Assessment summaries and management plans

Proposed new plantings by Guadalcanal Plains Oil Palms in Guadalcanal Province, Solomon Islands.

Submitted for review on 4/09/17 by Guadalcanal Plains Oil Palm, part of NBPOL Group.

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Acronyms

ADB	Asian Development Bank
ALS	Assessor Licensing Scheme
ANZ	Australia and New Zealand Banking Corporation
AOI	Area of Interest
BSP	Bank of South Pacific
CG	HCV Resource Network Common Guidance
CHS	Community High School
CPO	Crude Palm Oil
DEM	Digital Elevation Model
DFAT	Department of Foreign Affairs and Trade (Australian Government)
ECE	Early Childhood Education
EIS	Environmental Impact Statement
FFB	Fresh Fruit Bunch
FGD	Focus Groups Discussion
FPIC	Free, Prior and Informed Consent
FSC	Forest Stewardship Council
GIS	Geographical Information Systems
GPPOL	Guadalcanal Plains Palm Oil Limited
GPPOL	Guadalcanal Plains Palm Oil Limited
GPPOWA	Guadalcanal Plains Palm Oil Workers Association
GPRDA	Guadalcanal Plains Resources Development Association
GPRDC	Guadalcanal Plains Resource Development Company Limited
GPSS	Guadalcanal Plains Security Services
Ha	Hectare
HCS	High Carbon Stock
HCV	High Conservation Value
HCVA	High Conservation Value Area
HCVMA	HCV Management Area
IAIA	International Association for Impact Assessment
IUCN	International Union for Conservation of Nature
MID	Ministry of Infrastructure and Development
MOU	Memorandum of Understanding
MP	Member of Parliament
NBPOL	New Britain Palm Oil Limited
PKE	Palm Kernel Expeller
PKO	Palm Kernel Oil
POIG	Palm Oil Innovation Group
RSIPF	Royal Solomon Islands Police Force
RSPO	Roundtable on Sustainable Palm Oil
RSPO	Roundtable on Sustainable Palm Oil
RTE	Rare, Threatened or Endangered

SDA	Seventh Day Adventist
SIA	Social Impact Assessment
SIG	Solomon Islands Government
SIPL	Solomon Islands Plantations Limited
SOP	Standard Operating Procedures
TOR	Terms of Reference
UNICEF	United Nations Children's Fund
WWF	World Wide Fund for Nature

1. Overview and background

A new development is proposed by Guadalcanal Plains Palm Oil Limited (GPP). GPP is an oil palm estate which is owned by New Britain Palm Oil Limited (part of Sime Darby Group) and is located in Guadalcanal Province, Solomon Islands. The proposed development will potentially augment the existing plantations by 2117.57 ha of oil palm plantations and 559.85 ha of HCV/HCS management area, a total potential development and conservation area of 2677.42 ha.

1.1 Overall location

The project is located east of Honiara in the West Ghaobata, East Ghaobata and East Tasimboko Wards. It is roughly bounded within the following coordinates (160°8'42.893"E/9°24'34.395"S and 160°16'57.046"E/9°31'10.625"S).

Guadalcanal Province includes the largest island in Solomon Islands and its smaller associated adjacent islands cover a total land area of 5340km2. The western and eastern most proposed development within the project are 13km and 35km from Honiara respectively along the main Guadalcanal Plains road.

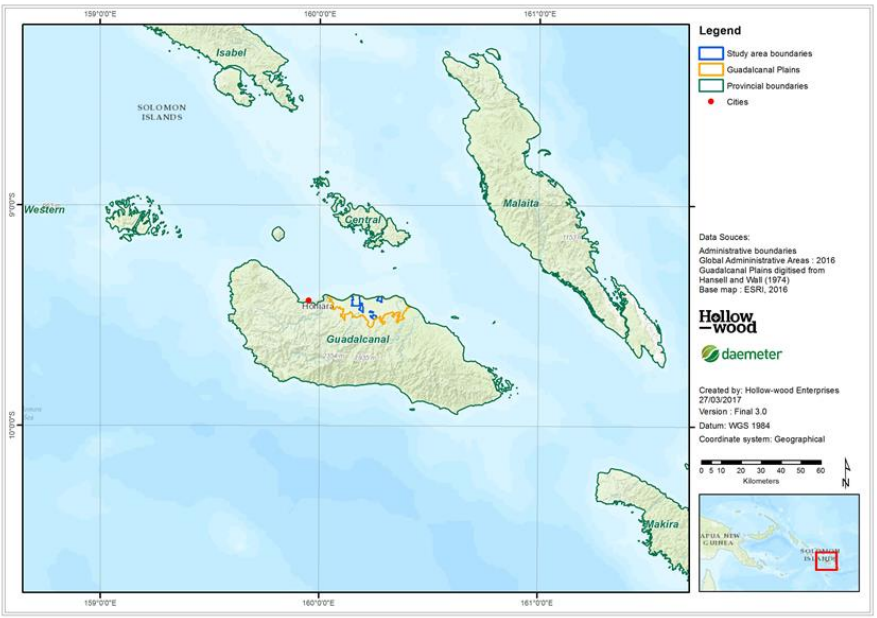


Figure 1 Overall assessment areas

1.2 General physical description land scape

The proposed areas are located on the Guadalcanal Plains in Guadalcanal Province at the south-eastern end of the Solomon Islands chain. The study areas broadly bounded by the Tenaru River in the west, the Mbokokimbo River in the east, the foothills of the southern mountain range forms the southern boundary and the northern coast of Guadalcanal, bordering the Pacific Ocean forms the northern boundary. Almost all of the study areas assessed for this project fall within the 'northern plains' physiographic region, as defined by Hansell and Wall (1974). The climate of Guadalcanal is described as 'tropical maritime', with the area being one of the wettest places in the humid tropics (Whitmore, 1969). The climate has a distinct seasonality that is determined not by temperature, but by changes in predominant wind direction and the associated rainfall patterns (Mueller-Dombois and Fosberg, 1998). During the months between April and November, south easterly trade winds are dominant in the area and interact with local topography to produce distinct rainfall patterns. During such times, the windward or 'weather' coasts experience a peak in rainfall, receiving between 3000 and 5000 mm, whereas the leeward sides of mountain ranges experience a pronounced dry period,

receiving between 1000 and 3000 mm (Mueller-Dombois and Fosberg, 1998; Whitmore, 1969). The pronounced dry period, or rain shadow, has formed the northern plains of Guadalcanal as a distinctive landscape feature, and represent the only area within the Solomon Islands (and much of the tropical pacific) where extensive alluvial plains have developed (Hansell and Wall, 1974). These plains are generally of slight relief and low elevation and stretch from the Lungga River in the west to Kaoka Bay in the east. The northern draining rivers within this landscape have incised channels between 5 and 6 m, leaving broad terraces between (Hansell and Wall, 1974).

1.3 Description of proposed areas

There are 6 separate areas that are currently being proposed for new development. The areas were chosen because of their current land cover is mostly grassland, they are close to existing NBPOL plantations and the landowners have expressed an unsolicited voluntary interest in developing these lands into oil palm plantations as a joint venture with NBPOL.

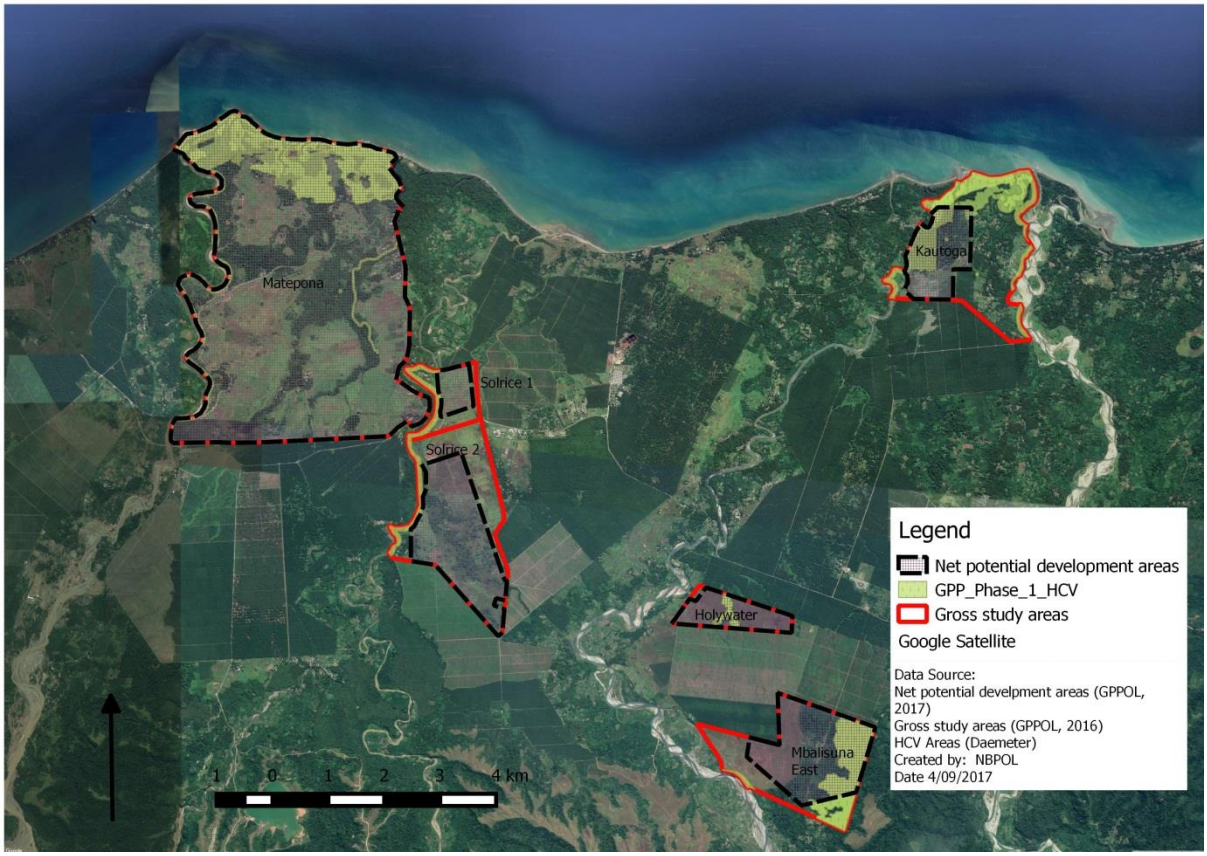


Figure 2 Gross assessment areas and net potential development areas

Note that the overall areas assessed are greater than the areas proposed for development. This is due to the iterative FPIC process utilized and the results of the feedback from the landowners resulting in the specific areas of their land they want to convert into oil palm plantations. Because the landowners participated in all the baselines studies: SEIA, HCV, HCS they were informed of the outcomes of this and the implications for land use potential that the safeguards represents. The safeguards include areas not available for conversion because of their High Conservation or High Carbon Stock values and “community use” areas that the land owners wanted to keep available for food production and housing. The resulting areas reported on in this New Planting submission are those that landowners have offered for development. They represent their Free and Prior Informed decision on what areas they would like NBPOL develop in a joint venture with them.

2. Assessment process and methods

2.1 Process overview

As explained, the process applied in this NPP varies from the New Planting Procedure as the final areas proposed for development is a subset of the total areas assessed. This approach is required due to the land tenure and resulting land acquisition process in Solomon Islands. In Solomon Islands concessions are not granted by the government, rather land development is authorized by the recognized indigenous landowners. The first and last decision on land use is made by the indigenous land owners. As such when they gave their first expression of interest it was only an indication of the potential area for development. Once the entire FPIC process was conducted, a process that took over a year to complete, the landowners had a better understanding of the social and environmental safeguards that NBPOL respects. As a result of this process, they made an informed decision on the lands they wanted to include in this submission.

In order to clarify that the current approach is the best option for the land tenure in Solomon Islands, a brief clarification follows. The basis studies, SEIA, HCV, HCS, LUCA and Soil Suitability studies cover a larger area than currently proposed. They have all been conducted to the highest standard and in compliance with the current New Planting Procedure. This approach allowed landowners to fully appreciate the advantages and disadvantages of following this best practice approach and make an informed decision on those areas they would like to convert into oil palm plantations. These areas also include some conservation areas as identified in the previously mentioned assessments. The Management Plans and Carbon Stock/Emission statements are restricted to these areas as these are the areas they will transfer land rights and management control over. Note however that this proposals also includes one area (Matepona) that may be developed by smallholders. These are areas which have no constraints but in which the landowners themselves have indicated they have yet to decide where and how much oil palm they want to plant. Smallholders in Solomon Islands are essentially independent but as they are not able to afford the cost of the required assessments they have the advantage of utilizing the results of this submission.

2.2 Scope

As mentioned above, the scope of the current submission is a subset of the entire area which was covered in the original baseline biophysical and social impact studies as required under the current New Planting Procedure[1]. This approach is utilized because in the Solomon Islands and much of the rest of Melanesia, concessions are not granted by the government and authorization to develop land must come from the indigenous landowners. In Solomon Islands indigenous traditional land rights are recognized in the Constitution. As such the first and last authorization of the process of conducting a feasibility study to transferring temporary land user rights for an oil palm development lies entirely with the traditional landowners and is guided by their traditions. The FPIC process allowed them to understand the full implications of the development and the current submission is an expression of their desired development option. In recognition of this the current NPP covers only a subset of the entire study area of the original biophysical and social impact studies that were carried out as per the current New Planting Procedure. The following table summarises the areas included in the original studies and the current submission:

[1] As approved by the RSPO Board of Governance November 2015

Table 1 Scope of baselines assessments and current submission

AOI	Area assessed in baseline studies (ha)
Holy Water	102.06
Kautoga	473.80
Matepona	1980.36
Mbalisuna East	388.04
Solrice 1	458.75
Solrice 2	102.58
Grand Total	**3505.58**

Table 2 Areas made available by landowners for development (conversion) and conservation

AOI	Potential development (ha)	Conservation (ha)	FY 18/19	FY 19/20	FY 20/21	FY21/22
Holy Water	87.69	10.98				
Kautoga	60.31	49.10				
Matepona	1429.89	425.74				
Mbalisuna East	201.76	74.03				
Solrice 1	45.71	0.00				
Solrice 2	292.21	0.00				
Grand Total	**2117.57**	**559.85**				

Note that with the exception of Matepona these will be leased to NBPOL and all the management control handed over to NBPOL. For Matepona, the areas that have been earmarked as **not** containing High Conservation Values or High Carbon Stocks will be developed at a pace decided by the relevant land owners. All development on this land will respect the outcomes of the NPP studies. The High Conservation Management Areas and the High Carbon Stock Areas will remain under management control of the landowners of Matepona and thus are not included in the Management Plan recommendations of this NPP.

2.3 Dates assessments were conducted

The main assessments (SEIA, HCV, and HCS) were conducted between September2016- August 2017. While the bulk of the field work and data collection was completed by December 2016 there was a required follow up period for the HCV peer review process which took until June 2017 to complete. The HCS/GHG work under the High Carbon Stock Approach requires a completed HCV assessment as such this was only completed once the HCV study was available. An important input to the HCS process was the participative mapping of "community use areas" to be enclaved from the analysis. With this the HCS was completed in August 2017. All of the supporting studies, Soil Suitability Study and Land Use Change Assessment were completed within this same time period. The Green House Gas assessment, which complements the HCS was finalized last, so as to reflect just the areas being proposed for development in the current submission. A table of all the assessment time lines and participative descriptions is included in Annex 1.

2.4 Assessors and FPIC experts and their credentials

2.4.1 HCV Team

Jules Crawshaw is the report writer on the Daemeter team. He is the Senior Forestry and System Manager at Daemeter. He worked as a private consultant in forestry since 2010, conducting various

work such as REDD project and other sustainability projects in forestry. He has a Master Degree in Business Systems from Monash University and a Bachelor of Forestry Science from University of Canterbury. He has been working in forestry since 1987. Jules is an ALS fully licensed HCV assessor (ALS14006JC) and has conducted field work and written reports for in excess of 30 HCV studies throughout Indonesia, Malaysia, Myanmar, PNG and Solomon Is. In all assessments he has either led or taken part in both the biodiversity and social assessments. He was also responsible for Reporting, Mapping & Project Coordination. He has worked on the HCVRN Quality Panel as an auditor.

