>	The common blue bottle
	Papilionidae	<i>Papilio demoleus</i>	The Lime butterfly
	Pieridae	<i>Catopsilia Pomona</i>	Lemon Emigrant
	Pieridae	<i>Delias eucharis</i>	Common Jezebel
	Pieridae	<i>Eurema brigitta</i>	Small Grass Yellow
Pieridae	<i>Eurema hecabe</i>	Common Grass Yellow	
Pieridae	<i>Appias albina</i>	The common albat rose	
Satyridae	<i>Ypthima ceylonica</i>	White Four Ring	
Freshwater Fishes	Cyprinidae	<i>Devario malabaricus</i>	Giant Danio
	Cyprinidae	<i>Puntius sarana</i>	Olive barb
Amphibians	Bufonidae	<i>Bufo melonostictus</i>	Common house toad
	Ranidae	<i>Rana temporalis*</i>	Common wood frog
Reptiles	Agamidae	<i>Calotes calote</i>	Green Forest Lizard
	Agamidae	<i>Calotes versicolor</i>	Garden Lizard
	Colubridae	<i>Ahaetulla nasuta</i>	Green Vine Snake

	Family	Scientific name	Common name
Birds	Accipitridae	<i>Spilornis cheela</i>	Crested Serpent Eagle
	Accipitridae	<i>Haliastur indus</i>	Brahminy Kite
	Accipitridae	<i>Ictinaetus malayensis</i>	Black Eagle
	Alaudidae	<i>Alauda gulgula</i>	Oriental Sky Lark
	Alcedinidae	<i>Alcedo atthis</i>	Common Kingfisher
	Alcedinidae	<i>halcyon smyrnensis</i>	White-throated kingfisher
	Bucerotidae	<i>Ocyroceros giganensis*</i>	Sri Lanka Grey Hornbill
	Capitonidae	<i>Megalaima zelanica</i>	Brown-headed Barbet
	Columbidae	<i>Chalcophaps indica</i>	Emerald Dove
	Columbidae	<i>Streptopelia chinensis</i>	Spotted Dove
	Cuculidae	<i>Centropus sinensis</i>	Greater coucal
	Estrildidae	<i>Lonchura malacca</i>	Black headed munia
	Hirundinidae	<i>Hirundo daurica</i>	Red-rumped Swallow
	Irenidae	<i>Aegithina tiphia</i>	Common Iora
	Meropidae	<i>Merops orientalis</i>	Green bee-eater
	Nectariniidae	<i>Nectarinia Zelonica</i>	Purple-rumped Sunbird
	Pycnonotidae	<i>Pycnonotus cafer</i>	Red-vented Bulbul
	Sturnidae	<i>Acridotheres tristis</i>	Common Myna

5.10 Appendix 1. Methodology of Biological Survey

Methodology Used in Sampling Flora and Fauna (biological environment)

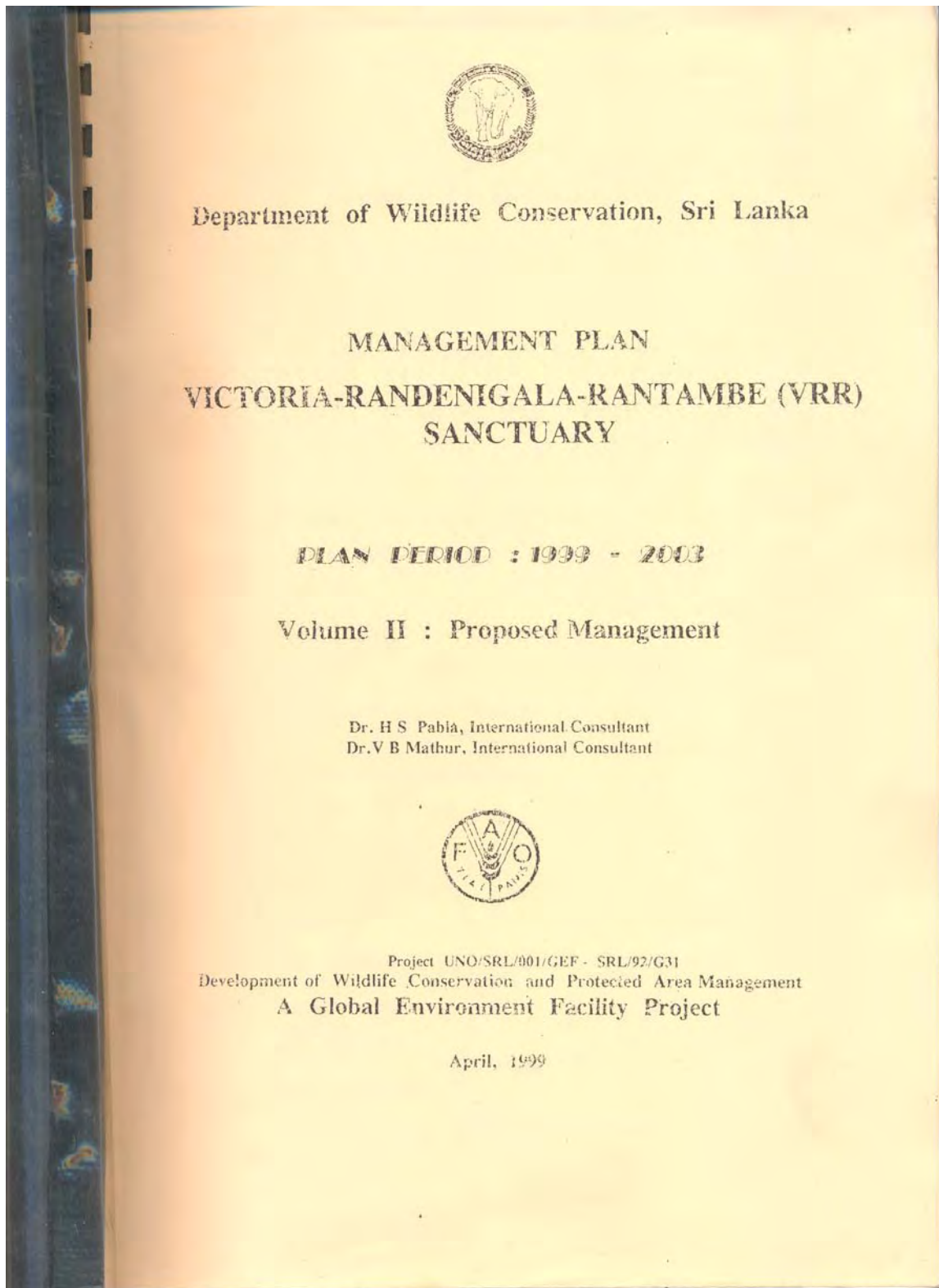
Vegetation sampling was done using belt transects. Transects were 50m in length and 5m in width. Transects were always oriented along an altitudinal gradient (ie. up and down the hills). Three transects were sampled in each site. All woody plant species and herbs encountered in transects were identified and counted. Small branch of the species that could not be identified in the field were brought to the laboratory for preservation and later confirmations of identify comparing to the authenticated samples at the National Herbarium, Peradeniya.

Fauna in the habitats were sampled using line transects. In each habitat an experienced observer walked 100m along a predetermined transect line. Amphibians, and reptiles encountered within 2m on each side of transect was identified and counted. Butterflies fling within a distance of 5m on each side of transect line was identified and counted. Birds flying or resting within 20m to each side of the transect line was identified and counted. At least three transect lines were sampled in each habitat

Extents of Sites

<u>Site No. & Name</u>	<u>Extent (Ha)</u>
1. Near power station	1.8
2. Hakuruthale	2.4
3. Kohombagana	30.4
4. Surge chamber	1.2
5. Additional intake	6.5
6. Quarry	2
7. Shooting gallery	2.1
8. Adikarigama	1.9

6. DWLC Management Plan for VRR Sanctuary



SUMMARY

1. This management plan covers Victoria-Randenigala-Rantembe (VRR) Sanctuary, area 42,078 ha, lying along the banks of Mahaweli Ganga and spans across three administrative districts, viz. Kandy and Nuwara Eliya in the Central Province and Badulla in the Uva Province of Sri Lanka. The VRR sanctuary is the largest sanctuary of Sri Lanka and was gazetted in 1987. It serves as an immediate catchment for three major hydroelectric reservoirs viz. Victoria, Randenigala and Rantembe constructed under the Accelerated Mahaweli Development Programme. Apart from meeting nearly half of the country's electricity demand these reservoirs provide water for dry zone agriculture.
2. The management of the VRR Sanctuary is aimed at achieving the following goals:
 - ◆ To conserve the biodiversity of the 'intermediate zone', with special emphasis on the flagship species, the elephant (*Elephas maximus*).
 - ◆ To protect the catchment of the three major hydroelectric reservoirs viz. Victoria, Randenigala and Rantembe, constructed under the Accelerated Mahaweli Development Programme.
 - ◆ To promote nature tourism and conservation awareness amongst the various target groups.
3. Based on the above mentioned goals the following management objectives have been formulated for the VRR Sanctuary:
 - ◆ To protect the catchments of Victoria, Randenigala and Rantembe multipurpose reservoirs.
 - ◆ To improve the management of the 'intermediate zone' forests including the endemic plant and animal species.
 - ◆ To provide opportunities for conservation-compatible tourism, nature interpretation and conservation education.