From 2008 to 2010 he worked for APRIL Group as Strategic Planning Manager in Riau Andalan Pulp & Paper. Jules Crawshaw received 1st place in the NSW Premiers Award for Business Management and Financial Performance in 2005 and also received FNSW CEO Commendation for Management of the Carbon Project in 2006.

Mellie Musonera is a Conservation Biologist from Papua New Guinea (PNG). He has been working as a freelance consultant since 2013. He has a Masters Degree in Conservation Biology from the University of Kent, an Honours Degree (First Class) and a Bachelor of Science in Biology from the University of Papua New Guinea. He has been working as a Conservation Biologist since 2005.

Mellie has worked on four HCV assessments so far and has conducted rapid assessments on birds, mammals, amphibians and reptiles. From 2009 to 2011 he worked as a staff Conservation Biologist with the Wildlife Conservation Society - PNG Program. He covered projects including REDD, biodiversity assessments and research into the endemic Admiralty cuscus in Manus Province, PNG.

Mellie was awarded a Chevening Scholarship to study for a Masters Degree in the United Kingdom in 2008.

Sander van den Ende is a forester by training who has worked in conservation, forestry and oil palm for over 15 years. Sander received a BSc in Plant Ecology from the San Francisco State University in California and subsequently a Masters in Tropical Forestry from the Wageningen Agricutural University in The Netherlands. He has worked to improve the environmental performance of the forestry and agriculture industry in African Latin America, SE Asia and Papua New Guinea/Solomon Islands through integrating conservation science and best practices within the industry and putting this into production systems through the use of credible certification standards like the FSC and RSPO.

Regina Gatu Pokana is the Sustainability Manager for Guadalcanal Plains Palm Oil Limited as of July 2016 till now but was with GPPOL since April 2013. She was recruited as the Community Liaison and Counsellor for GPPOL and got promoted in July. She graduated with a BA Arts in International Community Development and BA Honours in Sociology from University of Victoria, Melbourne in 2013. She has been with the Community Development Sector for the past 20 years, working for NGO and the Government Sector in the development of the National Youth Policy and the Solomon Islands Provincial Youth Policies in all 9 provinces. She was part of a team that did an analysis Youth Situation under the auspices of AusAid in 2002/2003, throughout the Solomon Islands. Was the Solomon Islands Regional Youth Representative from 2002 to 2005 to the Commonwealth Youth Program. Worked as the Head of Department for Youth, Women, Children and Sports for Honiara City Council 2003 to 2005. From 2005 to 2009 was the Youth Adviser for the Community Sector Program an AusAid funded project.

2.4.2 HCS/GHG Team

Michael Hansby is a forester by profession and owns a consultancy specialising in forest inventory and remote sensing. Michael has a Bachelor degree in Forest Science from the Australian National University and a Post Graduate Diploma in Bushfire Management from the University of Melbourne.

Michael has over 10 years' experience in vegetation assessment in a range of forested ecosystems, including the temperate wet forests of Victoria and NSW and the tropical forests of the Solomon Islands, Papua New Guinea and Cambodia. Michael has worked in Australian native forestry (specialising in native forest silviculture), fire management planning and more recently has conducted High Carbon Stock Approach (HCSA) assessments in Papua New Guinea and the Solomon Islands.

2.4.3 SEIA Team

Mike Finlayson has post-graduate qualifications in economics and more than 20 years' experience as a development specialist in Australia, Asia and the Pacific. Mike worked with NBPOL appointed staff. In the last decade Mike has focused on Social Impact Assessment (SIA) of large-scale resource projects and has led teams or participating in over 12 feasibility studies mining and gas projects through Oceania and SE Asia in the past decade. Mike has also undertaken social impact assessment work in the preparation of mine closure plans for 3 of the biggest mine closures in Papua New Guinea. Mike participated as a technical (social) expert in 23 RSPO audits for the BSI Group in PNG (2009 to 2014), Solomon Islands (2010 to 2013) and Indonesia (2010). Mike has also completed research in the Solomon Islands for the Asian Development Bank and AusAID on landowner benefit sharing arrangements (2016) and rural livelihoods (2009), respectively.

2.5 Methods used for conducting assessments and for conducting the FPIC process

2.4.1 Basic methodology with reference to FPIC

All of the studies were conducted using the highest industry standard which incorporate FPIC as best practice. The following methodologies were utilized for each study:

HCV: The HCV assessment utilized the HCV Resource Network Common Guidance for identifying HCVs across different ecosystems and production systems. Currently there is no HCV Toolkit available for the Solomon Islands. The HCV assessor is licensed by the Accredited Licensing Scheme www.hcvnetwork.org/als/assessor-profile/288 .

HCS: The HCS assessment was carried out within the auspices of cooperation with the Tropical Forest Trust (TFT) and utilized the High Carbon Stock Approach http://highcarbonstock.org/ as its guidelines.

SEIA: The SEIA was conducted by a very experienced assessor in line with best practice principles including: assessing direct, indirect and cumulative impacts; acknowledging that social, economic, cultural and environmental impacts are interconnected and cannot be treated in isolation; promotes an open, transparent and participatory process, giving due consideration to women and any vulnerable groups; providing information unique to each potential expansion site to help ensure community aspirations and concerns, and site-specific impacts, are identified and incorporated in the assessment; providing a focus on social impacts, both positive and negative, that are most significant in the eyes of impacted stakeholders; and specifying management strategies to enhance positive impacts and minimise negative impacts.

2.5.2 FPIC in Solomon Islands

Due to the nature of land tenure in Solomon Islands the entire approach for acquiring land rights and maintaining long term security over the investment on that land requires the full participation and consent of the traditional land owners. An important starting point is a requirement that all

proposed expansions result from the unsolicited expressions of interest from the landowners. Landownership is verified through local knowledge, which comes naturally as all the proposed areas are close to existing operations. The matter of ensuring the rightful landowners are identified and that all parties with rightful ownership are duly informed is a must so as to secure the long term investment required for agriculture. This includes consulting all sectors of these communities a process which necessarily takes time. These landowners are also very familiar with oil palm as crop as they are from within a landscape in which oil palm has been a long established fixture. Many of the landowners of the proposed expansion areas are shareholders in the existing plantations.

To put this into context a brief explanation of the history of oil palm in the Guadalcanal Plains is warranted. Large-scale planting of oil palm on the Guadalcanal Plains commenced in 1971 by Solomon Islands Plantations Limited (SIPL), a joint venture between the Commonwealth Development Corporation (80%), Solomon Islands Government (18%) and customary landowners (2%). Land had previously been acquired by the Solomon Islands Government (SIG) and was leased to SIPL for a period of 75 years. Oil palm production commenced in 1973 and continued until 1999, when the mill and other infrastructure were destroyed during the tensions, which continued until 2003. In 2004 NBPOL negotiated with the customary landowners for oil palm production to recommence. GGPOL was established, in which an 80% share was held by NBPOL and a 20% share held by five clans represented by GPRDA. GPPOL rehabilitated the mill and progressively increased the area of oil palm under estate management and by out-growers.

2.5.3 SEIA Methodology

The SEIA was implemented in line with best FPIC practices. All of the findings are reported in the SEIA and included in their reported recommendations for mitigation measures, management and monitoring of identified impacts. In line with best practice principles, the SEIA:

- Includes direct, indirect and cumulative impacts;
- Acknowledges that social, economic, cultural and environmental impacts are interconnected and cannot be treated in isolation;
- Promotes an open, transparent and participatory process, giving due consideration to women and any vulnerable groups;
- Provides information unique to each potential expansion site to help ensure community aspirations and concerns, and site-specific impacts, are identified and incorporated in the assessment;
- Provides a focus on social impacts, both positive and negative, that are most significant in the eyes of impacted stakeholders; and
- Specifies management strategies to enhance positive impacts and minimise negative impacts, and incorporates these into GPPOL's existing Social Impact Improvement Plan.

The SIA has been undertaken in close consultation with GPPOL and aims to utilise and contribute to the fullest extent possible, to GPPOL's stakeholder engagement and social management processes.

Key steps in the preparation of the SIA are described below:

- Identify individuals, communities and representative organisations that may be impacted by or have an interest in the project;
- Summarise the lifestyle and standard of living of people in the Study Area;
- Describe the activities of other stakeholders in the Study Area;
- Review the impact that oil palm has had on local communities since GPPOL was established;

- Predict the social impacts that the project will have in the Study Area (considering each potential site separately, if necessary) and at national and provincial levels and at different stages of the project;
- Identify and estimate the likely social impacts that other foreseeable projects or changes will have in the Study Area during the life of the project;
- Provide suggestions to maximise the positive impacts and minimise any negative impacts of the project;
- Provide suggestions on how social impacts may be monitored and managed to promote continuous improvement; and
- Involve local communities and other stakeholders in the identification of social impacts and social management plans, and document their attitude and any concerns towards the project.

GPPOL has a list of stakeholders for its current operations and follows a procedure for identifying and consulting with landowners for any new development. The key stakeholders and a summary of the stakeholder consultation are summarised including a summary of the response by different stakeholder groups to the proposed expansion of oil palm. A list of people consulted during the preparation of the SEIA is also presented in the SEIA.

2.5.4 HCV Methodology

Participative Approach

Using the HCV Resource Network Common Guidance as a reference, questions were prepared for meetings at the village level to evaluate the dependency of community members on natural ecosystems to fulfil their basic needs (HCV 5) and identify any important cultural sites (HCV 6).

In total, eight meetings were held in villages within the assessment area. In each interview a general introduction to the purpose and context of HCV was made. This was followed by a Focus Group Discussion (FGD) in order to collect data on social and cultural aspects. The FGD approach is an effective way to collect information on social and cultural dimensions of village life in an informal setting that permits discussion and exchange of ideas between group members. The interviews all took place in a mix of English and Pidgin. Company representatives attended to act as translators and assist with clarifications.

Following the results of the HCV assessments, interviews regarding the results of the HCV assessment were conducted by Hollow-wood between the 5th and the 8th of December 2016. These aimed to socialise the findings of the HCV assessment and provide an independent forum for discussion of any issues with the stakeholders relevant to each of the AOI's.

All of the outcomes of stakeholder consultation are reported in the HCV report. Where outcomes have resulted in HCVs identified these have been reported and included in the HCV management and monitoring recommendations.

Methods used during assessment

Secondary Data Collection

Secondary data was collected and analyzed (including an assessment of its spatial accuracy) during the planning phase of the assessment, as summarized below.

Land Cover
Land Cover mapping within each of the assessment areas was based on high resolution, drone captured aerial imagery. Land Cover mapping in the broader landscape was derived from image classification of both 2001 Landsat 7 and 2016 Landsat 8 imagery.

Ecosystem Mapping
For the identification of HCV 3 (*Rare, Threatened or Endangered Ecosystems*), the land system and vegetation type mapping undertaken by the Land Resources Division, United Kingdom (Hansell and Wall, 1976) was used as a proxy for ecosystems.

Species Data
Secondary data on species potentially present in the assessment area based on known distribution and habitat use were extracted from publications, field guides and supporting data. For **vegetation**, there is no publicly available field guide to the flora of the Solomon Islands. Field identification of target species was made by the compilation of various online resources; this included the online herbariums 'Flora of the Solomon Islands' (http://siflora.nmns.edu.tw) and the joint project between the National Herbarium of Papua New Guinea and the National Herbarium of New South Wales (http://www.pngplants.org), both provided critical information regarding target species identification. Additional searches were made of the IUCN Red List and CITES.

For **birds**, a check list of birds that would likely be present in the assessment area was compiled. The key references for this are Hadden, 2004. Dutson, G. 2011. A similar method was used for **mammals**, the key reference being Flannery, 1995.

Social Cultural Data
Secondary data for the assessment of HCV 5 and 6 were available from SIAs and Interim HCV Assessment reports provided by the company. These described a range of social and economic classes, livelihoods, and village infrastructure. This was augmented by mapping of village locations from satellite imagery.

Primary Data Collection

Plant Surveys
Remaining natural forest (as defined by satellite imagery and land cover analysis) were surveyed using a rapid assessment method that relied on informal transects. Forest health and structure are assessed and utilized as useful proxies indicating the potential presence of HCV habitat. This was informed by previous work done for the HCS plots and the vegetation cover classification that resulted. Rapid, semi-structured plant observations were made of trees and juvenile regeneration in all the forest areas within the assessment area.

Mammal Surveys

Mammal species were mainly identified by talking with the GPPOL employees and the local villagers who were invaluable in providing information of extant mammals in their area based on their past experience. Day walks were taken through the concession areas and were designed to maximize observations within various forest strata and to facilitate access via existing track and roads.

Bird Surveys

In surveying birds, the point count method was employed where the observer walks along a designated path - in this case it was mostly existing tracks or roads through the concession areas - and pause for five to ten minutes at regular intervals.

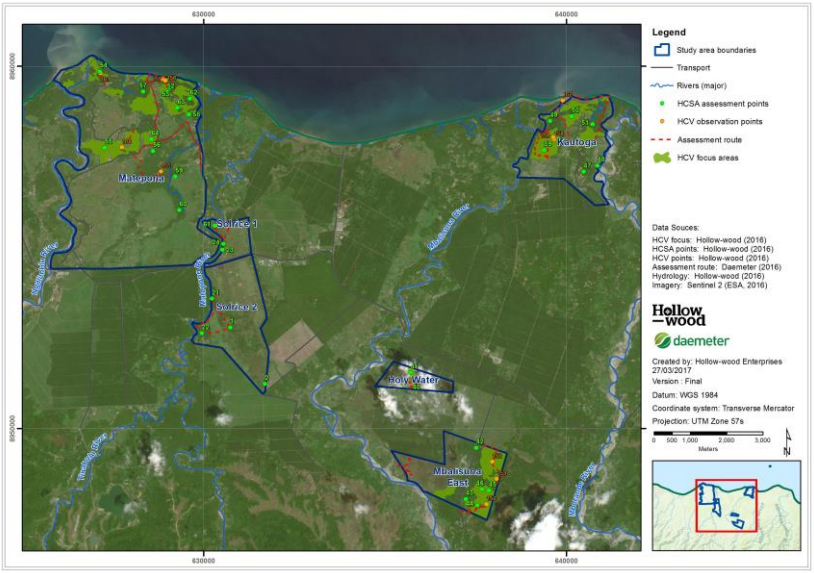


Figure 3 HCV Assessment Plots

Reptiles

In surveying for Reptiles, night walks were taken in two of the concession areas namely: Mbalisuna East and Kautoga while the rest of the other areas opportunistic sightings were done during the day simultaneously with surveys of birds.

Social and Cultural Surveys to Assess HCV 5 and 6

Using the CG as a reference, questions were prepared for meetings at the village level to evaluate the dependency of community members on natural ecosystems to fulfil their basic needs (HCV 5) and identify any important cultural sites (HCV 6).

In total, eight meetings were held in villages within the assessment area. In each interview a general introduction to the purpose and context of HCV was made. This was followed by a Focus Group Discussion (FGD) in order to collect data on social and cultural aspects. The FGD approach is an effective way to collect information on social and cultural dimensions of village life in an informal setting that permits discussion and exchange of ideas between group members. The interviews all took place in a mix of English and Pidgin. Company representatives attended to act as translators and assist with clarifications.

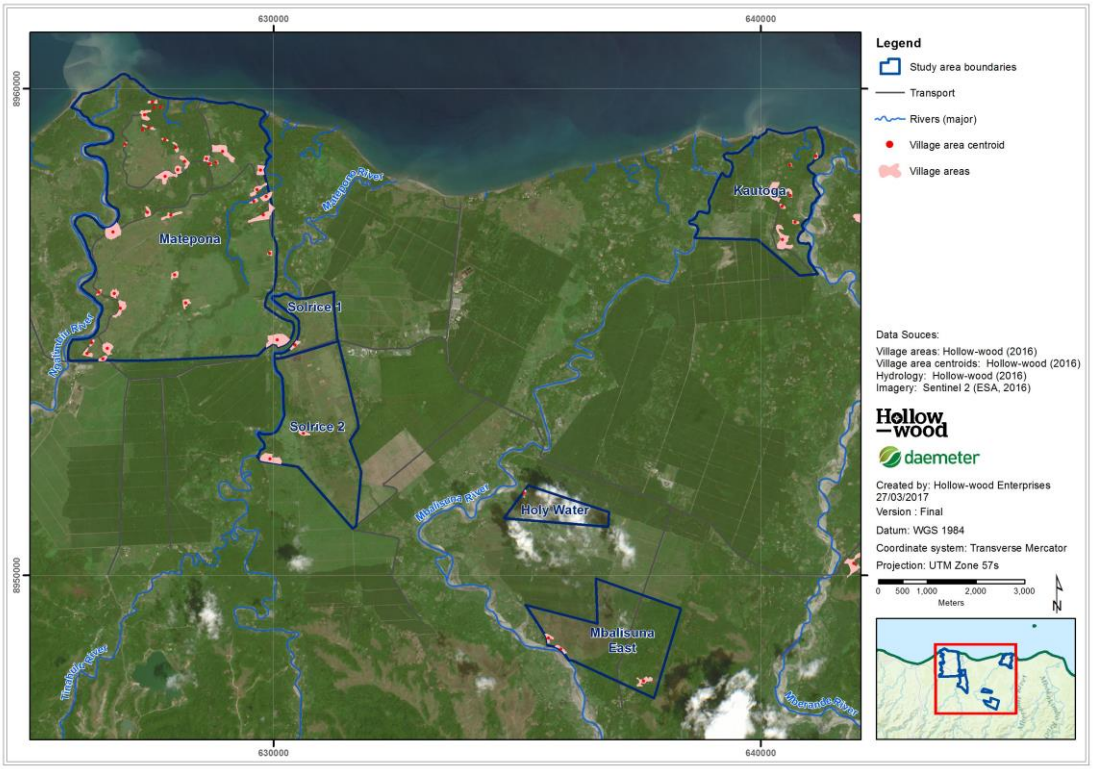


Figure 4 Maps of village and garden areas

The mapping of garden areas was mapped from satellite imagery. This shows the sheer number of villages in the assessment area.

2.5.5 HCS Methodology

Participative Approach

The HCS methodology followed by TFT is outlined in the toolkit found here: highcarbonstock.org/the-hcs-approach-toolkit/. This Toolkit has been developed by the HCS Approach Steering Group which includes has extensive FPIC guidance http://highcarbonstock.org/wp-content/uploads/2017/05/HCSA-Toolkit-V2.0-Module-2-Social-requirements_020517.pdf which was consistently implemented in this assessment.

The HCS assessors understand the need to engage with local community and land owners prior, during and post field work to inform them of the HCS work and possible outcomes, to request their involvement in providing access to their lands and to identify social values, rights, livelihoods and forest uses through participatory mapping for inclusion within the HCS Land Use Plan.

Prior to HCS assessor arrival on the 9-June-2016, GPPOL staff led by Regina Pokana (Sustainability Manger) carried out community awareness about the proposed oil palm development and the objectives of the HCS assessment at all study sites.

As HCS field assessors carried out the vegetation sampling they were accompanied by appropriate GPPOL staff that were familiar with local community and land owners, to introduce the HCS field teams in close proximity prior to field work. HCS field teams felt welcome by the local community and not unexpected throughout their work.

During this field work TFT/Hollow-wood assessors took initial observations of the social values, rights, livelihoods and forest uses, however this was not the focus of this initial visit and is not reported upon in detail here. The plan was that these initial observations and preliminary HCS map would help inform the GPPOL company led community engagement/FPIC procedure, as well as the SIA and HCV assessment with external consultants.

The FPIC, SIA and HCV activities will carry out the necessary HCS related community engagement and participatory mapping. Michael Hansby will be present on the HCV assessment and will also support the completion of HCS related community engagement/FPIC during this field work.

A full summary of the community engagement/FPIC activities and findings will be provided in the HCV-HCS Integrated Report, and full details within the HCV, SIA and FPIC meeting and participatory mapping records that are being collected by the GPPOL staff.

In order to ensure a fully informed process which represents the interests of the communities the following was undertaken:

- Understanding of the spatial extent of land ownership and land use within each of the study areas. Where community land boundaries extend beyond the study areas, it is also expected that land ownership and land use is also mapped, to fully understand the impact of the development on the community and the surrounding landscape.
- Documented evidence of how and when FPIC has been conducted. This needs to include meeting minutes that show the location, time and attendees of any FPIC information session that has been conducted.
- The completion of a 'preliminary social baseline study' that will provide an understanding of the current situation present within villages in the study areas.
- The identification of areas that are critical to basic community needs and those areas that may support current and/or alternate community livelihoods. Such areas (e.g. area needed for gardening) need to be captured spatially. Hollow-wood will can assist in the digitising of marked up maps if necessary.

Estimating Carbon Stock

This section outlines the methodology used for the various components of the HCSA assessment, including the initial land cover analysis, field inventory methods and the method developed for aerial photograph interpretation of the U.A.V sourced aerial imagery, and the methods used to analyse the data collected during field inventory.

Image analysis.

The initial area of interest for this assessment was a series of polygon boundaries supplied to Hollow-wood by GPPOL. A collaborative approach was adopted to ensure that the final assessment areas were mapped to logical, natural features such as rivers, roads, ridgelines and coastlines. A detailed mapped extent of the final assessment areas can be seen above in Section 1.7.

Freely available satellite derived data being utilised for the initial land cover classification. A serious constraint when working in tropical latitudes is the issue of cloud cover. All attempts were made to utilise cloud free images, but the nature of image classification / interpretation when working in such environments is that this can be difficult and at times not possible.

This project utilised high resolution UAV, aka drone, captured data for a further refinement of the land cover present. A small proportion of this data was available during the initial land cover classification, but as the image capture was not completed before field inventory was due to

commence, the decision was made to base the initial land cover classification on Landsat 8 and Sentinel 2 imagery.

Pre-processing

The Landsat 8 image used for classification were pre-processed to convert the DN values into top of atmosphere reflectance values, using the 'Landsat 8 Toolbox' from ESRI. The processed image was used for the creation of band ratios and indexes, such as those listed below in Table 2. Topographic correction (i.e. the flattening of the image to remove the shadow effect of aspect) was not performed, and it is acknowledged that the extent of denser forest strata may have been overestimated during this initial phase because of this.

Supervised classification

Initial classification was performed using supervised classification, utilising the 'image classification' function within ArcGIS (Spatial Analyst extension). Training samples were developed to represent six clearly identifiable classes. Error matrixes for both training samples and test pixels, as per Lillesand and Kiefer (2004).

Landsat 8.

Landsat 8 imagery used in this study was captured on the 21/04/2016. The Landsat 8 satellite is equipped with a multispectral sensor, focussing on wavelengths useful for operational land management. For vegetation studies, such as this one, bands capturing the visible, near-infrared and short-wave infrared parts of the spectrum are of most use.

These bands have a spatial resolution of 30m. More information regarding the spatial, spectral and radiometric resolution of the Landsat 8 sensor can be found at http://landsat.usgs.gov/landsat8.php.

The scene used for this study had a cloud cover of 9.6%, mainly occurring along the southern weather coast of the island. The scene identifier is LC80870672016112LGN00, indicating path 87 and row 67. Cloud cover of the study areas was zero, with this imagery providing the most consistent, cloud-free extent of the study areas.

Sentinel 2.

Imagery captured by the Sentinel 2 satellite has only recently become available for public use, and consequently, the image catalogue is limited. It is of much higher spatial resolution than Landsat 8, with multispectral resolution of 10m (R,G,B and NIR), compared to the 30m of Landsat 8. The scene identifier is *S2A_tile_20160104_57LXK_0*, and was captured on the 01/04/2016.

ASTER Digital Elevation Model (DEM)

No vector based topographical data was available for this study, so the 30m ASTERDEM dataset was used to understand the relative difference in topography across the study areas. This data was useful in areas where the topography was dissected and steep, but was of little use on the plains, primarily due to the resolution of the dataset not being sufficient to discern the small changes in relief that are common within this landscape.

Unmanned Aerial Vehicle (UAV) sourced imagery.

UAV or 'drone' captured imagery was made available for this project and was primarily utilised for post-field aerial photograph interpretation of the study areas, with this methodology outlined below.

The imagery was captured and processed by 'Sky-Eye', a Samoan based service provider. This imagery is of high spatial resolution, a range of 15 – 20cm, depending of the height of the UAV during capture. The preliminary land-use maps provided below in Section 3 are entirely based on aerial photograph interpretation of this data.

Band combinations, ratios and Indices.

During the initial image classification, and range of band ratios, combinations and Indicies were explored in order to find the greatest contrast between the classes of interest. These can be seen below in Table 3. Further detail is provided in Chapter 3 of HCSA (2015).

Table 3 Landsat 8 band ratios utilised

Name	Purpose	Bands used
True colour	Visual interpretation	Red, green, blue
Colour infrared	Vegetation vs non-vegetation	Near-infrared, red, green
Vegetation classification	Contrast between vegetation types, with SWIR responding to increasing soil moisture	Short-wave infrared, near infrared, blue
Normalised differential vegetation index (NDVI)	Measures water content (or turgor) within vegetation, with actively growing vegetation showing higher values than bare ground or dead vegetation	(NIR – Red) / (NIR + Red)
Simple vegetation ratio	Contrast between vegetation types	NIR / Red

Field Inventory

The field inventory performed for this project sought to ground truth the output of the initial image classification and to quantify the above-ground woody biomass (i.e. that within trees) found within each of the strata, across the study areas.

Sample design

Sample intensity (sample size) for each of the classes identified during image analysis was determined by;

1. The area of the strata.
2. The mean and standard deviation values of HCS strata captured during previous fieldwork in Papua New Guinea.

The sample size was calculated using the Winrock International 'sample plot calculator spreadsheet tool', found at https://www.winrock.org. The sample size for each class can be seen below in ()

The sampling strategy was based on a combination of stratified random sampling, generated by the 'create random point' function in ArcGIS, and by the use of transects. Transects were focused in the larger 'Tasimboko' assessment area, mainly due to the size and access constraints of the area, and random sampling was conducted throughout most of the other smaller, assessment area. Plot locations can be seen in ()

Inventory method

All field inventory was performed in June/July 2016, and was done according to the methodology set out in Chapter 4, HCSA (2015). This inventory method consists of two nested circular plots with plot radii of 5.64m and 12.61m, equating to 100m^2 and 500m^2 respectively. Trees between 5 -15cm are measured within the 5.64m plot and all trees >15.01cm are measured within the 12.61m plot. Further detail can be found in HCSA (2015).

All field data was collected digitally, using a data collection form specific to HCSA assessment, designed by Hollow-wood. Information collected during field inventory can be seen below in Table 4.

Table 4 Data collected during HCSA inventory

	Attribute	Value	Method
Plot Attributes	**Date**	dd/mm/yyyy	Form calculation
	Assessors	initials	User entry
	Location	Easting / Northing	Form calculation
	Elevation	Meters above sea level	Form calculation
	Plot number	Integer	User entry
	Assessment area name	Text	User entry
	Canopy cover	Projected foliage cover (%)	Visual estimate
	Canopy height	Site tall tree (m)	Clinometer / rangefinder
	Mid height	Mid strata mean (m)	Clinometer / rangefinder
	HCSA strata	Class from initial classification	Presence / absence
	Site slope	Site slope (degrees)	Clinometer
	Basal area	m ha $^{-1}$	Dendrometer
	Plot comments	text	User entry
	Photo #1 (north)	Photo identifier	User entry
	Photo #2 (south)	Photo identifier	User entry
	Photo #3 (canopy)	Photo identifier	User entry
Tree data	**Plot type (i.e. radius)**	m	Plot radii chain
	DBHOB	cm	Diameter tape
	Species	Genus / species	User entry

Data Analysis.

All plot data was analysed with 'R' statistical software package, and the summary results can be seen below. All biomass calculations were performed according to the method outlined in Chave *et al* (2014). This method is a two-step approach and utilises two models, equation 4 and equation 6a. Both models are pan-tropical allometrics, with equation 4 being a biomass allometric and equation 6a being a diameter / height allometric. A regionally specific high-diameter relationship was considered (Figure 5) based on data collected during previous work in Papua New Guinea. It was thought that this may provide a more accurate height estimate, but while the form of the two models show close agreement, the pan-tropical equation in Chave *et al* (2014) was used due the small sample size of the regionally specific data set (n=172).

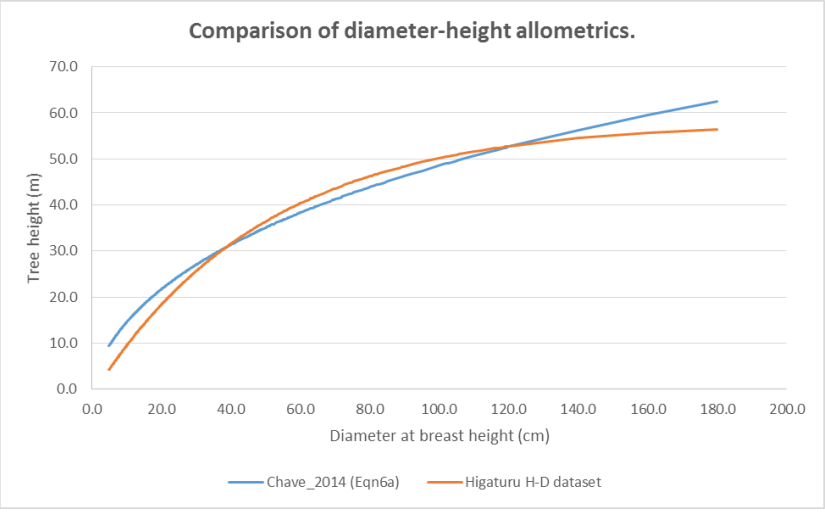


Figure 5 Comparison of diameter-height allometrics

Aerial Photograph Interpretation

GPPOL supplied Hollow-wood with high resolution U.A.V captured aerial imagery in order to improve the quality and accuracy of the final mapping product. This imagery was captured by Sky-Eye, a Samoan based service provider, and was supplied as an ortho-mosaic (orthorectified photo-mosaic) of multiple flight runs, captured over a large range of conditions (i.e. different light conditions determined by the time of day and cloud cover condition during the time of capture).

The range of variation that was present across the images effectively made vegetation stratification impossible using the image classification techniques out lined in HCSA (2015). Accordingly, it was decided that visual interpretation (Aerial Photograph Interpretation (API)) of the image would be performed, with the manual polygon line-work to be created by Hollow-wood.

API requires seasoned human interpretation and is a well-recognised technique of remotely classifying a landscape (forested or otherwise) using visual signatures such as colour, texture, size or relative landscape position to map the extent of a particular feature. The output of such analysis can be of high quality, but requires a high level of interpreter skill and knowledge of the study area.

By consultation with the client, it was determined that a unique mapping system was required for the project, a system that would enable vegetation types, stand condition and the HCS value to be understood.

A range of information sources were used derive a mapping system for the project, these included; vegetation studies by Whitmore (1969), Mueller-Dombois and Fosberg (1998) and Hansell and Wall (1974), vegetation mapping techniques outlined in Lillesand *et al* (2004), Kuchler and Zonneveld (1988), Hansell and Wall (1974) and Hamilton *et al* (1999).

The mapping system sought to capture four variables that would provide assistance in understanding areas available for development, but also provide accurate description of the vegetation communities existing with the study areas. The system captured the following information;

- Vegetation type (Table 5)
- Canopy cover class (%) (Table 6)
- Forest successional stage (Table 7)
- HCSA classification (Table 8)

Table 5 Vegetation community comparison from previous studies and the translation to this study.