- ◆ To develop appropriate systems, staff structure and associated infrastructure for effective law enforcement, resource protection and management.
- ◆ To mitigate human-elephant conflict (HEC)
- ◆ To reduce the natural resource dependencies of the adjoining communities on VRR sanctuary through ecodevelopment measures.
- ◆ To promote research, monitoring and training in biodiversity conservation.

4. A number of problems and other internal and external constraints produce hindrance in the way of achieving the above objectives. A matrix showing the hindrance value of each problem in the achievement of various management objectives of VRR Sanctuary is given in Table I.

Table 1: Management Objective-Problem Matrix for VRR Sanctuary

Problems	Objectives	Hindrane Score							Hindrane Rank
		1 P=3	2 P=3 P=2	3 P=2	4 P=2	5 P=2	6 P=2	7 P=2	
Shortage of staff for protection and management	3*3	3*3	2*2	2*3	2*2	2*3	2*2	42	1
Inadequate funds	3*3	3*2	2*3	2*2	2*2	2*3	2*2	39	2
Low staff motivation	3*2	3*2	2*1	2*2	2*2	2*2	2*2	38	3
Lack of training	3*2	3*3	2*2	2*1	2*2	2*2	2*2	33	4
Inadequate conservation awareness	3*2	3*3	2*1	2*2	2*2	2*2	2*1	32	5
Waste filling	3*3	3*3	2*2	2*0	2*2	2*3	2*0	32	5
Lack of co-ordination with other line agencies	3*2	3*2	2*2	2*0	2*3	2*3	2*1	30	6
Other Encroachments	3*2	3*2	2*1	2*3	2*2	2*2	2*0	28	7
Human settlements and dependencies	3*3	3*2	2*1	2*0	2*2	2*3	2*0	27	8
Absence of research/monitoring infrastructure	3*1	3*3	2*1	2*1	2*1	2*1	2*3	26	9
Chena cultivation	3*2	3*2	2*1	2*1	2*2	2*2	2*0	24	10
Poaching	3*0	3*3	2*2	2*2	2*1	2*2	2*0	23	11
Lack of NGO support	3*1	3*2	2*1	2*0	2*2	2*3	2*0	21	12
Inadequacy of protection infrastructure	3*1	3*1	2*1	2*3	2*1	2*1	2*0	18	13
Undemarcated boundary	3*1	3*2	2*0	2*2	2*0	2*2	2*0	17	14
Lack of roads	3*1	3*1	2*2	2*2	2*0	2*1	2*0	16	15
Waste Collection of NWWP	3*1	3*2	2*0	2*0	2*1	2*2	2*0	15	16
Unsustainable Fishing	3*0	3*1	2*2	2*1	2*0	2*3	2*0	15	16
Man-made fires	3*1	3*2	2*1	2*1	2*1	2*0	2*0	15	16
Livestock grazing	3*1	3*1	2*1	2*1	2*1	2*1	2*0	14	17
Tobacco cultivation	3*1	3*1	2*0	2*0	2*1	2*2	2*0	12	18
Feral Carnivores	3*0	3*2	2*2	2*1	2*0	2*0	2*0	12	18
Upland Animal Cropping	3*1	3*1	2*0	2*0	2*1	2*1	2*0	10	19
Garbage Dumping	3*1	3*1	2*1	2*1	2*0	2*0	2*0	10	19
Road Mining	3*0	3*1	2*1	2*1	2*0	2*1	2*0	9	20
Invasion of Exotic Species	3*0	3*2	3*1	2*0	2*0	2*0	2*0	9	20
Poor maintenance of electric fences	3*0	3*0	2*0	2*1	2*3	2*3	2*0	8	21
HEC	3*0	3*0	2*0	2*0	2*3	2*1	2*0	8	21
Inadequate nature tourism facilities	3*0	3*0	2*3	2*0	2*0	2*0	2*0	6	23
Pesticides	3*0	3*2	2*0	2*0	2*0	2*0	2*0	6	23
Total	105	150	70	62	70	98	20	577	

In this matrix, the objectives have been prioritized by giving a priority rating (P) on a scale of 3, where 3 is the highest priority, followed by 2 (medium) and 1 (low). Similarly, the problems have been assigned 'hindrance' value on a scale of 3, where 3 denotes high severity, followed by 2 (medium) and 1 (low). The product of the priority rank of the objective and the hindrance value of the problem, gives the total 'hindrance score' of a problem. The problems are ranked on the basis of their hindrance score.

5. As per this analysis, the staff shortage and other internal problems of the DWLC rank the highest while purely biological problems rank the lowest. It is, therefore, very clear that unless the DWLC takes steps to strengthen the organization in the field it will be difficult to solve the other problems. The management plan, accordingly, proposes strategies and prescriptions in the same order of priority.
6. Considering the goals, objectives, problems and management issues a number of management strategies have been proposed for achieving the objectives. To begin with it is important to review/revise the legal status of VRR sanctuary and its boundaries. The VRR sanctuary was created to protect the immediate catchment of the reservoirs. However, a sanctuary status by itself does not facilitate the protection of the catchment, as there are no legal restrictions on incompatible land uses. As per the FFPO, the rights of the people, which existed before the declaration of the sanctuary, can continue even after the declaration. Although the government has been successful in relocating a large number of families from the sanctuary area, many resettled families are reported to have come back. DWLC is not able to do anything about this because of the legal problem. The MDA, which initially resettled these people, appears no longer interested in this issue. The remaining human habitations are now concentrated, more or less, along the boundary of the sanctuary. Therefore, if the interior areas of the sanctuary, more or less defined by the core area boundary, are upgraded to the level of a national park, it will give the DWLC much better control on the area and will facilitate multipurpose management. The scenic beauty of the area can be used to promote

nature tourism, while the resettlement programme can be continued under a legal mandate.

7. The boundaries of the present sanctuary are generally defined by contour lines and imaginary lines joining various trigonometrical points (popularly called trig points) without any reference to the forest boundaries. This has resulted in the unnecessary inclusion of a large number of villages in the sanctuary. Whereas this has unrealistically enlarged the area of the sanctuary, it has also stretched the staff resources. This is clear from the fact that while the notified area of the sanctuary is 420.78 km², the actual area covered by natural vegetation is only 205.24 km². This gives DWLC or MDA no advantage in terms of the protection of forests, wildlife or catchment. Therefore, it is proposed that the present boundaries of the sanctuary be revised to make them approximately coterminous with the forest boundaries, as far as possible. The revised boundaries will facilitate modern wildlife management, such as the management of wild pig population, proposed in this plan and will also make the PA more compact and manageable. The proposed reorganization of the VRR Sanctuary is shown in Table 2.

Table 2: Proposed Reorganisation of VRR sanctuary.

Sr. No.	Name	Forest Area (km ²)	Non-Forest Area (km ²)	Submerged Area (km ²)	Total Area (km ²)
1	Proposed VRR Sanctuary	202.92	5.82	24.06	232.80
2	Proposed VRR National Park	107.13	3.26	22.70	133.09
3	Total	310.05	9.08	46.76	365.89

The reconstituted PA shall consist of a national park as the core and the sanctuary as the buffer zone. Whereas the human habitation in the proposed national park shall have to be relocated, large ecodevelopment inputs are proposed in the remaining villages inside the sanctuary to make their lifestyles and economic practices compatible with natural resource conservation. Although, as a result of the proposed changes in the boundary, there will be a net reduction in the size of

the PA, the extent of the forest area in the sanctuary shall go up by 16.89 km² as shown in Table 3 below. However, there will be a drastic reduction in the non-forest area amounting to 70.71 km². This reorganisation will rationalise the boundaries of the PA and will make it more compact and compatible with the surrounding land-use.

Table 3: Comparative Area Statement of Existing and Proposed PA. (All areas in km²)

	Forest Area	Non-Forest Area	Submerge Area	Total Area
Existing PA	293.16	79.79	46.76	419.71
Proposed PA	310.05	9.08	46.76	365.89

8. The current structure and strength of the sanctuary administration is not adequate even to perform the low-key functions undertaken at present. To enable it to cope with a quantum jump in activity and responsibility, proposed in the current plan, a comprehensive restructuring and strengthening is proposed. The main approach in restructuring is to increase the staff strength, provide them the infrastructure and support required performing the difficult tasks expected of them and then making them accountable for well-defined and manageable units. In order to make the range and beat organization more effective, it is proposed to adopt a "Compartment-based Management Approach" in VRR Sanctuary. This approach envisages the organization of the total geographical area of VRR Sanctuary into small units called "compartments." A compartment is basically the smallest unit of forest management designated for the purpose of administration, description and record. The number of compartments proposed in VRR Sanctuary is 94.
9. The proposed reorganization of the ranges and beats is based on the need to protect the territorial integrity of the area as well as its flora and fauna. Several considerations viz: geographical attributes, accessibility, accountability and

need to efficiently carry out the protection, habitat management, ecodevelopment and other functions envisaged in the plan, have guided the proposed number and location of the range and beat headquarters. The existing ranges and beats were rather remotely located with little basic infrastructure support in terms of electricity, communication, accommodation, roads and vehicles. All this had severe implications on work efficiency and the staff motivation and morale. Moreover, with the range and beat offices located away from the habitations, the interaction and involvement of the sanctuary staff with the local communities was minimal. This plan, therefore, puts forward proposals to ameliorate the above situation. It is proposed to have five territorial ranges and twelve beats. Table 4 gives the summary of the proposed organisation.