Vegetation community (Hansell and Wall)	Vegetation community description (Hansell and Wall)	Regional vegetation types (Muller and Fosberg)	Vegetation communities (Whitmore)	This study	Code abbreviation
Da	Abandoned military installations	n/a	n/a	Anthropomorphically Modified Vegetation	***Amv***
Dg	Agricultural lands	n/a	Grasslands and heaths	Anthropomorphically Modified Vegetation	***Amv***
Ds	Colonising shrubs on water courses or landslip areas	n/a	n/a	Anthropomorphically Modified Vegetation	***Amv***
Dt	Village areas	Village areas	Village areas	Village areas	
Fhd	Upland rainforest on slopes - disturbed	Lowland rainforest on well drained soils	Lowland Forests	Upland Rainforest	***Urf***
Fhm	Upland rainforest on slopes – medium closed canopy	Lowland rainforest on well drained soils	Lowland Forests	Upland Rainforest	***Urf***
Flc		Coastal Strand Forest	Beach Forest	Coastal Strand Forest	***Csf***
Fld	Lowland rainforest on flat land - disturbed	Lowland rainforest on well drained soils	Lowland Forest	Lowland Rainforest OR Seasonally Dry Forest	***Ldf OR Sdf***
Gl	Low grasslands on ridges	Seasonally dry grasslands	Grasslands	Grasslands	***Grs***

Gm	medium height grasslands	Seasonally dry grasslands	Grasslands	Grasslands	***Grs***
Ms	Saline swamp forests	Mangrove Forest	Mangrove Forests	Saline Swamp Forests	***Ssf***
Sg	Swamp grasslands dominated by *Phragmites karka*	Herbaceous wetland vegetation	Grasslands and heaths	Phragmites Swamp	***Phs***
Sh	Herbaceous swamplands	Herbaceous wetland vegetation	n/a	Mixed Herbaceous Swampland	***Mhs***
Sm	Swamp forest, mixed species	Freshwater Swamp Forest	Freshwater Swamp Forest	Freshwater Swamp Forest	***Fsf***
Ss	Sago palm swamplands	Sago swamp forest	n/a	Sago Swampland	***Ssl***
St	Terminalia swamp forest	Freshwater Swamp Forest	Freshwater Swamp Forest	Freshwater Swamp Forest	***Fsf***
Wc	Low woody regrowth.	Anthropomorphically Modified Vegetation	n/a	Anthropomorphically Modified Vegetation	***Amv***
n/a	n/a	n/a	n/a	Plantation – Coconut	***Plc***
n/a	n/a	n/a	n/a	Plantation – Oil Palm	***Plo***
n/a	n/a	n/a	n/a	Plantation – Hardwood	***Plh***

Table 6 Canopy cover class

Canopy Cover Class	Equivalent percentage (%)
1	0 – 24
2	25 - 49
3	50 - 74
4	75 - 100

Table 7 Successional stage descriptions

Successional Stage	Code Abbreviation	Description
Primary Forest	Pf	Virgin Forest. Stand dominated by large diameter, mature primary species. Complex, multi-strata forest in lowlands and with species composition simplifying at higher elevations due to increasing competition for light and nutrients). Isolated wind-throw and land slips are the predominant form of natural disturbance within forests falling into this category.
Transitional Forest	Tf	Healthy forests recovering from disturbance. Secondary species reaching advanced maturity and/or senescence. Regeneration of secondary forest species suppressed by the well-developed sub-canopy of regenerating primary forest species.
Advanced Secondary Forest	Asf	Forest represented by this category have generally been disturbed at least once. The resulting forest is a mature, closed canopy dominated by secondary forest species. Primary species may be present as young recruits in the understorey, but few primary species remain as mature individuals.
Young Secondary Forest	Sf	Area of forest that has undergone severe disturbance and currently possesses few primary species. Early successional or pioneering species dominate the site.
Recently Disturbed	Rd	Areas of vegetation that are under a system of shifting cultivation. This may include areas in fallow (i.e. resting) or areas in current use. This vegetation is typically low in diversity and show evidence of the repeated use of fire.

Table 8 High carbon stock approach (HCSA) classification

HCSA classification	Code abbreviation	Description (HCSA, 2015)
High Density Forest	HDF	Closed canopy natural forest ranging from high density forest to low density forest. Inventory data indicates presence of trees with diameters >30cm and the dominance of climax species
Medium Density Forest	MDF	
Low Density Forest	LDF	
Young Regenerating Forest	YRF	Highly disturbed forest or forest areas regenerating to their original structure. Diameter distribution dominated by trees 10-30cm and with a higher frequency of pioneer species when compared to LDF.
Scrub	SCB	Land areas that were once forest but have been cleared in the recent past. Dominated by low scrub with limited canopy closure.

Table 9 Matrix for determining HCSA class

	Canopy Cover Class			
Successional Stage	**4**	**3**	**2**	**1**
Pf	HDF	MDF	MDF	LDF
Tr	MDF	LDF	LDF	YRF
Asf	LDF	YRF	YRF	SCB
Sf	YRF	YRF	SCB	SCB
Rd	SCB	SCB	SCB	SCB

Data regarding the vegetation type, species composition and stand condition was collected at each of the inventory plot points, and used to guide the visual interpretation and final classification of the mapped polygon. The major vegetation type assigned to each polygon was based on the species composition recorded during fieldwork and from the mapping reported by Hansell and Wall (1974). The successional stage was interpreted from field data. The canopy cover class assigned to each polygon was a combination of data recorded during field work and was interpreted visually from the UAV imagery.

A matrix was developed to derive a HCSA classification from a combination of successional stage and canopy cover class, this can be seen in Table 9. This matrix works on the assumption that there is a relationship between tree canopy cover and above ground biomass, such as that explored by Karlson *et al* (2015). It is acknowledged that this approach may be simplistic, but was deemed sufficient for the purpose of this mapping system.

Each Polygon has been assigned one of the four classes detailed above, with the combined classification being used to create a unique code.

An example of the full code may be: ***Fsf_Pf_4_HDF***

This particular example refers to 'freshwater swamp forest (Fsf), of primary successional stage (Pf), with a canopy cover of between 75 and 100% (4), which translates to a HCSA class of High Density Forest (HDF).

In Figure 6 below, the area of forest to the west has a much lower proportion of primary forest species (larger crowns), and also contains a significant proportion of secondary species (small yellowish crowns). This forest is transitional in nature, as advanced secondary and primary species are co-existing in the one community. The canopy cover is lower (50 – 74%) and when all of the above factors considered, it translates to a HCSA class of Low Density Forest. The whole code = ***Fsf_Tr_3_LDF.***

The area surrounding the swamp forest are either mixed herbaceous or sago dominated swamplands, all are mature with high vegetation cover. These have been mapped as ***Mhs_Mat_4_NonHCS*** and ***Ssl_Mat_4_NonHCS*** respectively.

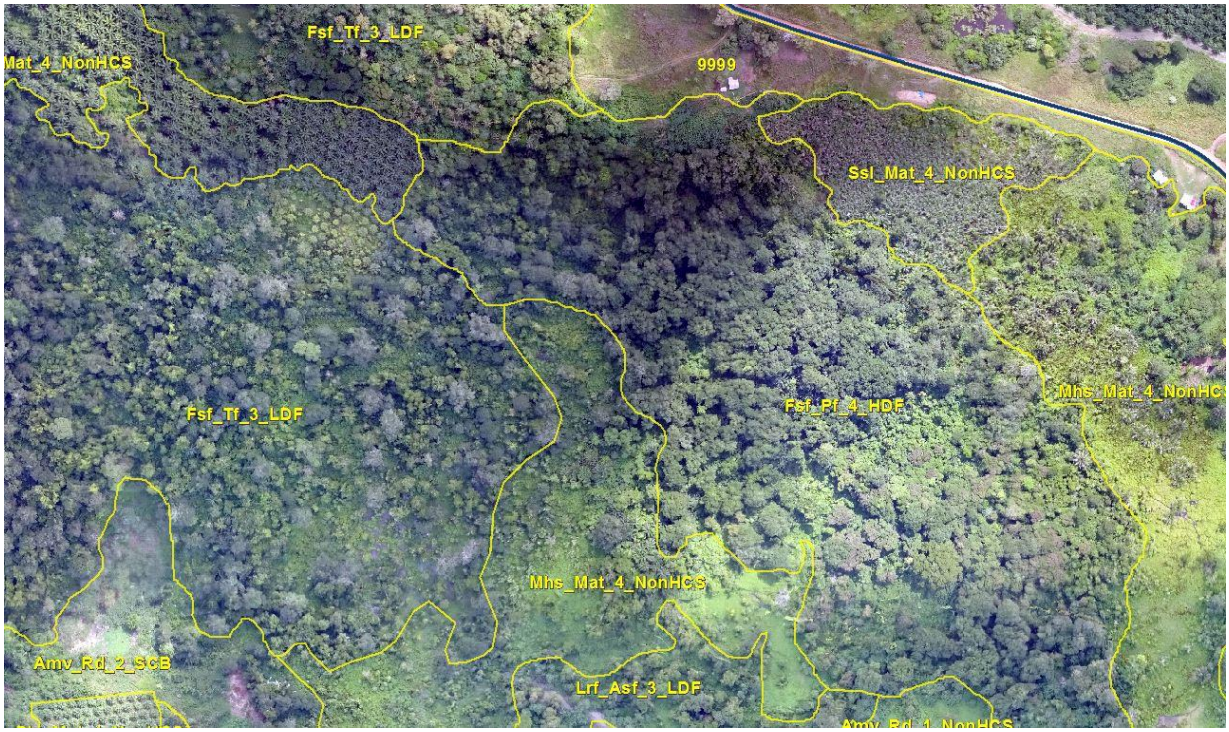


Figure 6 Vegetation mapping code examples

3. Summary of findings

3.1 SEIA

The social and Environmental impact of oil palm operations over the past decade will provide information to help assess the social impact of the proposed expansion. However, it is important to understand the historical context in which oil palm was redeveloped. The Tetere area was a focus of the tensions between 1998 and 2003. The armed conflict occurred, in large part, in response to a belief that investment and development on Guadalcanal were disproportionately supporting the rest of the country at the expense of the island's indigenous inhabitants (Evans 2010, p. 122). The large Malaitan population, who held many of the jobs with Solomon Islands Plantations Limited (who initially developed oil palm in the Tetere area) and at the Gold Ridge mine, were forcibly evicted from rural Guadalcanal. Large-scale resource projects in the hands of foreign companies were also deemed to contribute to the tension, through a perceived lack of cultural respect and [inherent] challenges to local identity and landholding (Evans 2010, p. 128). Although the tensions ended in 2003, much infrastructure in rural Guadalcanal had been destroyed, economic opportunities were almost non-existent, social tension remained high, and law and order had yet to be re-established. NBPOL entered negotiations to recommence oil palm when the Tetere area was widely viewed as a 'no go zone'. The following assessment of social and environmental impacts focuses on the area in the vicinity of existing oil palm grown under estate and outgrower schemes, rather than impacts at national or provincial levels.

3.1.1Positive and negative environmental effects

The following reports the perceived positive and negative environmental effects as reported in SEIA. GPPOL has been questioned over its environmental impacts, specifically relating to water quality in areas downstream from the estates. GPPOL monitors bore water quality in each compound (monthly) and river water quality at several locations, both upstream and downstream from the estate (each quarter). The analysis covers a range of chemical and physical properties. Results indicate that water quality has not been adversely impacted. In fact, water quality is often better downstream from oil palm estates than what it is before entering the estates. This is because the water is usually free of waste that would normally enter the river when passing near villages. A similar grievance relates to buffer zones along rivers. Buffer zones are required to reduce erosion and runoff, and while some buffer zones may need widening, or more vegetation, some people also extract timber, firewood and other products from the buffer zones, which can reduce their effectiveness.

3.1.2 Socio-economic impacts to country, region and local communities

Benefits at National and Provincial Levels

The proposed development, is expected to increase the area of oil palm plantation along with associated production. The increase in production is expected to have a proportionate increase in:

- Government revenue;
- The value of goods and services procured from within the Solomon Islands;
- Employment opportunities and wage payments to Solomon Islanders;
- Skills development among Solomon Islanders; and
- Payments to landowners, outgrowers and local contractors.

The expansion will help strengthen the viability of the oil palm industry in the Solomon Islands and stimulate economic and social development on the Guadalcanal Plains. This development is not limited only to the population in the immediate vicinity of the proposed oil palm, but populations

further east, which in the past have been isolated from Honiara and other parts of Guadalcanal Province.

The benefits to Guadalcanal Province include:

- An increase in the road network;
- An increase in the coverage of quality health services;
- Employment and income growth; and
- Sustainable economic growth, which could lead to improvements in the general level of security.

The province will also experience continued population growth, which will place additional pressure on schools and other service providers, which will require investment by the Provincial Government to meet increased demands.

3.1.3 Socio-economic impacts in respect of emergent communities (workers, suppliers etc.)

A number of changes will occur as a result of the project. These changes, and resulting impacts, are discussed below.

Population

The expansion of oil palm will require an additional employees. It is anticipated that approximately 80% of employees for will be recruited locally. Based on an average family size of 5.4, additional people will live in the Study Area as a result of the development. These people will reside on the estates in housing compounds built by GPPOL. Other than for casual workers (which comprise less than 1% of the current workforce), people will apply for a position, and successful applicants will be awarded a permanent position, subject to a three-month probation period. The project is therefore expected to lead to a direct increase in population as a result of this expansion. Some additional in-migration is expected, despite the limitations imposed on migrants as a result of customary land ownership. Some people from the interior of the province, and Weather Coast, are likely to be attracted to the area, due to the economic opportunities and improved access to services. Some others are likely to migrate to the area as a result of marriage. Reasonably high population growth is therefore expected to continue in the Study Area, as a result of the project, for at least a decade. The proportion of customary landowners may decline as future expansion progress as the majority of workers will originate from other provinces. The workers and their families will reside in work camps established by GPPOL and they will be under instruction to not use resources on customary land.

Roads

The highway is sealed from Honiara to the Mbarande River, and is unsealed to Aola. Buses generally travel no further than the Mbokokimbo River. The current ADB project will construct three new bridges and seal the road from the Mbarande River to the Mbokokimbo River, a distance of 10.5 km. The proposed SIG-DFAT-GPPOL partnership will construct bridges across the Mbokokimbo and Monga Rivers, which will potentially allow buses to travel all the way to Aola.

Income Levels

A number of different groups will benefit from higher income levels:

- Landowners who lease land to GPPOL;
- New outgrowers;
- New oil palm employees;
- Contractors who are able to provide goods or services to GPPOL; and

- Other people who capitalise on higher income levels and improved road access to sell products in the local area or Honiara.

The increase in income levels will be proportionate to the area of new oil palm developed.

Health and Wellbeing

Health levels should improve as a result of the increased population covered by GPPOL's clinics, the increase in access to emergency health services in Honiara, and in some cases, improved diet, for example, an increase in protein as a result of higher income levels.

In the longer-term, where many people have enjoyed higher income levels for a decade, adverse health impacts may occur as a result of poor diets and a lack of exercise. This may contribute to an increase in diabetes and other lifestyle diseases, essentially from a gradual replacement of fruit and vegetables with store foods that have high salt, sugar and fat content. Thus, while health impacts are expected to be substantially positive in the short to medium term, the benefits may be eroded without appropriate health education and lifestyle changes in the longer term.

Education and Skills

Higher income levels should make education more affordable, and improved road access should contribute to higher enrolment and retention levels in schools, particularly in secondary school. The increase in population as a result of the expansion of oil palm will substantially increase the number of school-aged children. Some schools may struggle to accommodate a substantial increase in students without an increase in teachers, classrooms and other facilities. Over-crowding in schools could cause some tension between the children of local residents and GPPOL workers, which could lead to poor attendance by the children of workers.

The project will train employees in oil palm operations, along with basic knowledge on health and safety. Although the majority of employees will work in labouring positions in the plantations, the expansion offers considerable opportunity for local employees to be promoted over time. GPPOL provides considerable training to ensure people have the necessary skills and to maximise the proportion of workers who are from the Solomon Islands. Some of the skills learned while working with GPPOL could be utilised in other industries, or could benefit the broader population as skilled workers return to their communities and apply the skills they have learned.

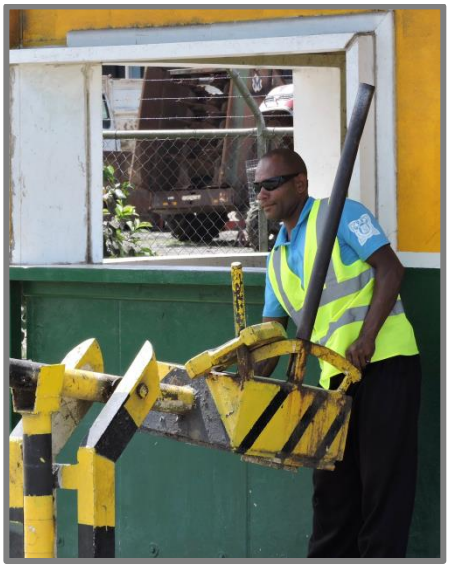


Figure 7 GPPOL Employee at Tetere Mill Gate

Subsistence Resources

The increase in oil palm will reduce the land available for subsistence production. However, the expansion areas in particular, are predominantly unused and there will be a minimal reduction in available subsistence resources.

Although some people from the Mbalisuna East area expressed a concern that oil palm development would cause shortages of gardening land, oil palm development was not proposed in the area they reside or garden

People may also fish in rivers and streams that are located within the proposed oil palm area. However, part of the conservation assessment process identifies areas that are used for subsistence, and documents the type of subsistence products and their importance. Any land that is important for subsistence purposes is not therefore used for oil palm development. While the results of this assessment are documented separately, it will also be important to consider the subsistence needs of future generations.

Figure 8 Mbalisuna East Grassland

A concern raised by several stakeholders has been the impact of oil palm on groundwater quality. Water quality is sampled by GPPOL at 21 locations on a quarterly basis, both at the point of entry to, and the point of departure from, existing estates. As results from several years indicate that the water quality is better at departure than on entry, this is not expected to be a major issue, although water quality testing will continue and is expected to be undertaken at all new estates.

Housing

An increasing number of local families are expected to capitalise on their higher income levels and invest in improved housing, including solar power, iron roofing, water tanks, and relatively modern toilets. This has a range of benefits:

- Good lighting allows children to do homework and makes detecting mosquitoes easier;
- Electricity enables family members to earn income from the use of sewing machines (dress making) or refrigerators (selling food and drinks);
- Clean drinking water and clean toilets will reduce the risk of sickness; and
- A reduction in subsistence labour may occur as a result of a decrease in time to collect water or repair the houses.

Additional workers recruited by GPPOL for the expansion will be accommodated in the work compounds. Additional housing may be required. New compounds will established for the Stage 2 expansion. It is envisaged that any new housing will be constructed using the improved designs used in recent years at Okea.

Law and Order

Higher income levels are expected to lead to an increase in alcohol consumption and alcohol abuse, which is likely to lead to an increase in domestic violence, fighting, stealing and other crimes. GPPOL is active in the work compounds in terms of raising awareness on domestic violence, providing support and counselling for victims of domestic violence, reducing illegal production of alcohol, minimising excessive alcohol consumption, and promoting a peaceful and harmonious living environment. However, the tensions occurred less than two decades ago and the risk of social unrest – potentially starting with disputes and ending with property damage, violence and a disruption to oil palm production – should not be ignored. Social unrest could occur between:

1. Different ethnic groups within work compounds;
2. Compound residents and local residents;
3. Oil palm beneficiaries; and
4. People benefiting from oil palm and people not benefiting from oil palm.

Ethnic tension within compounds can occur for a number of reasons, including extra marital affairs, stealing, excess noise, etc. These issues are likely to lead to disputes and violence when people are frustrated from poor living or working conditions.

Disputes between compound residents and local residents generally occur due to cultural differences, but can be triggered as a result of:

- Illegal use of local resources (making gardens, harvesting coconuts, etc);
- Extra-marital affairs or sexual relationships between teenagers that involve parties from the compound and local community;
- Traffic accidents involving a driver from another province and a local pedestrian;
- Refusal to assist with requests for assistance from the local community; or
- Unsociable behaviour by local residents in the work compounds, or by workers in local communities.

Disputes between oil palm beneficiaries are likely to occur in relation to the management of benefits. This includes the allocation and management of benefits by GPRDA and GPRDC. It appears that few landowners are happy with current management arrangements, and this dissatisfaction is likely to increase over time as the benefits increase with the expansion.

Finally, people benefiting from oil palm may earn much higher incomes than people not benefiting from oil palm. This could result in jealousy, disputes around the impacts of oil palm, and general unrest. The economic disparity is likely to be greatest when oil palm prices are high, or conversely, when the price of other commodities (e.g. copra, cocoa) is low.

Empowering Local Tribes and Clans

Much of the land on which SIPL developed oil palm had been alienated. The approach adopted by NBPOL in establishing GPPOL was to return the land to the customary owners and provide them with a share in the ownership of GPOPOL. This empowered local tribes and clans and made it easier to address concerns in the community when they occurred. The establishment of GPSS also helped empower local tribes and clans.

Empowering local tribes and clans should help assert local identity and help preserve local traditions and culture.

Impacts on Women and Children

The development will continue to benefit women through greater economic opportunities and improvements in housing, improvements in road access, increased economic opportunities, improved health services and improved education affordability. All these benefits will be greater if the general level of security also improves.

3.1.4 Issues raised by stakeholders and assessors comments

The general attitude towards the expansion of oil palm in the Study Area, and any specific comments or concerns raised during preparation of the SIA, are summarised in the table below.

Table 10 Attitude towards the expansion of oil palm

Stakeholder	General Attitude	Comments/Concerns
Metapona landowners	Mixed	Favouring oil palm development for the economic benefits, but also concerned about (i) management arrangements within the existing landowner association, and (ii) potential shortages of land suitable for gardening in the future.
Kautoga landowners	Supportive	The only issue relates to existing operations, and specifically their decision not to be affiliated with GPRDA, which means they are not entitled to any of the dividends paid by GPPOL.
Mbalisuna East landowners	Supportive	The landowners support oil palm development. Some nearby people expressed concern about oil palm expansion, however, oil palm was not being proposed in the area that these people occupy or garden. The area proposed for development is unused grassland and its development has full support of the landowners.
Holy Water landowners	Supportive	The area proposed for development is unused grassland and its development has full support of the landowners.
Solrice 1 landowners	Supportive	The area proposed for development is grassland, the vast majority of which is largely unused.
Current landowners	Supportive	The only issues relate to existing operations and include: • Buffer areas along rivers • Groundwater quality downstream from estates • The lack of cooperation and support received by the national and provincial governments • Royalty distribution and GPRDA management
Current outgrowers	Supportive	The only issue relates to existing operations, and specifically, uncertainty about the FFB price.
GPPOWA	Supportive	The expansion should allow the number of workers affiliated to the Union to increase. The Union hoped that further improvements to workforce housing would occur.
GPSS	Supportive	Nil.
National Government	Supportive	The Prime Minister is supportive of the expansion. It is also expected that the SIG will sign up to a tripartite agreement (with DFAT and GPPOL) to support the proposed expansion of oil palm.
Tetere Police	Supportive	Approval has been given to increase the number of Police officers based at Tetere. The officers have requested continued liaison with and support from GPSS and GPPOL.
Nguvia Community High School	Supportive	Raised a concern that the expansion would put pressure on school resources, and commented that there is low school attendance among GPPOL families.
DFAT	Supportive	It is expected that DFAT will sign up to a tripartite agreement (with SIG and GPPOL) to support the proposed expansion of oil palm.

As shown above, the vast majority of stakeholders are overwhelmingly supportive of the proposed expansion of oil palm. This support is premised on the expected economic benefits and social development. However, some concerns have also been raised, most relating to existing operations rather than the proposed expansion of oil palm.

Concerns relating to existing operations, which are dealt with by GPPOL through their existing social and environmental management processes, include:

- Maintaining buffers beside rivers;
- The quality of ground water;
- Management of GPRDA funds;
- FFB prices;
- Workforce housing; and
- School attendance.

Some of these concerns are equally applicable to the proposed expansion, and have therefore been included in the assessment of social impacts.

The landowners of the proposed expansion did not have any concerns with the proposed expansion of oil palm. Some other people expressed concern about the expansion of oil palm on land they were using, but their concerns were unwarranted, as the land they were using is outside the areas considered for the expansion.

3.1.5 List of legal documents, regulatory permits and property deeds related to the areas assessed

The Environment Act 1998 regulates the approval process for development activities in the Solomon Islands. In the Act, the environment is defined as all natural and social systems and their constituent parts, and the interaction of their constituent parts, including people, communities and economic, aesthetic, culture and social factors (National Parliament of Solomon Islands, 1998, p. 7).

Section 23 of The Environment Act 1998 outlines the content of an Environmental Impact Statement (EIS) for a development project, which shall:

a) Contain a full description of the objectives of the prescribing development;
b) Analyse the need for the prescribed development;
c) Indicate the consequences of not implementing or carrying out the prescribed development;
d) Include adequate information and technical data to allow assessment of the impact of the prescribed development on the environment;
e) Examine any reasonable alternatives to the prescribed development, including alternative sites for it;
f) Describe the environment that is or is likely to be affected by the prescribed development and any reasonable alternatives to it;
g) Assess the actual or potential impact on the environment of the prescribed development and of any reasonable alternatives to it, including the primary, secondary, short-tem, long-term, adverse and beneficial impacts on the environment;
h) Outline the reasons for choice of the prescribed development;
i) Estimate the time period of any expected impacts;
j) Describe the geographic boundaries of the impacts;
k) State the methods of predicting and assessing each impact from the construction, operational and where relevant, the de-commissioning phase of an implemented development and for each alternative presented;

l) Justify the prescribed development in terms of environmental, economic, culture and social considerations;
m) Identify and analyse all likely impacts or consequences of implementing the prescribed development including implications for the use and conservation of energy;
n) Describe measures to prevent or reduce significant adverse impacts and enhance beneficial effects and an account of their likely success with estimated costs as appropriate;
o) Describe residual impacts which cannot be mitigated or can only be mitigated partially;
p) Describe proposed monitoring and reporting schemes with estimated costs as appropriate;
q) Describe and assess the estimated cost-effectiveness of any safeguards or standards for the protection of the environment to be adopted or applied including its implementation, monitoring and reporting;
r) Give an account of the impact on the environment of any of a series or programme of similar development (whether implemented or not) over a period of time;
s) Give any sources and references of information relied on and outline any consultations with any persons made during the preparation of the report;
t) Include a site survey report concerning National Heritage items or traditional artefacts as specified by the Director;
u) Address any further matters as the Director specifies; and
v) Give a clear and concise summary printed on a separate page (National Parliament of Solomon Islands, 1998, pp. 20-22).

The legislative requirements outlined above, which pertain to the assessment of social impacts, have been reflected in the methodology.

A Development Consent was granted on 18/09/2017 by Environment and Conservation Division of Ministry of Environment Climate Change, Disaster Management and Meteorology. The Development will take place on the following lands.

Name of Area	**Tenure**
Holy Water	Customary
Mbalisuna East	Customary with application for registration
Matepona	Tribal Ownership
Kautoga	Privately Owned (group)
Solrice 1 and 2	Privately Owned

3.2 HCV assessment

The following summarizes the relevant sections of the HCV assessment carried out as part of the FPIC process utilized in this new development. The HCV assessment has passed the HCVRN ALS peer review process and can be viewed at https://www.hcvnetwork.org/als/public-summaries (number 40).

3.2.1 HCV outcomes and justification including summary table

Of the total area (3505.6 ha) 653.7 ha was considered HCVMA and 2851.8 ha was plantable. Of that area only a subset was made available by the landowners for development. The following table summarizes the total areas assessed. Plantation specific management plans will be derived from the outcomes of this studies relevant to the HCVs present at that location.

Table 11 HCVMA Area Summary

New Development Areas	HCV 1	HCV 2	HCV 3	HCV 4	HCV 5	HCV 6	HCVMA[2]	Non-HCVMA	Total
Mbalisuna East	101.3	0.0	101.3	3.7	0.0	0.0	11.0	91.1	102.1
Matepona	85.2	0.0	121.2	173.4	227.4	0.6	151.5	322.3	473.8
Kautoga	0.0	0.0	48.8	86.0	75.8	0.6	349.2	1631.2	1980.4
Solrice 1	0.0	0.0	0.0	18.1	0.0	0.0	105.1	283.0	388.0
Solrice 2	0.0	0.0	0.0	18.8	0.0	0.0	18.2	84.4	102.6
Holy Water	0.0	0.0	10.4	4.4	0.0	10.4	18.9	439.9	458.7
Total	**186.5**	**0.0**	**281.7**	**304.4**	**303.2**	**11.6**	**653.7**	**2851.8**	**3505.6**

HCV Presence

Table 12 Summary of HCV presence in original assessment areas

HCV	Definition	Present	Potential	Absent
1	Species diversity			
2	Landscape-level ecosystems and mosaics			
3	Ecosystems and habitats			
4	Ecosystem services			
5	Community needs			
6	Cultural values			

3.2.2 Interpretation of HCV Findings

HCV 1 - Species Diversity

Protected areas

Key Question	Outcome
Does the AOI or surrounding landscape contain either of the following categories of Protected Areas (PA)? • Legal Protected Areas, • Global conservation priority sites	**Not Present**

Justification

[2] The sum of HCV 1 – 6 do not necessarily equal the HCVMA area because of overlaps between the individual HCVs

No protected areas are known within the assessment area.

Concentrations of biological diversity

Interpretation

Key Question	Outcome
Is the AOI or the adjoining landscape known or likely to contain areas with concentrations of biological diversity including endemic species, and rare, threatened or endangered (RTE) species that are significant at global, regional or national levels?	**Present**

Mammals

There are no mammals of significance known to be living in or around the assessment area.

Birds

Based on information from literature reviews, the coastal stand forests identified on the northern boundaries of both the Kautoga and Matepona blocks would provide ideal potential nesting and hunting habitat for Haliaeetus *sandfordi,* and such areas therefore could be considered for HCV 1. One bird of this species was sighted in Kautoga, however the forest in these areas was in a very degraded and a single bird sighting was not considered sufficient for HCV 1 status.

Vegetation

The forest in the assessment area was highly fragmented and generally existed as small to moderate sized patches within larger areas of grasslands or cultivated areas. No mature, primary forest areas were found to be present within the AOI, although there were examples of mature individuals such as *Alstonia scholaris*, *Pterocarpus indicus* and *Calophyllum peekelii* were found amongst the areas of secondary forest, particularly in the coastal forest area at Matepona.

No IUCN listed taxa identified are considered endemic to Guadalcanal Island, however the presence of *Pterocarpus indicus* in both the Matepona and Mbalisuna East AOI's are a justification that HCV 1 is present, due to the vulnerable listing of this species.

Mammals

A list of mammal species which are drawn up for consideration in this assessment, this list included species that are categorized as threatened under the IUCN and CITES listings. Most of these species include rats in the Muridae family as well as flying foxes. None of these species were seen or mentioned by members of the community.

Summary

The CG defines HCV 1 as "Any area that contains significant concentrations of HCV 1 species (RTE or endemic)….", however this definition is of limited use as the term "significant concentrations" is not defined. The CG does give an example of what would be considered HCV 1, which is "A high overall species richness, diversity or uniqueness within a defined area when compared with other sites within the same biogeographic area." Daemeter uses the biophysical region, Northern Guadalcanal Plains, as mapped by Hansell and Wall (1974) (Figure 9) as a proxy for the biogeographic area. There is very little forest remaining in the biogeographic area. Consequently, Daemeter considers

the some of the remaining forest areas within the assessment area to fulfil the previously mentioned criteria. As such this element of HCV 1 is considered present.

Spatial and temporal concentrations of species

Interpretation

Key Question	Outcome
Is the AOI or the adjoining landscape known or likely to contain critical temporal concentrations of species?	**Not Present**

Justification

Any migratory species found within the AOI are likely to be sea-birds, which would be unaffected by changes to the vegetation within the assessment area.