Table 4 : Proposed organization of ranges and beats in VRR Sanctuary.

Range	Area (km ²)	Beat	Area (km ²)
Hasalaka	235.15	Hasalaka	67.03
		Ambagahapalessa	53.83
		Moragahaulla	56.56
		Dagavilla	57.72
Kandaketiya	184.56	Kandaketiya	41.02
		Keerthibandarapura	98.44
		Theripala	45.10
		Total	436.76

10. In order to professionally administer the plan it is necessary that the organization and location of sanctuary headquarters be at a place, which is conducive to overall control and coordination. It is proposed that the sanctuary will be managed by a Grade I Ranger, who will be designated as the Sanctuary Warden (SW), who would be under administrative control of the Assistant Director (Central Region). The present VRR headquarters at Ambagahapalessa is also not appropriate to the enhanced role and responsibility of the Sanctuary Warden, as envisaged in this plan. The coordination role of the Sanctuary Warden will be significantly enlarged and he will be required to liaise with various individuals and agencies, especially in relation to the ecodevelopment activities. In future, the sanctuary is

going to be managed as a part of the overall development programme of the area, rather than in isolation. For this the SW will have to work with a host of stakeholders and other concerned agencies. Therefore, his location has to be at a place where he has easy contact and access to various government agencies. It is therefore proposed to locate the office of the SW at Hasalaka.

11. The achievement of more than one management objectives in a protected area, requires differential treatment to be given to different parts of the habitat. The problems and pressures faced by different areas within the PA may vary and the areas may also have a varied ecological history and may be specifically suitable for the fulfillment of a specific management objective. Thus, the forests on the hills are, to some extent, pristine, those in the plains have been subjected to much higher levels of disturbance in history. Many ecologically sensitive springs occur in the hills and need to be handled with extreme care. At the same time many areas may be required to cater to the various needs of the resource dependent communities. On these considerations, area of VRR Sanctuary is proposed to be divided into two distinct zones (Table 5), each with a specific purpose and enabling management prescriptions.

Table 5 : Proposed Zonation in VRR Sanctuary. All areas in sq km

Zone	Range							
	Hasalaka				Kandaketiya			
	Forest Area	Non-Forest Area	Submergence Area	Total	Forest Area	Non-Forest Area	Submergence Area	Total
Core	49.44	2.24	-	51.68	57.12	1.02	22.70	80.84
Buffer	144.32	39.13	-	183.45	42.27	37.40	24.06	103.73
Total	193.76	39.13	-	235.15	99.39	38.42	46.76	184.56

x *

12. Although the forest-side communities suffer damage from many species, the discussion on the subject, in Sri Lanka, generally gets confined to the human-elephant conflict (HEC). Although losses due to the elephants are more visible, crop losses due to attacks from wild pig, monkeys, porcupines and many other animals are in no way insignificant. In the case of the VRR sanctuary, while elephant damage has been reported in only 31 villages, leopard depredations have been reported from 44 villages, damage due to wild pig, sambar, deer, porcupine, toque monkey and grey langur has been reported from almost all of the 92 villages surveyed by the Resource Inventory team. During discussions with villagers, crop damage due to wild pig was reported to be much more rampant and serious than that due to elephants. Therefore, the PA management has to find ways of mitigating the difficulties of the people from all aspects, rather than limiting themselves to the solutions of HEC. This plan proposes an innovative wild pig management programme with the following objectives: (a) Management of its population, (b) Development of an efficient and systematic system for the compensation of crop losses, occurring due to animal depredations, (c) Demonstration that wildlife can be managed on the principle of 'sustained yield', (d) Promotion of people's participation and stakes in the conservation of natural resources. The scheme proposed below shall be run on a pilot basis in a few selected villages and shall be expanded and/or modified on the basis of experience.
13. To ensure better protection and law enforcement new initiatives have been proposed. These include institutional strengthening, patrolling on foot, by vehicles, elephants and speedboats as appropriate, improving footpath network, establishing radio-communication network and enhancing staff motivation through incentives and other welfare measures.
14. The ecodevelopment approach proposed in the plan seeks to achieve the following objectives: (a) check the growth of demand for fuelwood in the adjoining communities, (b) reduce the economic dependencies of the adjoining

villages on the PA and securing the participation of all stakeholders in achieving these objectives. The importance of inter-agency co-ordination in ecodevelopment has been emphasized in the plan. Without this being made a very specific prescription, this aspect can be easily ignored because it is one of the most difficult tasks in ecodevelopment. But if pursued seriously, it can make the difference between a successful programme and a sham. The strategies for the achievement of the above objectives have been determined on the basis of their potential effectiveness and sustainability. All the strategies proposed in the plan are based on one fundamental premise-the conservation of natural resources in Sri Lanka, as elsewhere in South Asia, can be done only if it does not adversely affect the lives and livelihoods of the rural communities and that the participation of the local people and other stakeholders is a must for effective conservation. The protected areas are a part of the large local and regional landscape and resource-base. Their management cannot be done in isolation of the regional development programmes and conservation of these resources must be made a part of the integrated development planning of the region. In conformity with these principles, strategies have been proposed to address the specific issues related to PA-people relations viz. (a) promoting fuel saving technologies-biogas, improved cook stoves and solar cookers, (b) implementing alternative income generation programmes and (c) establishing community-based organizations. A sum of approx. Rs.31 million SLR has been proposed for implementing ecodevelopment strategies.

15. The VRR sanctuary and its immediate environs have the potential to provide a unique visitor experience, which has been termed as "VRR Heritage Experience". The specific objectives of the tourism management in VRR Sanctuary are (a) to develop general facilities for promoting safe tourism in the sanctuary and enhancing the quality of visitor experience, (b) to keep the impact of tourism on the resources of the sanctuary to the minimum and (c) to develop nature interpretation and conservation education facilities in the sanctuary. Considering the rugged nature of terrain and varied topography along with an enchanting

landscape, the thrust of tourism activities in VRR will be towards the development of sites, which are scenic and provide scope for outdoor activities. Nature has already endowed VRR with a number of such scenic sites with cascading waterfalls and perennial water bodies, which are eminently suitable for bird watching, camping and adventure hiking. Many of these sites are already used by people, but these sites are deteriorating because of unregulated use and lack of awareness about their conservation. In order to disperse the tourist pressure, which is likely to grow in the coming years, no single designated tourism zone is being proposed in this plan. Instead tourism activities will be allowed at a number of sites under adequate supervision so that both resource protection and positive wilderness experience to the visitors can be ensured. Development of visitor amenities, minimization of disturbance, enhancing visitor satisfaction and wilderness experience through better information and interpretation would be the major thrust of management of tourism in VRR.

16. The Wildlife Trust of Sri Lanka has been very actively involved in carrying out a range of nature tourism and interpretation activities in VRR sanctuary for a long time. It manages a comprehensive infrastructure at Randenigala, which is the hub of their activity. It is, therefore, proposed that DWLC and the Wildlife Trust should work in close collaboration in planning, development and management of all tourism, interpretation and conservation education activities in VRR sanctuary. In order to formalize the relationship a Memorandum of Understanding (MoU) between the DWLC and the Wildlife Trust will be signed which should cover the broad range and scope of activities and also their specific details. Mechanism for sharing of revenue generated by these activities will also need to be worked out. If the Wildlife Trust agrees to fund the tourism/interpretation infrastructure development then it should keep the entire revenue generated during the first five years in order to recover its investments. This arrangement should then be reviewed and an appropriate revenue sharing mechanism should be worked out. Development of visitor amenities, minimization of disturbance, enhancing visitor satisfaction and wilderness experience through better information and

interpretation would be the major thrust of management of tourism in VRR Sanctuary.

- (7) Research, Monitoring and Training provide sound foundation to the scientific management of Protected Areas (PAs). Due to a variety of reasons these activities have not been given the due consideration they deserve. The focus of research activities will therefore be to generate basic information on flora, fauna, and the attendant human aspects, which will enable the PA managers to address the critical management issues. Broadly, the information that needs to be generated through research belongs to the following two categories: (i) Ecological and (ii) PA-People Interaction. Considering the present limited capability of the DWLC for carrying out field research in the PAs it is proposed that the system of contractual research as already in vogue in the GEF project should be continued. Universities, research organizations, NGOs and individuals should be encouraged to take up field research on mutually agreed terms and conditions. It is also proposed to recruit a Research Coordinator on a contract basis to organize and coordinate the research and monitoring activities in VRR Sanctuary. A scheme for monitoring of wildlife populations through "Daily Observation Diary" and "Transect Walk" has been proposed to generate information on population dynamics. Field managers and staff should constantly upgrade their knowledge and skills in order to enable and empower themselves to efficiently discharge their duties. Apart from the formal basic training, which is essential for all staff for laying the foundation, the field staff has also to be provided opportunities for "on the job" and 'in service' training. It is equally important to learn from the field experiences of PA managers in areas with similar management issues through visits and study tours. Participation in training workshops and specialized courses is a standard means for acquiring professional knowledge and skills. There is a need to adopt the "Competency-based" training approach in which the performance criteria, the acceptable range, underpinning knowledge and understanding are developed in a participatory manner to increase the efficacy of training.