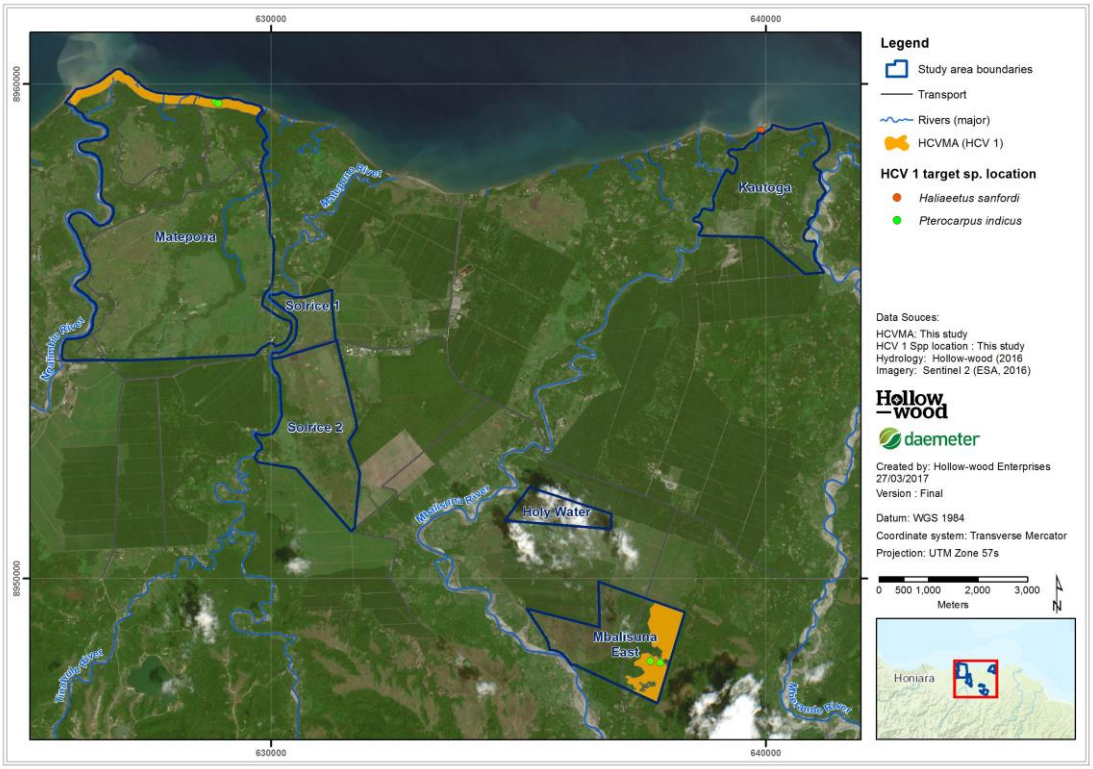


Figure 9 Summary of HCV sighting areas

The above figure provides a summary of the HCV 1 areas with sightings of HCV 1 species (*Pterocarpus indicus and Haliaeetus sandfordi*). The forest blocks in Mbalisuma East and Matepono were deemed to be HCV 1 because the forested area met the criteria of "a high overall species richness, diversity or uniqueness within a defined area when compared with other sites within the same biogeographic area." Despite seeing *Haliaeetus sandfordi* in Kautoga, Daemeter considered this to be a random sighting as the forest in the area was not good quality (which is generally required by this species).

HCV 2 - Landscape-level ecosystems and mosaics

Interpretation

Key Question	Outcome
Does the AOI or surrounding landscape contain natural ecosystems or ecosystem mosaics which are large in extent, largely un-fragmented, form significant components of the landscape or are of significant importance at a local, regional of national level, and which contain most of the naturally occurring species?	**Not Present**

Justification

The CG suggests mapping the AOI and its connection to Intact Forest Landscapes (IFL). The IFL are confined to the upper slopes of the mountains behind the Guadalcanal Plains. There is no connectivity with the AOI.

Furthermore, the assessment landscape is heavily altered by humans, with few patches of undisturbed forest on the plains in the AOI.

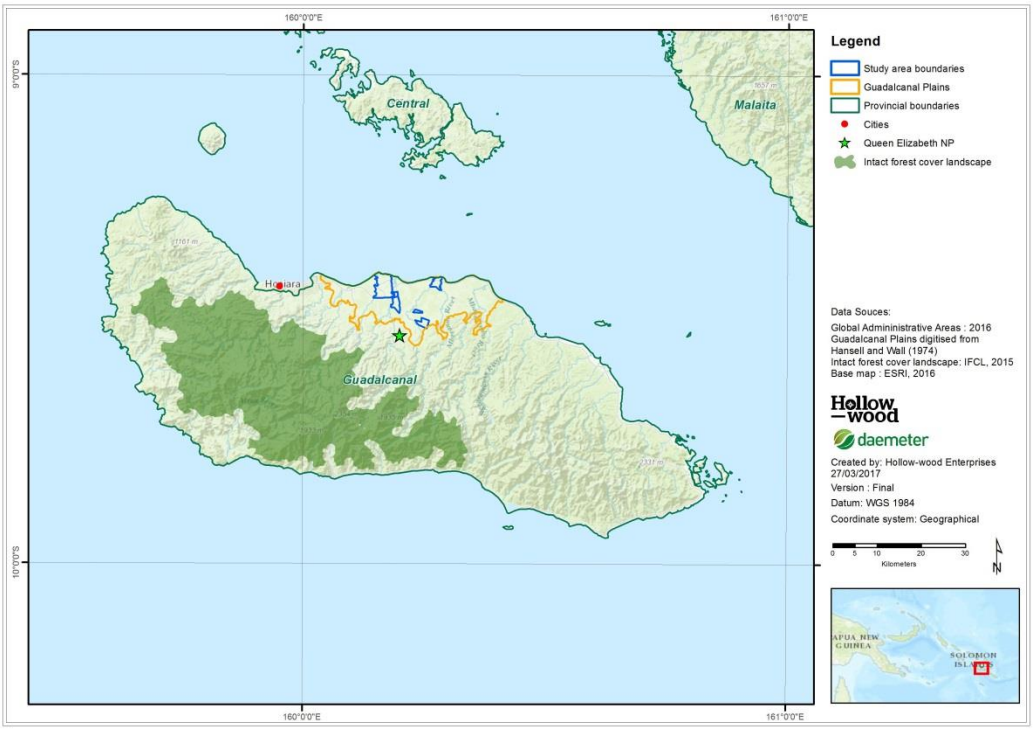


Figure 10 Intact Forest Landscapes

The CG suggests mapping the project area (which is mapped as the Guadalcanal Plains) and its connection to Intact Forest Landscapes (IFL) or even contiguous forested areas. In this map the IFL are confined to the mountain tops and there is no connectivity with the project area. Therefore, HCV 2 is considered to be not present.

HCV 3 - Ecosystems and Habitats

Interpretation

Key Question	Outcome
Does the AOI or surrounding landscape contain ecosystems that are naturally rare, have become rare due to past processes, or threatened by current and future processes?	**Present**

Justification

As shown in Figure 11 there has been considerable deforestation in the assessment area since 1974.

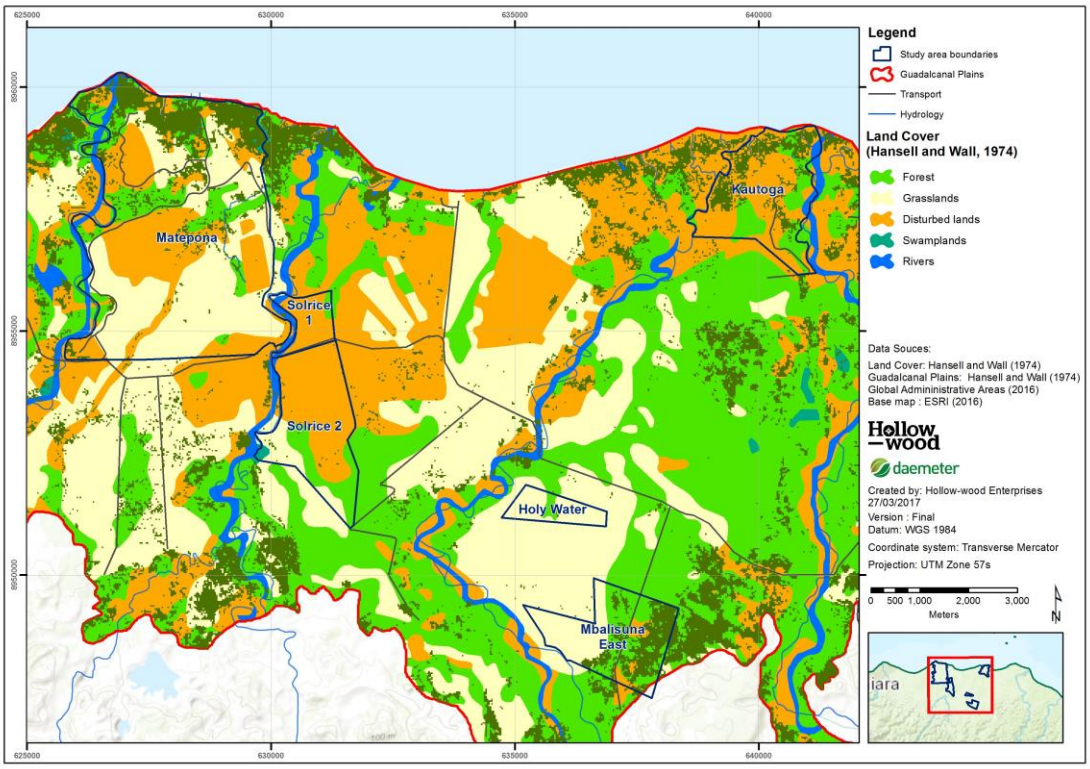


Figure 11 Current versus past forest cover

In the above figure the current forest cover (dark green) overlaid with 1974 vegetation cover. The current forest cover in this map includes HCS forest and young regenerating forest (as mapped in Figure 11). The 1974 forest cover is from Hansell and Wall data. When reduction in forest cover is mapped against land systems (as mapped by Hansell and Wall, 1974) it shows that forest in the all blocks is considered endangered (greater than 50% reduction in extent). However not all forest is in sufficiently good condition to be considered HCV3 (many areas are just a few small patches of pioneer species). The blocks that are considered HCV 3 are mapped in Figure 12.

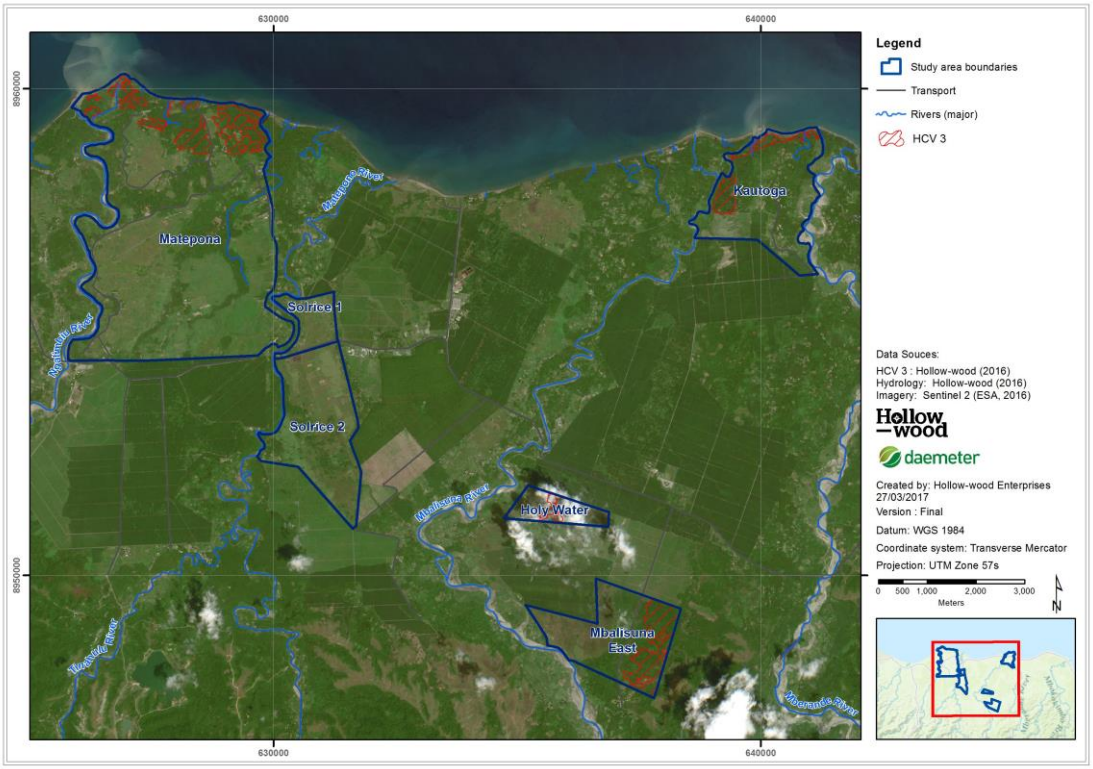


Figure 12 Map of HCV 3

Final HCV3 map which shows the HCV3 areas that are within the assessment area blocks that GPPOL has management control over. These are forest areas of sufficient size and good enough condition to warrant management.

HCV 4 - Ecosystem services

Protection of water catchments:

Interpretation

Key Question	Outcome
Does the AOI or surrounding landscape contain areas that are critical to the protection of water catchments?	**Present**

Daemeter refers to the Solomon Islands Logging Code of Practice (2002) for definitions of rivers and wetlands and associated buffer requirements that were used as a reference in identifying HCV 4.

Table 13 Rivers and Mandatory buffer widths form SI Logging Code of Practice

Category	Minimum Buffer Width
Oceans, lakes and lagoons	100m[3]
Class 1 stream[4] (flowing more than 6 months of the year)	50 m to left and right
Class 2 stream[5] (flowing more than 6 months of the year))	25 m to left and right
Gully (flowing less than 6 months of the year)	10 m to left and right

Justification

There are a number of large rivers that flow through the project area and have been mapped in Figure 13. These would be classified as class 1 streams and require a 50 m buffer to the left and right of the river.

There is anecdotal evidence that significant flood events may cause larger streams to move both along their course and at their mouth. In this situation, riparian vegetation may be damaged and the river's new course might mean the river now flows right into the oil palm plantation without any riparian buffer. Based on this information the river buffer on class 1 streams has been increased to 100 m along the normal course of the river and 200 m near the river mouth where it branches out due to the flat land and the interaction with the coastal flow.

The return interval (i.e. frequency) or intensity of such events is currently unknown, and it is therefore difficult to prescribe adequate buffer recommendations without further analysis. In other areas (e.g. Mbalisuna) the soil in the river buffers is the only area suitable for agriculture.

Additionally, there are many small rivers and watercourses within the estates, which would be classified as class 2 streams and require a 25 m buffer to the left and right of the river. These are difficult to reliably map from satellite images. The course of these small rivers should be GPSed prior to development so that appropriate buffers can be demarcated.

These areas have access to water and often have the best soils for growing crops, therefore the community prefers these areas for gardening.

Generalised extreme value analysis is an accepted method that may provide insight into return intervals for significant flood events (Renard and Lang, 2007), however, such analysis is reliant on accessing historic streamflow data and/or weather station data. Such analysis is considered to be outside the scope of this HCV assessment.

Control of erosion of vulnerable soils and slopes

Interpretation

Key Question	Outcome
Does the AOI or surrounding landscape contain areas that are critical for preventing soil erosion?	**Present**

HCV 4 occurs in areas where natural vegetation types (e.g. forest or native grasslands) in good condition are required to help prevent erosion, landslip and gullying, especially where such events

[3] Buffer starts at the high water mark
[4] Stream base more than 10 m width
[5] Stream base less than 10 m width

would have a critical impact on people or the environment.

Justification

The assessment area is generally flat, so there is very little risk of hillside erosion. Nevertheless, there are a number of areas where the estates border class 1, class 2 rivers or gullies as per the code of practice. Riparian buffers will reduce erosion, but in times of flood any vegetation more significant than grasses will be ripped out and washed down the river.

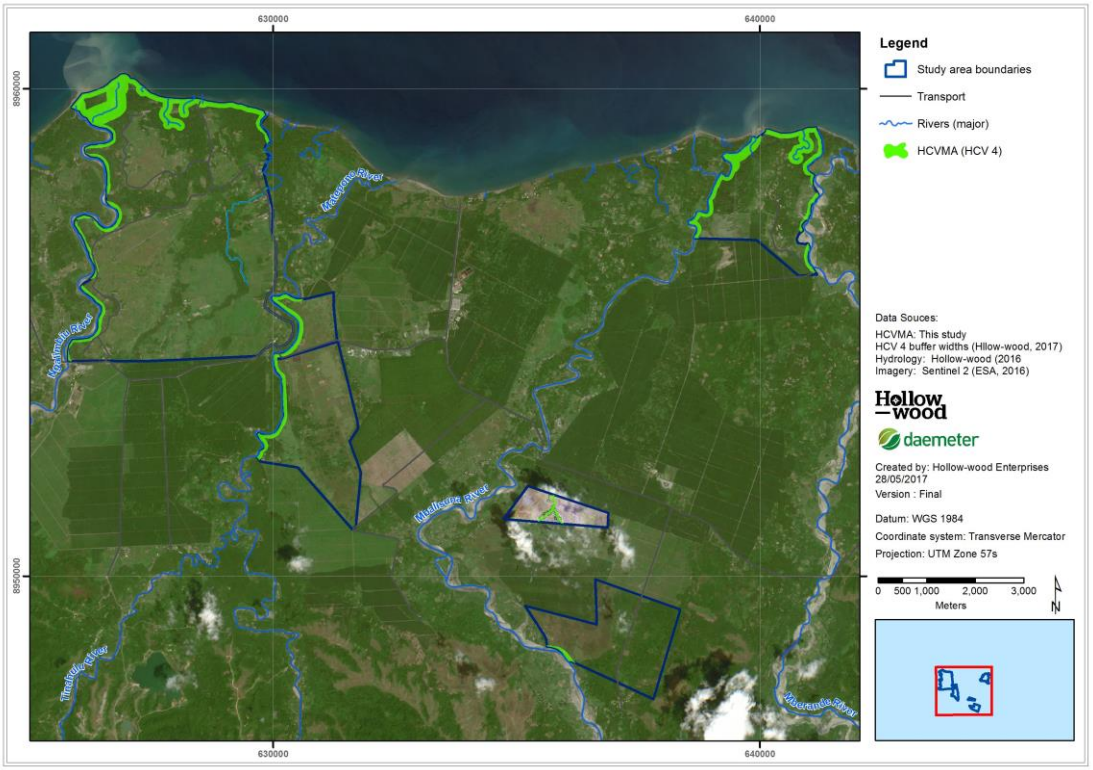


Figure 13 Indicative HCV 4 Map

The above figure is an indicative HCV 4 map – which includes the river buffers and coastal strip. All the rivers are class1 (except in Holy Water which is class 2). The map is "indicative" because not every small stream has been identified. This should be done prior to development. This is one of the management recommendations.

HCV 5 - Community needs

Interpretation

Key Question	Outcome
Does the AOI or surrounding landscape contain sites and resources fundamental for the basic necessities of local communities or indigenous peoples?	**Present**

Discussion of each basic need

Food

The area around the villages is made up of a matrix of secondary forest, scrub, grassland, oil palm and gardens. Most food is cultivated in gardens, not a lot of food was gathered from natural areas. The diet of the people is mainly vegetarian, with meat generally being eaten during festivals.

Carbohydrates

The basic carbohydrates that are grown are potatoes, cassava and sweet potatoes (kumara). These are eaten with every meal. Interestingly there is a transition towards eating rice, which is bought from the shops. It appeared this was to give some variety in peoples' diets. Although sago is present in the swampy areas there is no culture of sago harvesting.

Fruits

The main fruits grown are paw-paw, mangoes, watermelon, guava, bananas, ngali nuts and pineapples. Mangoes, paw-paw and bananas are grown around the village, whilst melons and pineapples are planted in the gardens. Ngali nuts are forest trees. These fruits are eaten or sold at the market. The exceptions being copra and cocoa which are harvested on a commercially but operations are of small scale and with a low level of technical input.

Vegetables

The main vegetables grown are slippery cabbage, capsicum, tomatoes, lettuce, beans, taro, corn, pumpkin, pumpkin tips (the leaves of pumpkin), peanuts, cucumber, and eggplant. These are all grown in gardens. Some villages mentioned swamp cabbage and kankung which are harvested from the forest or river banks.

Protein

The main source of protein is fish. However fish is only eaten once or twice per week at a maximum. People mentioned that they fished in the rivers, but it was not part of their weekly or daily schedules. Often the sea was too far to walk from the village. Rather they bought fish at the markets with money they earned from selling vegetables. Also there was a strong preference for tinned fish, which has the advantage it can be stored but it is also very expensive[6]

Meat is either sourced from domestic animals (pigs or chickens) or hunted (wild pigs and birds were mentioned). When discussing hunting, it tended to be something that was done years ago and seldom, if ever done nowadays. Pigs were eaten once or twice a year and associated with church activities (e.g. Christmas). Chicken might be eaten once a week, but was regarded as expensive.

Water

There was no piped treated water supply although there was some sort of water infrastructure project in Matepona. Water is sourced from wells or bores. The wells are dug manually and are typically 2 -5 m deep and the bores up to 18 m deep. Other villages use their women and children to fetch and carry water from springs whilst others took the water from holes dug next to the river (Solrice 2). Every village said the water was good quality except Solrice 2; the water was sourced

[6] $10 for a 170g tin of fish, a field worker might earn $50 per day.

from the Matepona River which was downstream of the Goldridge mine and the only river in the area which is consistently turbid.

Figure 14 Water sources in Matepona

Construction Material

While the majority of the houses are made of natural renewable materials sourced from nearby forests, there are some houses that are built with more permanent materials such as tin rooves and fibrolite cladding. The use of these materials indicate a presence of expendable cash for the conveniences that these housing materials offer. Sago palm leaves are used for rooves. These are surprisingly waterproof and much cooler than tin roofs, but must be replaced every few years. The house piles and frames are made from forest timbers which are resistant to rotting.

Furniture / Utensils / Equipment

Solomon Islands houses do not typically do not have a lot of furniture. People use boards as furniture. Utensils are usually bought, coconut shells were once used as cups and plates but are now not used in the assessment area. Exceptions are the large vessels called the *popo*, which are used during festivals and the woven bags. Tools such as knives, axes and machetes are all sourced from the hardware store in town or made.

Cooking Fuel

All cooking is done on the umu. This a technique where rocks are heated by fire and then food is put on top of the hot rocks to cook. Firewood is used for cooking. This is sourced from sticks from around the garden and coconut shells. Some villages used kerosene and gas, but only small amounts.

Medicine

Typically, people treat minor ailments with traditional medicine. Examples of this are:

- Mile-a-minute vine as an antiseptic for cuts
- Bark from milky pine for anaemia and to give women who have just given birth more breast milk
- Oeasi leaf as a blood coagulant
- Paw-paw seeds for malaria

If the traditional medicine does not work or the ailment seems serious they go to the clinic for modern medicine.

Fodder

Fodder consisting of leftover food of no special variety is used to feed pigs and chickens.

Cash Income

Food grown in excess of peoples' own requirements is usually sold in the market to get cash for various purchases in town. Other sources of income are :

- Royalties from oil palm
- Copra
- Cocoa.

Hunting

Hunting appears to be a thing of the past. When people were asked about it they said occasionally they would hunt pigs with spears or shoot birds with sling-shots. It did not appear to be an everyday activity, partly due to shrinking forest cover.

General Comments about Resource Usage

An interesting observation was that no village made the complaint about a lack of resources or a declining resource base. Daemeter found this quite surprising given the large increase in population of this area and the loss of forest that has occurred over the last 15 years. Other areas where HCV assessments had taken place the local people were very concerned about the increasing population and loss of natural resources.

Another observation that was made was that even in very accessible areas there were still valuable timber trees standing (e.g. rosewood and vitex). Similarly, there were ngali nut trees in areas close by the villages that no one had gathered the nuts.

Table 14 HCV 5 Presence

Site name	HCV 5 Presence
Holy Water	**Not Present** - This is predominantly grassland. There is a small forested area around the river that runs through the block that the owner had taken the occasional tree for construction purposes. But he agreed that this was a tambu site and he should get trees from other areas that he owns.
Mbalisuna East	**Not Present** – The community lived some distance from this block and any HCV 5 related use was present outside the block.
Matepona	**Present** – HCV 5 was present in forested areas where the community harvested the occasional tree, some forest medicine and collected nuts.
Kautoga	**Present** – HCV 5 was present in forested areas where the community harvested the occasional tree, some forest medicine and collected nuts.
Solrice 1 and 2	**Not Present** – These blocks were grassland and there was no evidence of HCV 5 related use.

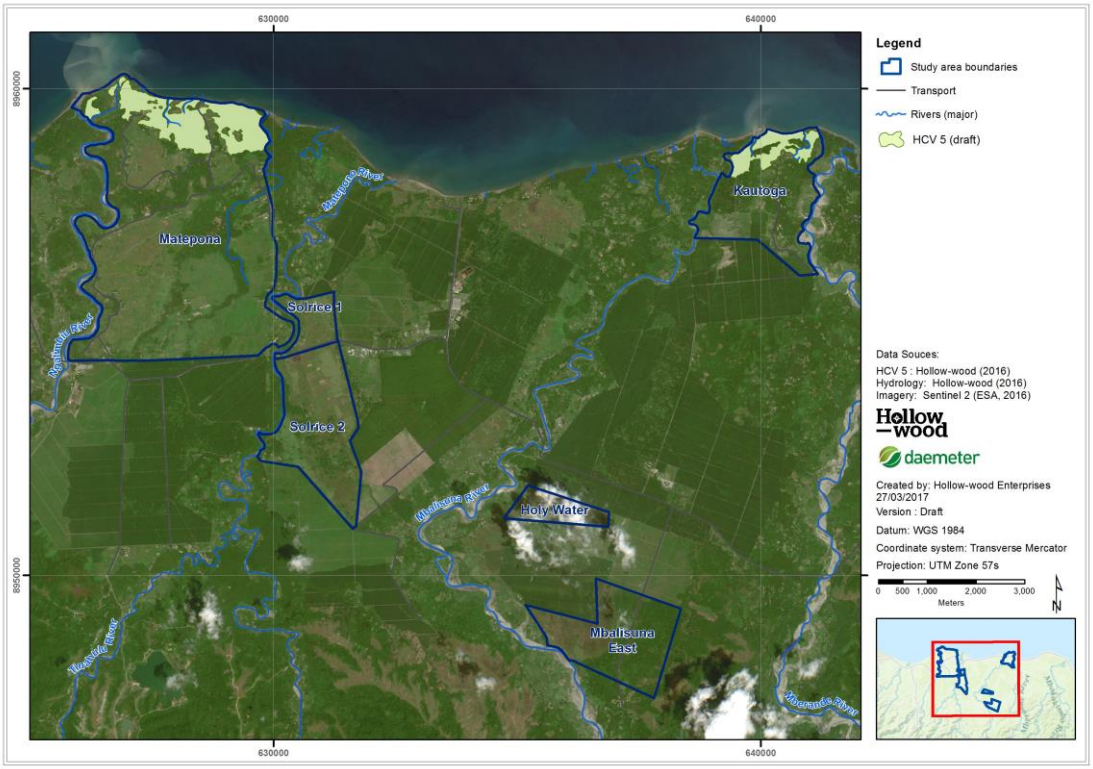


Figure 15 HCV 5 Areas

The above areas include forested areas where there are sufficient materials for construction and various herbs and berries are collected.

Findings in the AOI
The communities living in and around the AOI are reliant on natural areas for meeting their basic needs. A crucial consideration is ensuring adequate area is maintained for farming. **Therefore HCV 5 is deemed Present**.

HCV 6 - Cultural values

Interpretation

Key Question	Outcome
Does the AOI or surrounding landscape contain areas that are tied to cultural values critical to the traditional cultural identity of local communities, including areas of cultural, ecological, economic, religious or archaeological significance?	**Present**

Justification

There are a number of tambu[7] sites, cemeteries and relics from WW2 (which are protected by Solomon Is law) within the development area. These are mapped in Figure 16.

[7] Similar to "taboo" – forbidden places

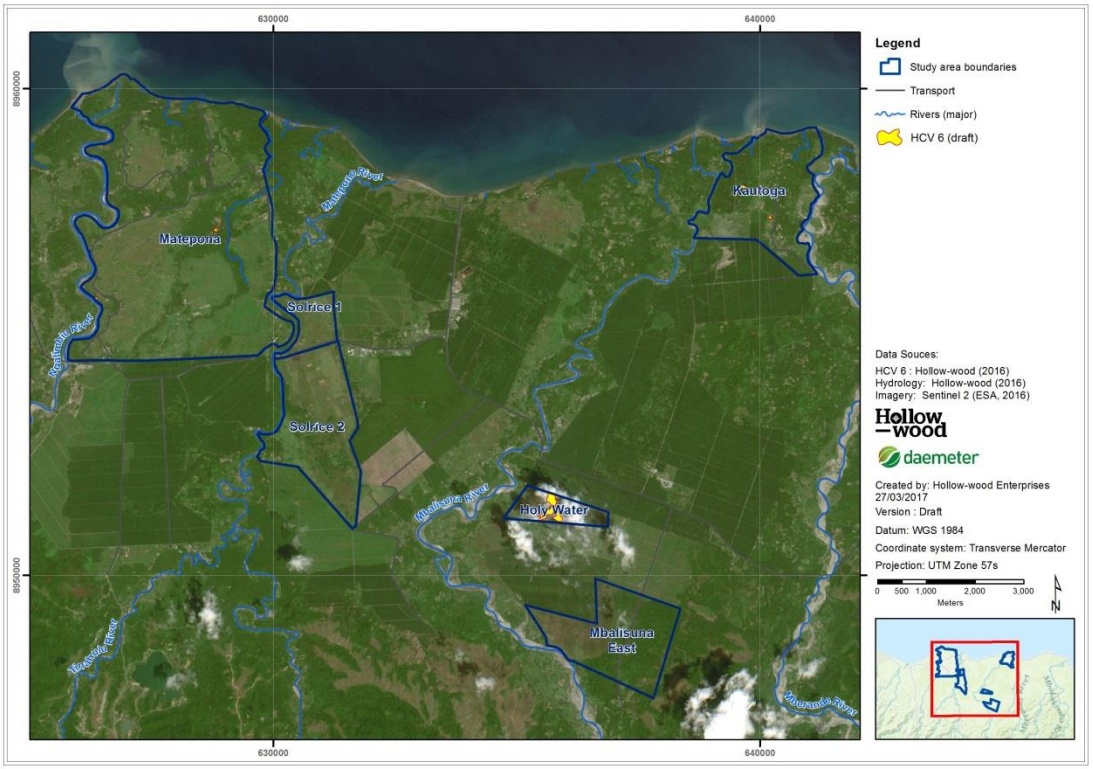


Figure 16 Location of HCV 6 Areas

The above map shows the location of HCV 6 areas identified. The assessor considers these maps as draft as the actual demarcation has to be done by the landowners on site prior to the land clearing. This will ensure that the areas are respected and preserved.

3.2.3 HCV stakeholder consultation outcomes

Interviews regarding the results of the HCV assessment were conducted by Hollow-wood between the 5th and the 8th of December 2016. These aimed to socialise the findings of the HCV assessment and provide an independent forum for discussion of any issues with the stakeholders relevant to each of the AOI's.

Table 15 Details of HCV stakeholder consultation

Date	Organisation	Name	Position	Discussion/ Assessor Response
06/12 /2016	Holy Water representatives	Mark Pohula and Charles Saemania	Land owners and community representatives	Findings of HCV assessment and the implications of the HCVMA that was identified during the field assessment. Discussion around the implication of the OP development and how land use will change in the HCVMA. Discussion around how no tree felling would be permitted in the HCVMA. Enclave areas were also identified during this discussion and the mapping for the site was amended to reflect this.

06/12 /2016	Kautoga Lands Association	Andrew Kohana, Billy Talu and Sale.	Association representatives	Discussion with the three representatives revealed that much more consultation is need at this site. This discussion was the first time that the community representatives had seen an aerial photograph of the land proposed for development. It was also evident that the association believed that they possessed more land (in hectares) than they actually do. An A1 format map of the proposed development areas was prepared for the association and they were encouraged to develop a draft land use plan with other community members.
07/12 /2016	Solrice 2	John Saki	Land owner and community representative	John had not seen a decent aerial image of the proposed development area and was very interested in what was presented. John has plans to develop and integrated farming enterprise that includes Oil Palm, market gardening, cattle and community use. John was also given a large format map that will be marked up as a draft land use plan.
07/12 /2016	Matepona area	Dr Paul Bosawai	Land owner and community representative	The Matepona site is complex and includes a range of land owners and land uses. Dr Bosawai was consulted as a representative of his family land. Dr. Bosawai and family are interested in developing a range of enterprises, which may include Oil Palm on areas considered suitable.
06/12 /2016	Solrice 1	Representatives not available at time of community consultation.		The land owner unavailable for consultation during the time on ground.
06/12 /2016	Mbalisuna East	Representatives not available at time of community consultation.		The land owners unavailable for consultation during the time on ground.

4.0 Soil and topography

A soil suitability study was carried out by an independent soils expert in August 2017. Following are the results of the findings.

4.1 Marginal and fragile soils

Marginal soils identified in proposed development areas

The soil associations HD and C can be considered marginal soils. The HD soil association occurs along the flood plains of the major rivers that drains the terraces. They consist of a Troporthent with excessively drained boulders and gravely loose sands. The soil is weakly acid to acid and is low in available nutrients and reserve potassium. Although this soil type is associated with a Tropofluvent (H), which is a loamy clay textured and base rich soil, with capacity to hold water, the occurrence of HD soils in the floodplains increases their risk of movement through flooding, which occurs several times a year (Hansell and Wall, 1973).