- 18 Corridors are the habitat patches linking two or more Protected Areas (PAs). The corridors are considered extremely important for the long-term survival of those animal populations e.g. elephants in Sri Lanka which (i) are pocketed in areas legally designated as PAs and/or adjoining non-PA areas; (ii) have small population size and (iii) need large areas to fulfill their seasonal habitat requirements. The prescriptions for management of the VRR-WNP-Maduru Oya corridor have been provided in the plan.
- 19 A system of boundary demarcation and maintenance has been proposed in the plan. Development of infrastructure viz. Footpaths, trails, barriers, vehicles, equipment, radio communication network and buildings has been proposed in a planned way. A realistic need-based assessment of additional staff requirement has been made and following staff positions-9 Range Assistants, 10 Wildlife Guards and 31 personnel in the office staff, mahouts and labour category are required to implement the management plan.
- 20 It is emphasized that this is the first management plan of the area. Hitherto, the management has been adhoc and there are no traditions of implementing sound wildlife management practices. Further, many of the prescriptions contained in this plan e.g. institutional strengthening, rationalization of the boundaries, subsidized power fencing, subsidized crop insurance will be difficult to implement without the DWT.C creating a proper policy framework to facilitate the job of the PA managers.
- 21 No plan can be perfect because all plans are based partly on facts and partly on assumptions. There is always an inherent uncertainty about the biological processes and marked complexity about the socio-economic processes. Therefore, the strategies prescribed in the plan have to be carefully implemented and closely monitored. If any mid-course correction is required it should be promptly

discussed and implemented. A flexible approach in the implementation of this plan is strongly recommended.

22. The overall implementation of the Management Plan for the 5-year period has been estimated at Rs.183 million or US \$ 2.65million. Conversion Rate 1 US \$=SLR 09.

PART II PROPOSED MANAGEMENT

Chapter Five MANAGEMENT GOALS AND OBJECTIVES

5.1 Introduction

Victoria-Randenigala-Rantembe (VRR) sanctuary, area 42,078 ha, lies along the banks of Mahaweli Ganga and spans across three administrative districts, viz. Kandy and Nuwara Eliya in the Central Province and Badulla in the Uva Province of Sri Lanka. The VRR sanctuary is the largest sanctuary of Sri Lanka and was gazetted in 1987. It serves as an immediate catchment for three major hydroelectric reservoirs viz. Victoria, Randenigala and Rantembe constructed under the Accelerated Mahaweli Development Programme. Apart from meeting nearly half of the country's electricity demand these reservoirs provide water for dry zone agriculture.

The VRR region falls within the intermediate climatic zones of the country. Biogeographical classifications identify VRR sanctuary as part of the intermediate zone tropical semi-evergreen forests. A wide range of vegetation types ranging from mature climax vegetation types, comprising (i) sub-montane forests, (ii) semi-evergreen forests, (iii) riverine forests, (iv) bamboo forests and (v) rock-outcrop forests, the late successional vegetation represented by (vi) scrub forests and (vii) savannas; and the early successional vegetation represented by (viii) homegardens, (ix) abandoned homegardens, (x) *chenalands*, (xi) abandoned *chenalands*, (xii) grasslands and (xiii) *Leucaena* stands are found in VRR sanctuary. The VRR forests harbour 76 endemic plant

species of which 31, 18 and 11 are found in the semi-evergreen forests, riverine forests and sub-montane forests, respectively.

The VRR sanctuary harbours an extremely rich fauna. It ranges from the megaherbivore species elephant and the relict hump-nosed lizard to many species of endangered butterflies. The vertebrate fauna include 30 (six endemic) freshwater fish, 10 (eight endemic) amphibian, 35 (eight endemic) reptilian, 153 (twelve endemic) bird and 29 (one endemic) mammalian species, making a total of 267 species of vertebrates, of which 35 species are endemic to Sri Lanka. This is approximately 40% of the total inland vertebrate species and 20% of the endemic vertebrate species found in Sri Lanka. The invertebrate fauna includes 71 species (three endemic) of butterflies, 41 species (thirty one endemic) of freshwater and terrestrial mollusks and many species of spiders, beetles and termites as well.

Presently, approximately 96,000 people live within the sanctuary. The sanctuary is surrounded by 122 Grama Niladhari Divisions all along its periphery and about 113,000 people live in close proximity to the sanctuary boundary. The major non-forest landuse types in the sanctuary include *chena* cultivation, home gardens, paddy cultivation and tobacco farming.

The VRR sanctuary on account of its splendid landscape, diverse flora and fauna, historical sites, central location and easy access attracts nearly 600,000 visitors (mostly local), although the visitor amenities are virtually non-existent. The area has a great potential for ecotourism/nature tourism, which is quite popular among foreign as well as local tourists.

These considerations have formed the basis for determining the management goals and objectives of VRR sanctuary.

5.2 **Goals**

The management of VRR sanctuary is aimed at achieving the following goals.

- 5.2.1 To conserve the biodiversity of the 'intermediate zone', with special emphasis on the flagship species, the elephant (*Elephas maximus*).
- 5.2.2 To protect the catchment of the three major hydroelectric reservoirs viz. Victoria, Randenigala and Rantembe, constructed under the Accelerated Mahaweli Development Programme
- 5.2.3 To promote nature tourism and conservation awareness amongst the various target groups.

5.3 **Objectives**

The management objectives for VRR sanctuary are defined as follows:

- 5.3.1 To protect the catchments of Victoria, Randenigala and Rantembe multipurpose reservoirs
- 5.3.2 To improve the management of the 'intermediate zone' forests including the endemic plant and animal species
- 5.3.3 To provide opportunities for conservation-compatible tourism, nature interpretation and conservation education
- 5.3.4 To develop appropriate systems, staff structure and associated infrastructure for effective law enforcement, resource protection and management
- 5.3.5 To mitigate human-elephant conflict (HEC)
- 5.3.6 To reduce the natural resource dependencies of the adjoining communities on VRR sanctuary through ecodevelopment measures
- 5.3.7 To promote research, monitoring and training in biodiversity conservation.

5.4

Rationale for Management Objectives

The raison d'être of the VRR sanctuary was to conserve and protect the immediate catchment and prevent siltation of the three multipurpose reservoirs. The catchment area has a steep topography and is extensively cultivated, both of which pose a severe siltation threat to the reservoirs. Due to the geographic location of VRR sanctuary in the 'intermediate zone' it harbours a diverse range of flora and fauna, many of which are endemic to Sri Lanka. The rare geomorphological formations inside the VRR sanctuary, which have unique assemblages of species, need to be preserved. Tourism is a very important economic activity in the country and is a major source of foreign exchange earning. By virtue of its central location and unique landscape the VRR sanctuary attracts large numbers of local visitors. The rugged terrain and the accompanying waterfalls alongwith other waterbodies provide high potential for developing nature tourism especially the adventure tourism. Therefore, providing opportunities for tourism, interpretation and conservation education will be an important management activity under this plan. Despite the ecological significance and tourism potential of the area, the existing field organization for the management of the area is rather weak and ineffective. Therefore, this plan seeks to strengthen the field organization. The natural resource dependencies of the people living around the VRR sanctuary, result in conflict between the management agencies and them, especially under the strengthened protection regime. It is, therefore, imperative for the management to look for approaches that take into account the needs and aspirations of the local communities and also seek their support and participation in management. The extensive agricultural development both inside and on fringes of the sanctuary increases the intensity of human-elephant conflict on one hand and also threatens the reservoir life, due to increased siltation rates. The mitigation of the human-elephant conflict is an important consideration for PA management. Supporting research, monitoring and training is an integral part of the management of PAs. The location of the sanctuary near the educational centres at Kaniyadippuwa provides unique opportunities for conducting biodiversity research, monitoring and training activities.

7. Cost Benefit Analysis

7.1 Appendix 1: Reduction of Energy during Constructions

The downstream option and pumped storage option require drawdown of the Randenigala reservoir water level during the construction of the outlet structure. To confirm the impact of the drawdown during the construction stage, the water balance simulation is carried out by using the inflow and downstream demand obtained in the feasibility study. The model of the water balance study is developed by the network river basin simulation software package “MODSIM”¹. The model structure is shown in **Figure 7-1**.

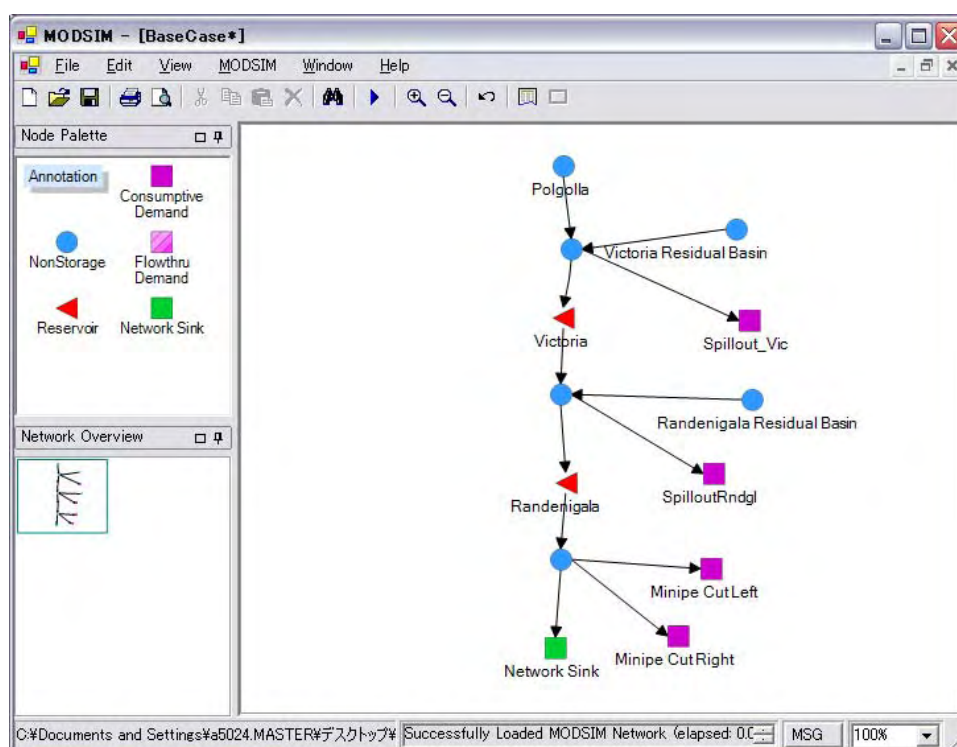


Figure 7-1 Water Balance Simulation Model

The data used in this water balance are:

- Inflow : Monthly Inflow discharge data at Polgolla diversion given by MASL.
- Residual Basin Inflow : Inflow is calculated in proportion to river basin area.
- Demand : Monthly demand quantity of “Minipe Cut Left Bank” and “Minipe Right Bank” given by MASL.
- Spill out : Spill out discharge is the water quantity not used for hydropower generation.

The operation of the Victoria and Randenigala reservoirs and hydropower stations is envisaged as shown in **Table 7-1**.

¹ Labadie, J.W., (2005) “MODSIM: River Basin Management Decision Support System,” Chapter 23 in Watershed Models, V. Singh and D. Frevert, eds., CRC Press Boca Raton, Florida.

Table 7-1 Operation Rule during Construction

	Basic Option	Downstream option	Pumped Storage Option
Victoria	Normal	Hydropower generation considering with irrigation demand	Hydropower generation considering with irrigation demand
Randenigala	Normal	Lowering WL to 209 Generating like run-of-river type	Lowering to 207 mASL. No hydropower generation.

In the simulation of the above water balance, the Randenigala reservoir water level is lowered to the sill elevation as described before. Following **Table 7-2** shows the reduction of the energy by the Victoria and the Randenigala hydropower stations combined.

Table 7-2 Reduction of Energy during Construction

Item	Unit	Basic option	Downstream Option	Pumped Storage Option
Reduction of Annual Energy	GWh/year	0	108	349
Duration of drawdown	year	0	1	1.5
Total reduction of energy	GWh	0	108	524

As shown in the above table, annual energy of the downstream option will be decreased of 108 GWh, and that of the pumped storage option will be decreased by 524 GWh during construction.

7.2 Appendix 2: Road Repairing Costs (RDA estimates)

MS1-005B Patching pot holes of medium, depth of 20-75mm with premix material (site made) using cut back bitumen 10% - 20% @ rate of 83.5 ltr per cu.m of 19 mm and down gauge stone aggregate, including pr. surf - part 2 of the item MS-005

Analysis for 9.29 Sq.m

No	Item Description	Item Ref	Unit	Quantity	Rate	Amount
1	Patching Pothole including Tack Coat	H				
1.01	Labour Semi Skilled (S/SK)	B0-003	Day	1	516.84	516.84
1.02	Labour Unskilled (U/SK)	B0-004	Day	1	474.29	474.29
1.03	Allow 2.5% of Items (1.01, 1.02) for Tools	A			24.78	24.78
1.04	Emulsion -C.S.S.1 (Excluding transp.)	B0-352	litre	6.97	26.1	181.92
Total for			9.29 Sq.m			1,197.83
Rate for			1 Sq.m			128.94
Rate (Say)						903.35 1,084.02 1,214.1024

8. Answers for Annex I of TOR/EIA

8.1

Requirement of TOR

The MASL must have a reasonable water policy to avoid any shortage of D/S irrigation releases for System B and C if the pump- turbine alternatives are implemented. This alternative must be accompanied with the Regulatory reservoir incorporating the pump intake that also serves as the tailrace for the turbine, to avoid possible restrictions of using the active storage of the Randenigala reservoir should have a capacity of approximately 1-2 MCM being the daily peak volume pump back. The minimum operating level of the regulatory reservoir must match the pump intake level.

Further, diversion of the 150-200 MCM off the Mahaweli Basin with the Implementation of the Uma Oya project and the expansion of the Maduru Oya RB are also to be considered.

However, presently about 1200- 1500 MC is being released through Victoria and 2000-2500 MCM passed via Randenigala-Rantambe complex annually. The water rights should be retained with the MASL giving priority to irrigation issues.

Measures by PP

As mentioned in 2.1.5 of EIA Report, the basic option was selected as the most preferable plan for the proposed expansion project. Therefore, the pumped storage option will not be implemented. Hence, this requirement is not relevant to the proposed project.

8.2

Requirement of TOR

Lowering the proposed turbine axis by 5-10 meters with respect to the existing turbine is to be considered. Such a lowering of the proposed turbine axis would not be interfere with the back water of the Randenigala reservoir as it virtually operates far below the FSL for most month of the year.

Measures by PP

The feasibility study team (Study Team) conducted a comparative study on Layout A and Layout B in the downstream option as described during the initial stage of the Comparison Study on the three alternative options.

8.2.1 Layout A;

To avoid any open-air structures located on landslide deposits area, an open-air powerhouse and outlet are installed downstream of the landslide area. The Layout A has longer tunnel length than the Layout B mentioned below.

It is noted that any open-air type structure could not be installed upstream of the landslide deposits area, because there are small valleys on which do not deems suitable to install open-air structures.

8.2.2 Layout B;

Turbine center elevation is EL. 218 m which is 10 m lower than that of the existing facilities to prevent the Randenigla reservoir water level from being lowered during construction of the outlet structure. . A powerhouse is of underground type to avoid the adverse geological condition, but the outlet is located in the landslide area and its sill elevation is EL. 220 m.

It noted that Layout B corresponds to the layout required in Annex I of TOR.

The general plan and profile of “Layout A” and “Layout B” are shown in **Figure 8-1** and **Figure 8-2**, respectively.

The number of generation units is considered as three, and the maximum discharge for generation is 140 m³/s for both layouts in this comparative study.

In order to confine the internal pressure of the water conveyance tunnel, it is required to have enough rock cover above the tunnel roof. For determining alignment of the headrace tunnel, the tunnel alignment is laid on where ground surface elevation is EL. 450 m or higher on the topographic map.

The tunnel length of each layout is shown in **Table 8-1**;

Layout A	Layout B
9.1 km	7.0 km

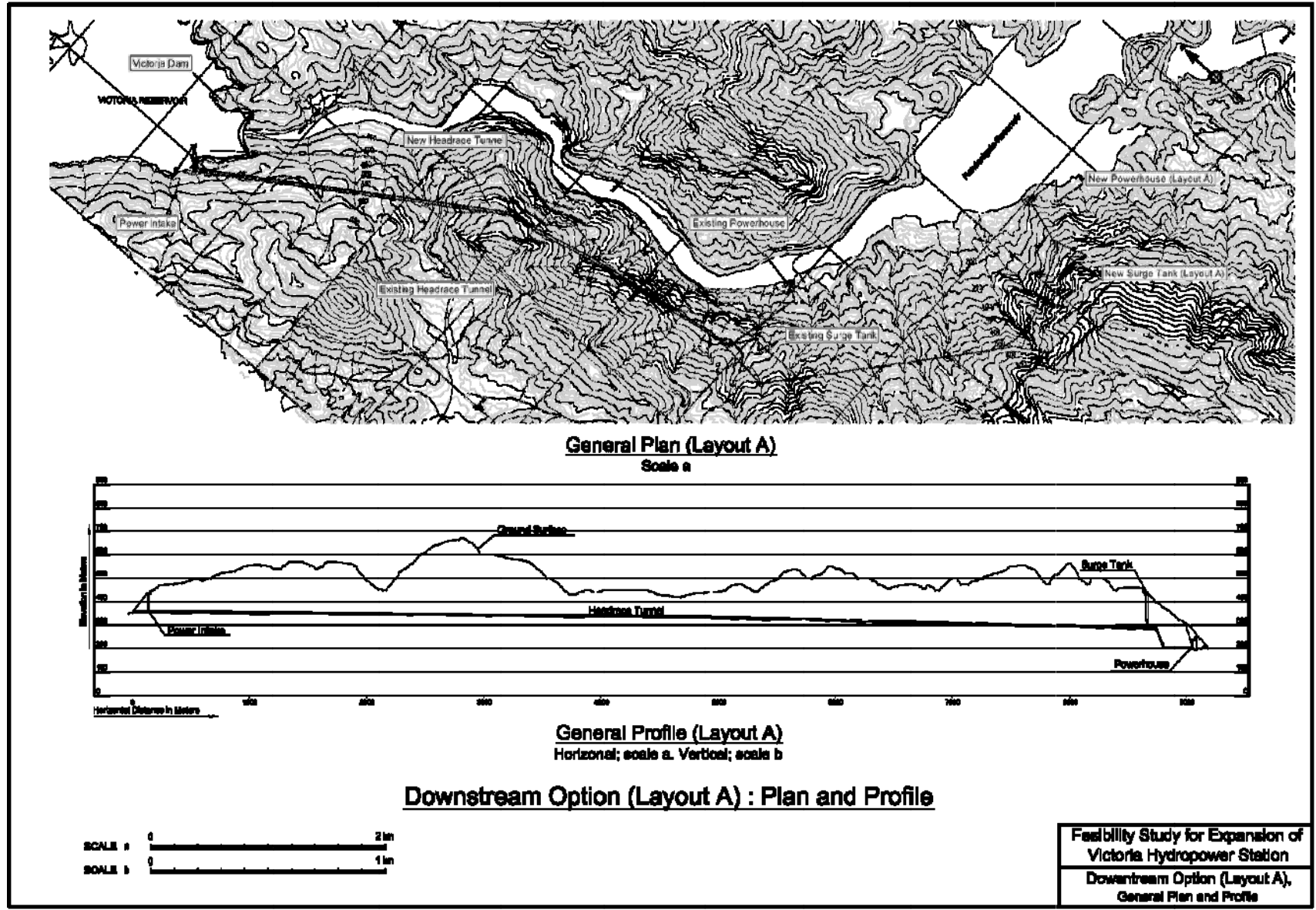


Figure 8-1 General Plan and Profile of Layout A

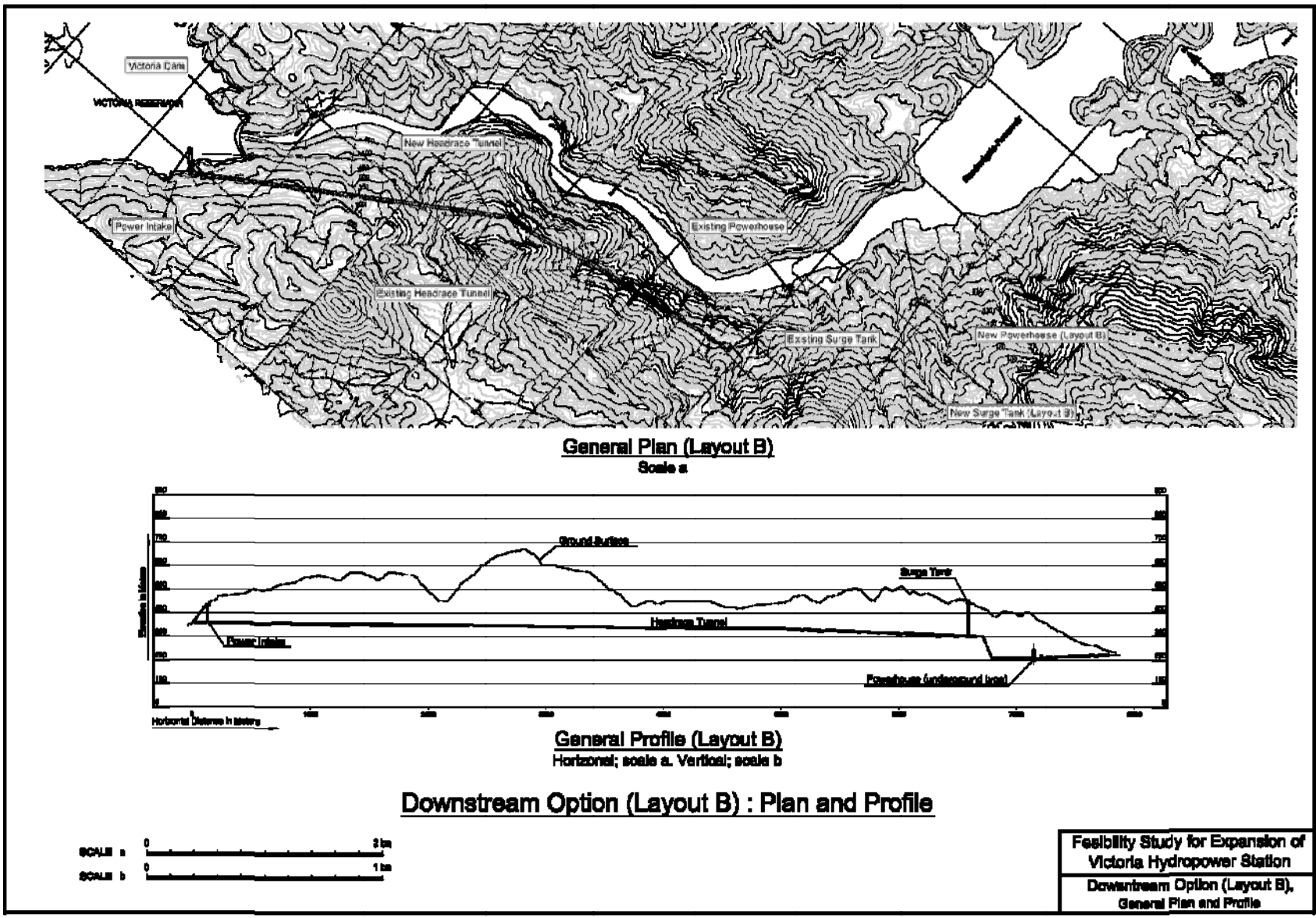


Figure 8-2 General Plan and Profile of Layout B

After that, annual energy and construction cost for both layouts were calculated in the same way mentioned in 2.1.3 of EIA Report. Details of the comparative study are attached in 9.1 of ANNEX VI of EIA Report.

The ratio of the benefit to the cost for “Layout A” and “Layout B” is calculated as tabulated in **Table 8-2**.

Table 8-2 B/C Analysis of Layout A and B

Item	Unit	Layout A	Layout B
Installed capacity	MW	219	225
Benefit	Mill. US\$/year	41	42
Cost	Mill. US\$/year	29	31
B/C		1.42	1.37

As shown in the table, the B/C of “Layout A” is larger than that of “Layout B”. Therefore, “Layout A” is the better to be the downstream option from the economic point of view and compared with the other two options in the feasibility study and in 2.1.4 of EIA report.

8.3

Requirement of TOR

If pump-turbines are installed Randenigala Minimum Operating Level will have to be raised and the MASL will have to face difficulties in using the full active storage of Randenigala.

Measures by PP

As mentioned in 2.1.5 of EIA Report, the basic option was selected as the most preferable plan for the proposed expansion project. Therefore, the pumped storage option will not be implemented. Hence, this requirement is not relevant to the proposed project.

8.4

Requirement of TOR

A full inspection of the Tunnel the Dam and the Power Station by an independent consultant such as the original designers. M/S Gibb is recommended to ascertain any structural problems before construction and after commissioning.

Water tightness of both the existing and the proposed tunnel, after its construction is to be tested and ensured before elapsing of its contract maintenance period.

Measures by PP

It is proposed that the above requirement should be discussed among relevant organizations such as MASL, CEB, etc. during the detailed design stage, because this subject is an important technical

issue for the project implementation and necessary to consider a lot of things such as possibility to stop operating the Victoria Hydropower Station, procedures, time schedule, etc.

9. Optimal Layout of Downstream Option for Comparative Study of Alternative Options

9.1 General

The Study Team conducted the comparative study of the alternative options on a preliminary feasibility study level as specified in the inception report. During the comparative study, the following layouts are examined for the downstream option in consideration of the landslide deposit area shown in **Figure 9-1**;

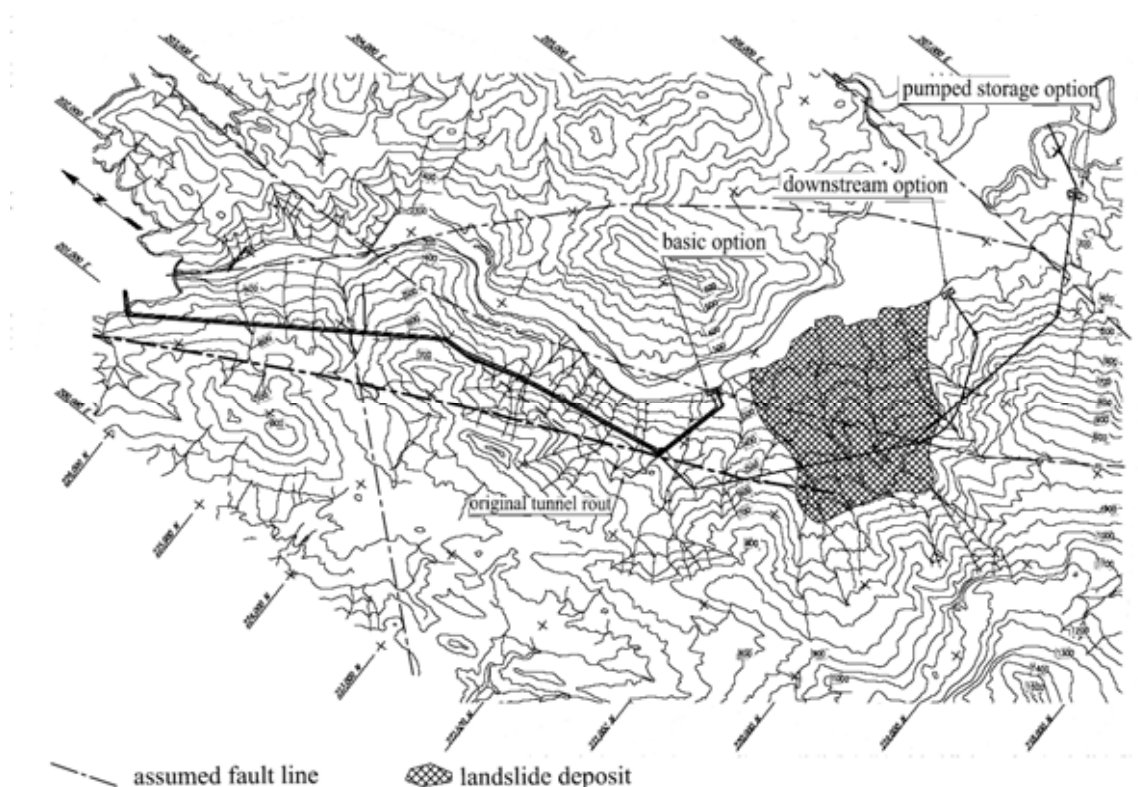


Figure 9-1 Main Geological Structures

9.1.1 Layout A;

To avoid any open-air structures located on landslide deposits area, an open-air powerhouse and outlet are installed downstream of the landslide area. The Layout A has longer tunnel length than the Layout B mentioned below.

It is noted that any open-air type structure could not be installed upstream of the landslide deposits area, because there are small valleys on which do not deems suitable to install open-air structures.

9.1.2 Layout B;

Turbine center elevation is EL. 218 m which is 10 m lower than that of the existing facilities to prevent the Randenigla reservoir water level from being lowered during construction of the outlet

structure. A powerhouse is of underground type to avoid the adverse geological condition, but the outlet is located in the landslide area and its sill elevation is EL. 220 m.

9.2 Scale of Expansion

9.2.1 General Layout

The general plan and profile of “Layout A” and “Layout B” are shown in **Figure 9-2** and **Figure 9-3**, respectively.

9.2.2 Number of Units and Discharge for Generation

The number of generation units is considered as three, and the maximum discharge for generation is 140 m³/s for both layouts in this comparative study.

9.2.3 Tunnel Length

In order to confine the internal pressure of the water conveyance tunnel, it is required to have enough rock cover above the tunnel roof. For determining alignment of the headrace tunnel, the tunnel alignment is laid on where ground surface elevation is EL. 450 m or higher on the topographic map.

The tunnel length of each layout is shown in **Table 9-1**;

Table 9-1 Tunnel Length of Layouts A and B

Layout A	Layout B
9.1 km	7.0 km

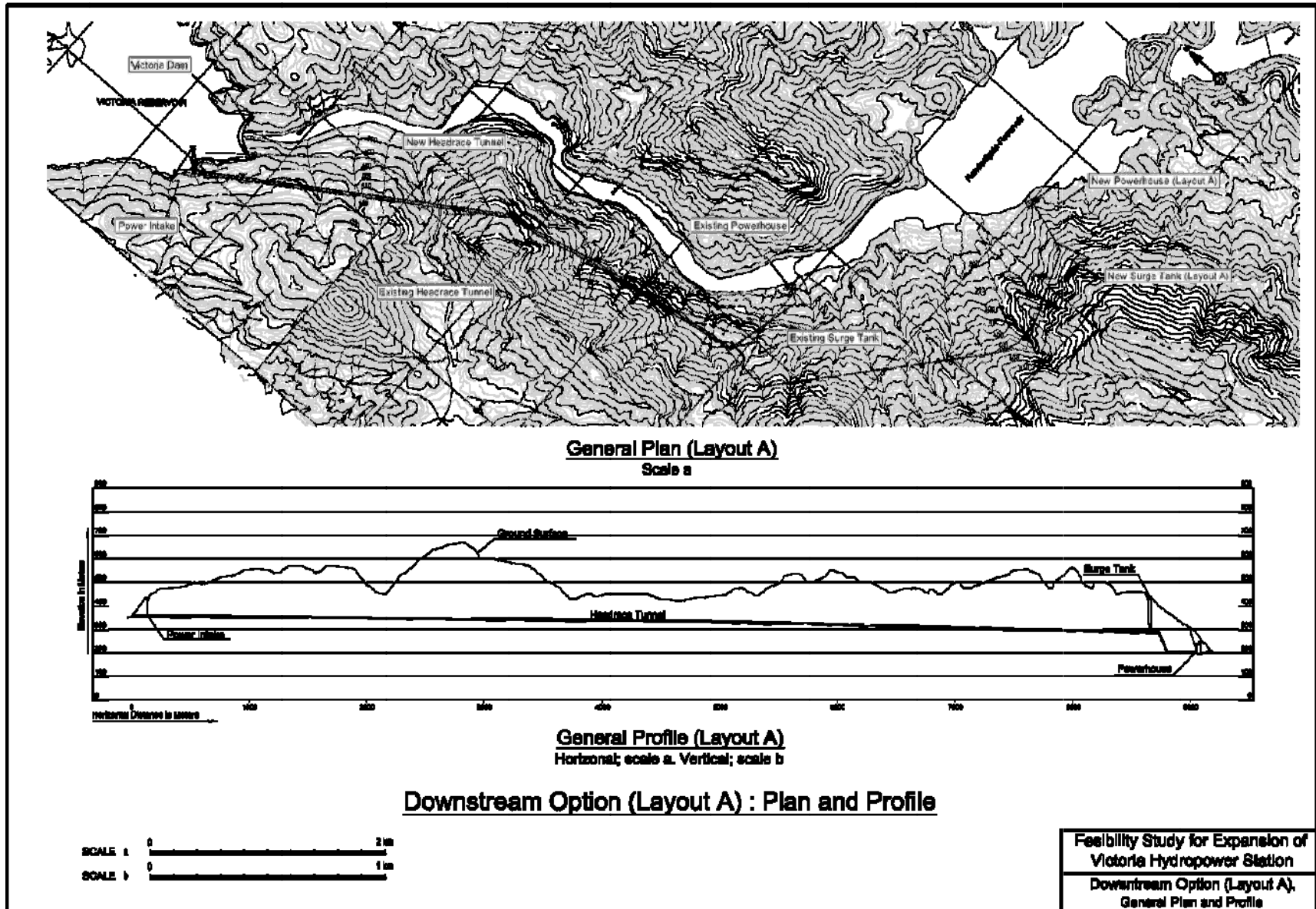


Figure 9-2 General Plan and Profile of Layout A

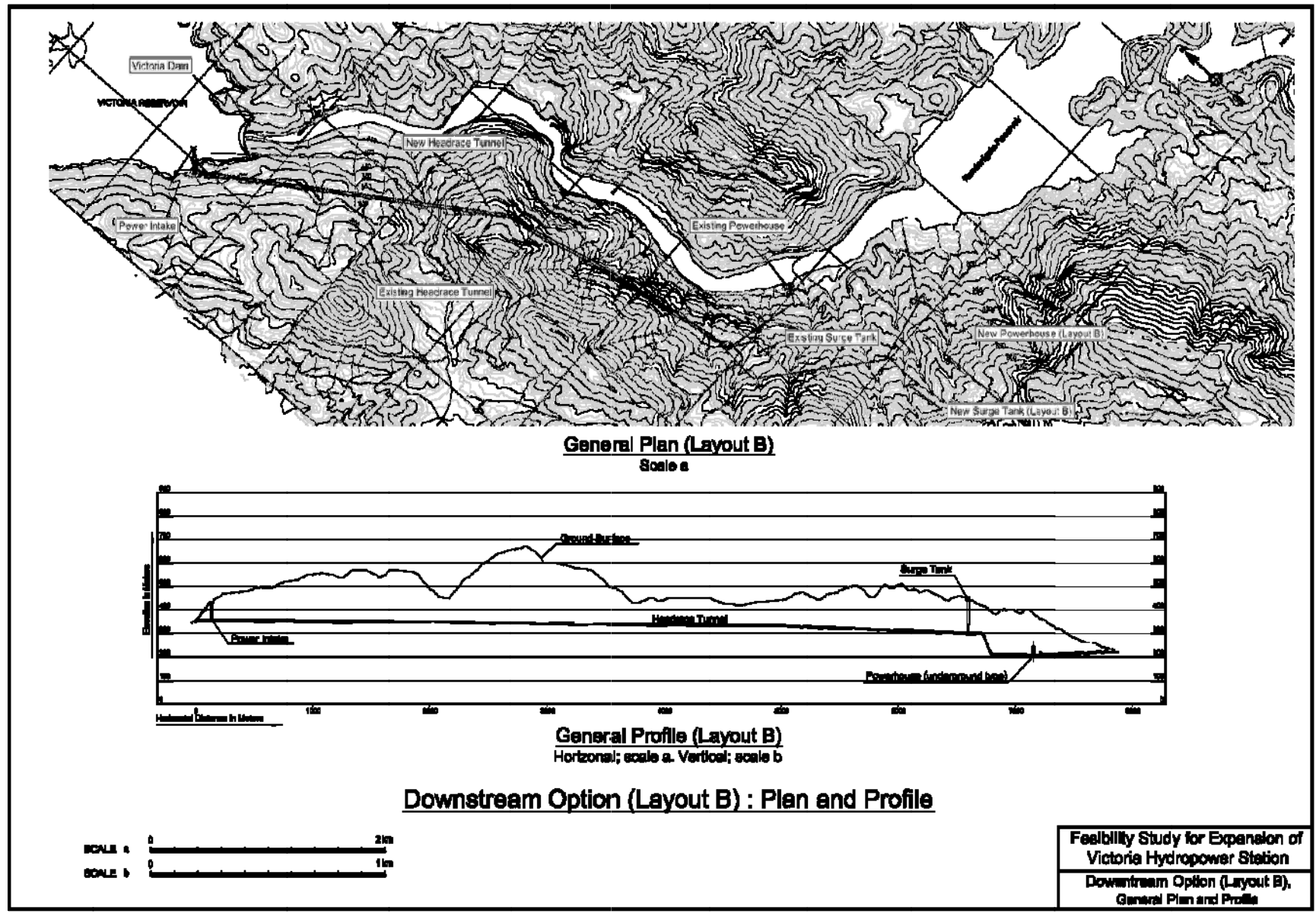


Figure 9-3 General Plan and Profile of Layout B

9.3 Annual Energy

Annual energy for “Layout A” is calculated as 652 GWh/year by the simulation on power generation using monthly inflow data into the Victoria reservoir. The detail of the calculation is given in the **Chapter 6, Feasibility Study for Expansion of Victoria Hydropower Station Final Report (June 2009, JICA)**.

The annual energy for “Layout B” is calculated by using the same data for “Layout A”. The duration of the inflow data used in the power generation simulation is from 1985 to 2006.

The result of the power generation simulation of “Layout B” is shown with that of “Layout A” in **Table 9-2**.

Table 9-2 Annual Energy and Dependable Capacity of Layouts A and B

Option	# of units	Installed Capacity (MW)	Annual Energy (GWh)	Firm Energy (GWh)	Secondary Energy (GWh)	95% Dependable Capacity (MW)
Downstream Option: Layout A	3	219	652	449	203	361
Downstream Option: Layout B	3	225	658	460	198	359

9.4 Construction Cost

The construction cost of “Layout A” is described as the 3-unit expansion of the downstream option in the Chapter 6, the final report of the feasibility study. For “Layout B”, the cost due to lowering the reservoir water level of Randenigala reservoir may not be necessary during the construction, because the sill elevation is EL. 220 m with temporary coffer dam. However, the underground power house necessitates more construction cost than the surface type powerhouse. The estimated cost of “Layout A” and “Layout B” is summarized in **Table 9-3**.

Table 9-3 Project Cost of Layouts A and B

Item	Unit	Layout A	Layout B
		peak duration = 3 hrs	peak duration = 3 hrs
		3 unit	3 unit
Preparatory Works	Mill. US\$	1.96	1.96
Civil works	Mill. US\$	90	109
Equipment & Transmission Line	Mill. US\$	83	81
Environmental Cost	Mill. US\$	3	3
Administration & Engineering Fee	Mill. US\$	17	19
Contingency	Mill. US\$	20	21
Reduction of Energy	GWh/year	108	0
Period of reduction	years	1	0
kWh value by coal	US\$/kWh	0.053	0.053
Cost of reduction of energy covered by Coal power	Mill. US\$	5.8	0
Total construction cost	Mill. US\$	215	236
Total construction cost incl. cost of reduction of energy	Mill. US\$	220	236

It is noted that the total construction cost of “Layout B” is larger than that of “Layout A”. This is mainly due to the increment of construction cost of underground power house.

9.5 Benefit and Cost Analysis

9.5.1 Cost

The benefit and cost analysis is to comparing the ratio of annualized benefit and cost (B/C). The method of the B/C analysis is given in the chapter 6 of the final report of the feasibility study. The annualized cost of “Layout A” and “Layout B” is given in **Table 9-4**.

Table 9-4 Annualized Cost of Layouts A and B

Item	Unit	Layout A	Layout B
		peak duration = 3 hrs	peak duration = 3 hrs
		3 unit	3 unit
1) Additional capacity	MW	219	225
2) Installed capacity including existing units of 210 MW	MW	429	435
3) Dependable capacity	MW	361	359
4) Annual Energy	GWh	652	658
Firm Energy	GWh	449	460
Secondary Energy	GWh	203	198
5) Total Construction cost	Mill. US\$	215	236
Construction cost: civil works	Mill. US\$	90	109
Equipment & Transmission Line	Mill. US\$	83	81
Construction cost: others	Mill. US\$	42	45
6) Construction period	years	5.5	5.5
7) Economic life of hydropower	years	50	50
8) Interest rate	%	10.0	10.0
9) Capital recovery factor	%	10.1	10.1
10) O & M rate for civil works	%	0.50	0.50
11) O & M rate for Equipment & Transmission Line	%	1.50	1.50
12) Annual O & M Cost	Mill. US\$/year	2	2
13) Interest during construction(IDC)	Mill. US\$	47	52
14) Annualized cost: Construction, IDC and O&M: [5) + 13)] × 9) + 12)	Mill. US\$/year	28	31
15) Cost of reduction of energy during construction	Mill. US\$	6	0
16) Annualized Cost of 15)	Mill. US\$/year	1	0
17) Pump-up cost (using coal kWh value)	Mill. US\$/year	-	
Annualized cost: 14) + 16) + 17)	Mill. US\$/year	29	31

9.5.2 Benefit

The benefit of “Layout A” and “Layout B” is calculated by the increment of the benefit to the existing generation facilities. The detail of the method of benefit calculation is given in the chapter 6 of the final report of the feasibility study. The annualized benefit of the both “Layout A” and “Layout B” is shown in **Table 9-5**.

Table 9-5 Benefit of Layout A and B

Description	Unit	Existing	Downstream	Downstream
			Layout A	Layout B
1. Annual Energy	GWh	632	652	658
Firm Energy	GWh	230	449	460
Secondary Energy	GWh	402	203	198
2. Dependable Peak Capacity	MW	210	361	359
3. Power to be Generated (Gas)	MW	248	427	425
4. Energy to be Generated (Gas)	GWh/yr	235	459	470
5. Energy to be Generated (Coal)	GWh/yr	435	220	214
6. kWh-Value (Gas)	US\$/MWh	177	177	177
7. kWh-Value (Coal)	US\$/MWh	53	53	53
8. kW-Value (Gas)	US\$/kW	70	70	70
9. Annual Benefit (Gas) for capacity	Mill.US\$/yr	17	30	30
10. Annual Benefit (Gas) for firm energy	Mill.US\$/yr	42	81	83
11. Annual Benefit (Coal) for secondary energy	Mill.US\$/yr	23	12	11
12. Annual Benefit (Gas&Coal)	Mill.US\$/yr	82	123	124
Increment of Benefit	Mill.US\$/yr	0	41	42

As shown in the table, the benefit of “Layout B” is slightly larger than that of “Layout A”.

9.5.3 B/C

The ratio of the benefit to the cost for “Layout A” and “Layout B” is calculated as tabulated in **Table 9-6**.

Table 9-6 B/C Analysis of Layouts A and B

Item	Unit	Layout A	Layout B
Installed capacity	MW	219	225
Benefit	Mill. US\$/year	41	42
Cost	Mill. US\$/year	29	31
B/C		1.42	1.37

As shown in the table, the B/C of “Layout A” is larger than that of “Layout B”. Therefore, “Layout A” is the better to be the downstream option from the economic point of view and compared with the other two options in the Study.

10. Cracks in the Houses in Hakurutale

CRACKS IN THE HOUSES IN HAKURUTALE



11. Photographs of Some Scoping Meetings in the Impact Area





Scoping Meeting in Adikarigama Temple Sept. 10, 2009



**The local Grama Niladari raising an issue at the Scoping Meeting
in Adikarigama on Sept 10, 2009**