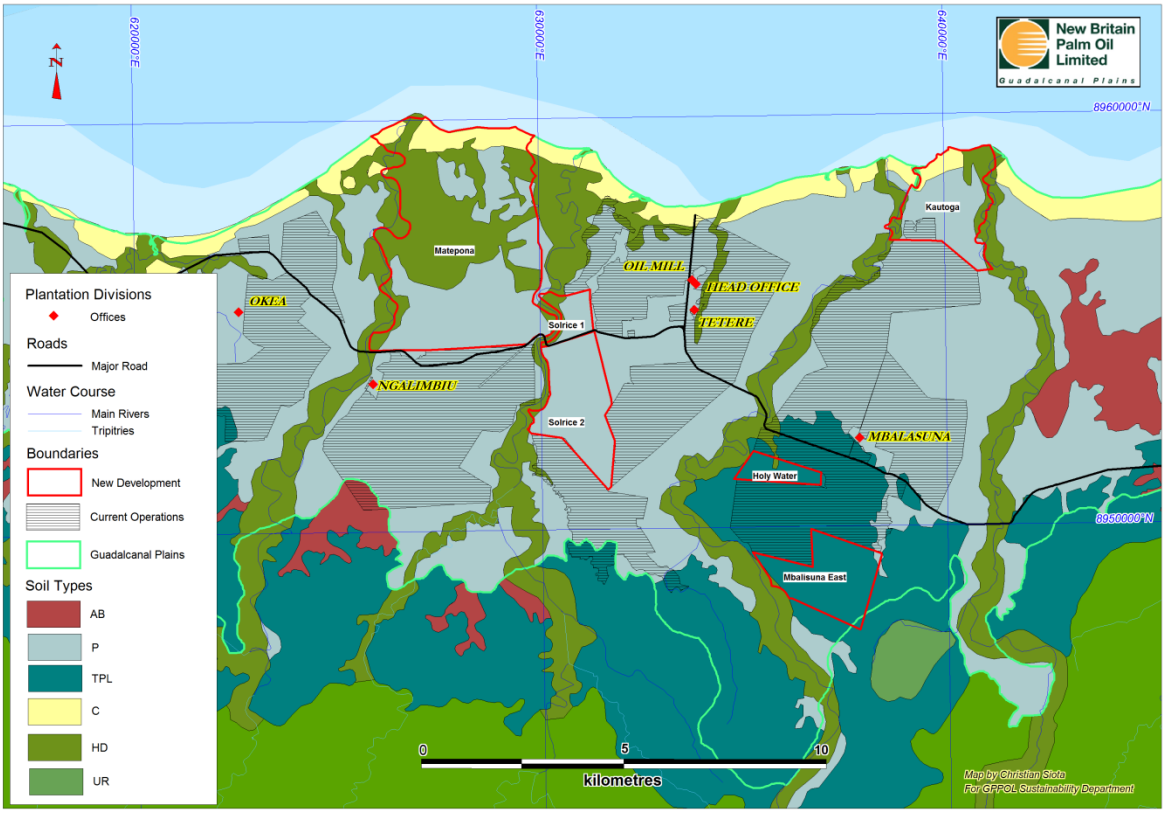


Figure 17 Map of soil types

The C soil association are mainly sandy and pale stony soils which are also classified as Troporthents. They occur in the northern boundary of the Metapono and Kautoga NDAs. They are not only stony but also excessively drained and prone to salination and coastal erosion from wave action.

Marginal soils can be developed with appropriate management according to the RSPO guidelines (NPP 2015). This may need to be considered in the Metapono New Development Areas (NDAs) given a large portion of the land area consisted of the HD soil association. However, in the other NDAs these soils only occupy smaller portions of the NDAs concerned, and especially on the boundaries. Thus, they are best left vegetated by natural forests as buffer zones along the rivers and shorelines to reduce speed of overland flow or flooding. They can also be reserved or vegetated for conservation and biodiversity purposes.

Fragile soils (including peat)

There are no indications of peat soils within the boundaries of the proposed NDAs, although peat soils are present in the Guadalcanal Plains. An example of the peat soils are the Tropohemists of the AB soil association (Hansell and Wall, 1973). They are found especially near the foothills and east of Mbarande river. A pit sampling and analysis of this soil type revealed an organic matter content (loss on ignition value) greater than 70% in the 0 – 50 cm depth (Hansell and Wall, 1973), thus meets the RSPO definition of a peat soil. Nonetheless, the absence of this soil type within the NDAs indicates that no management requirements relating to fragile or peat soils are necessary in these proposed NDAs.

4.2 Excessive gradients

There are no steep slopes found within the NDAs or in the Guadalcanal Plains area. The NDAs are generally flat with 0 – 2^0 slopes and therefore poses low erosion risks. However, given the flat and low elevations of the Guadalcanal Plains flooding is likely in the Metapono, Solrice 1& 2 and Kautoga NDAs. The likelihood of flooding is once in every two years (Hansell & Wall 1972), and therefore it is a minor limitation. Flooding is not a risk in the higher terraces of the Konga land system where the Holy Water and Mbalisuna East NDAs are located.

5.0 Summary of carbon stock assessment and GHG emissions

5.1 Land cover map of the new development area (include verification process)

This section covers the two methods of land cover assessment that were performed during the HCSA assessment, 1) being image classification of Landsat 8 imagery and 2) being interpretation of high resolution, UAV sourced imagery. Image pairs (LS8 and UAV) were developed for comparison purposes, this can be seen in Figure 21. The image classification results can be seen in Map 1[8]. An example of the image interpretation results can be seen in Map 2.

5.2 Accuracy assessment

The accuracy assessments presented in this section are conducted as per the methods outlined in Lunetta and Lyon (2004) and Lillesand *et al* (2004). The error matrix presented in Figure 19 shows an excellent result, with an overall accuracy of 97% and a k-statistic (Cohens kappa value) 0.97. Figure 18 is an assessment of the accuracy of the training samples developed for the land cover classification, with the high result being an indication of training polygon homogeneity, and therefore the spectral separability of each of the classes developed.

Figure 19 is an accuracy assessment of the classified image itself, with a sample of test pixels being compared against model output (i.e. the classified image).

60 test pixels were developed for each of the six classes (n=360) with values being assigned to each of the test pixels based on a manual interpretation of the image. This interpretation was then compared against the classified image. The overall accuracy of the classification was 92% with a k-statistic of 0.91. Both commission (over classification of the class) and omission error (under classification of the class) were generally low. A notable exception exists between the 'young regenerating forest' and 'scrub' classes, with both showing relatively high commission and omission error. This fact is consistent with the author's observations that the separation of such classes can be difficult due to their structural similarity, with major differences being species composition.

[8] Note Map references start with 3 in line with the sections of the original report

Reference data for training samples							
Classification Results	OL	HCSF	Scb	YRF	PLT	OW	Row Totals
OL	**122**	0	0	0	0	0	122
HCSF	0	**125**	0	1	0	0	126
Scb	0	0	**136**	10	1	0	147
YRF	0	8	0	**219**	0	0	227
PLT	0	0	3	0	**182**	0	185
OW	0	0	0	0	0	**152**	152
Column Totals	**122**	**133**	**139**	**230**	**183**	**152**	**959**

Overall accuracy = (122 + 125 + 136 + 219 + 182 + 152) / 959 = 97.6 %

K statistic = 0.97

Producers Accuracy (%)		
OL	122/122 =	100.0
HCSF	125/133 =	94.0
SCB	136/139 =	97.8
YRF	219/230 =	95.2
PLT	182/183 =	99.5
OW	152/152 =	100.0

Users Accuracy (%)		
OL	122/122 =	100.0
HCSF	125/126 =	99.2
SCB	136/147 =	92.5
YRF	219/227 =	96.5
PLT	182/185 =	98.4
OW	152/152 =	100.0

Figure 18 Error matrix for training samples created for the initial land cover classification

Reference data for test pixels							
Classification Results	OL	HCSF	Scb	YRF	PLT	OW	Row Totals
OL	**58**	0	2	2	0	0	62
HCSF	0	**54**	0	5	0	0	59
Scb	0	0	**57**	8	2	0	67
YRF	0	6	1	**45**	0	0	52
PLT	0	0	0	0	**58**	0	58
OW	2	0	0	0	0	**60**	62
Column Totals	**60**	**60**	**60**	**60**	**60**	**60**	**360**

Overall accuracy = (58 + 54 + 57 + 45 + 58 + 60) / 360 = 92.2 %

K statistic = 0.91

Comission Error (%)		
OL	4/62 =	6.5
HCSF	5/59 =	8.5
SCB	10/67 =	14.9
YRF	7/52 =	13.5
PLT	58/0 =	0.0
OW	2/62 =	3.2

Omission Error (%)		
OL	2/60 =	3.3
HCSF	6/60 =	10.0
SCB	3/60 =	5.0
YRF	15/60 =	25.0
PLT	2/60 =	3.3
OW	0/60 =	0.0

Figure 19 Error matrix for test pixels.

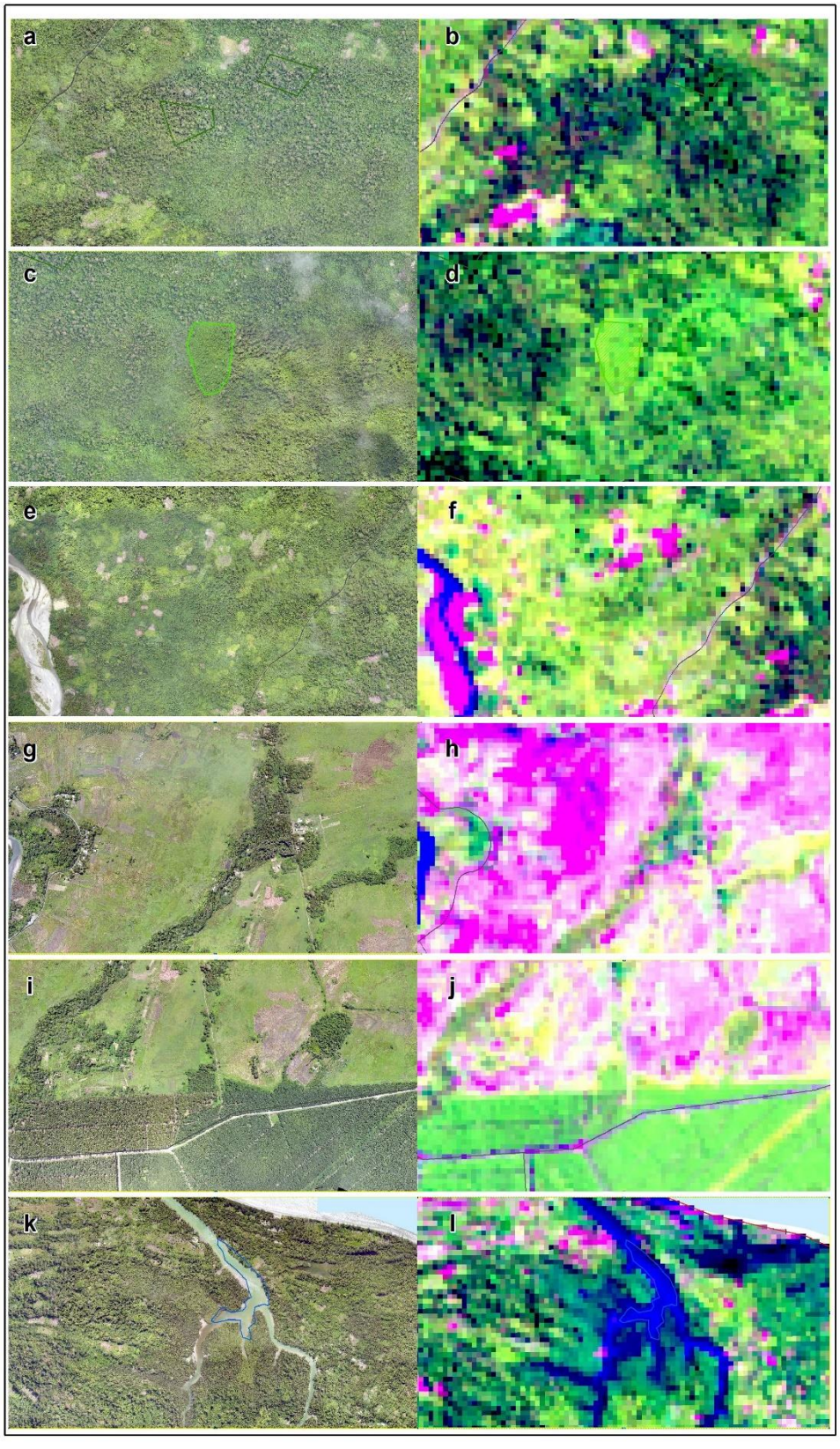
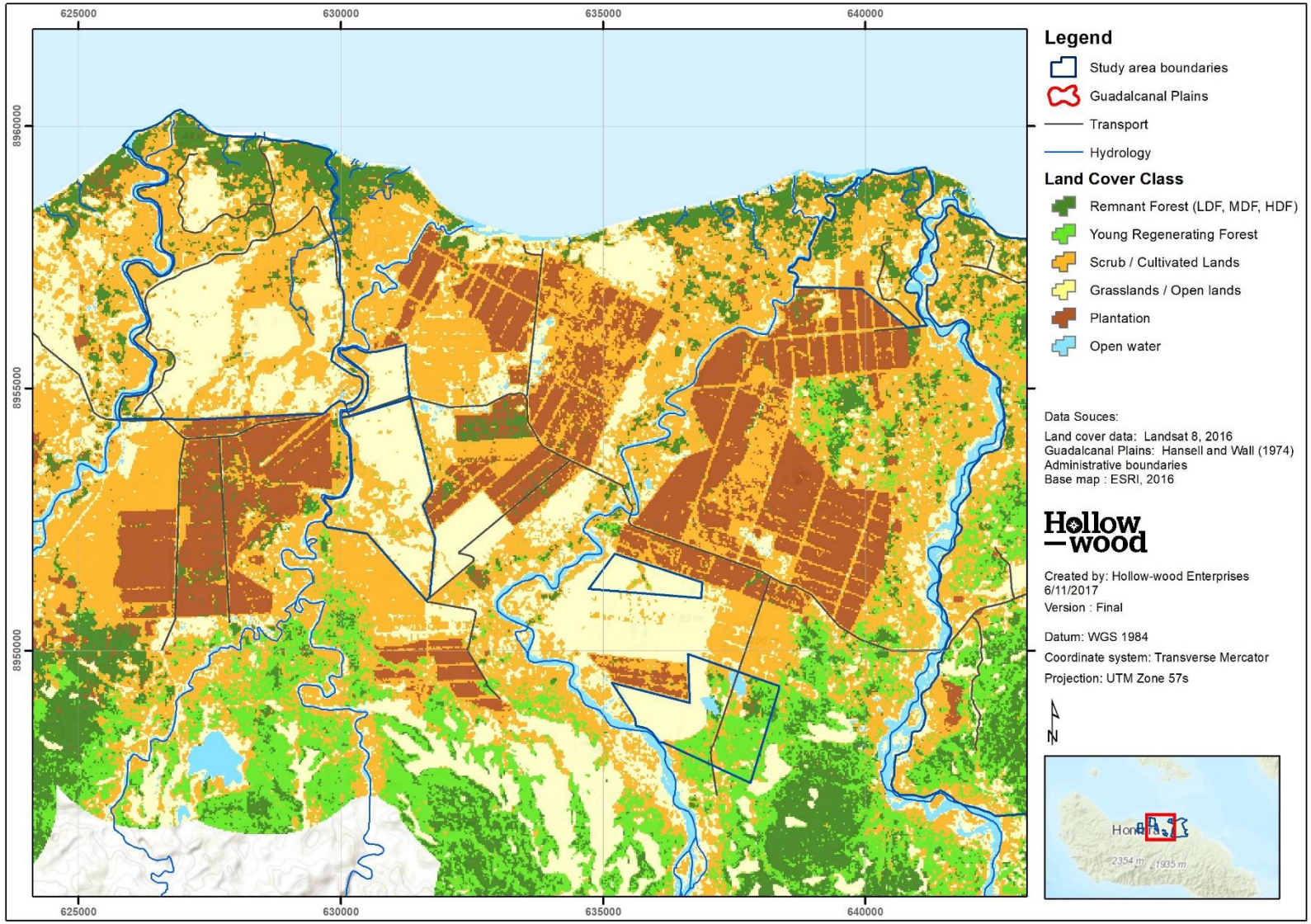


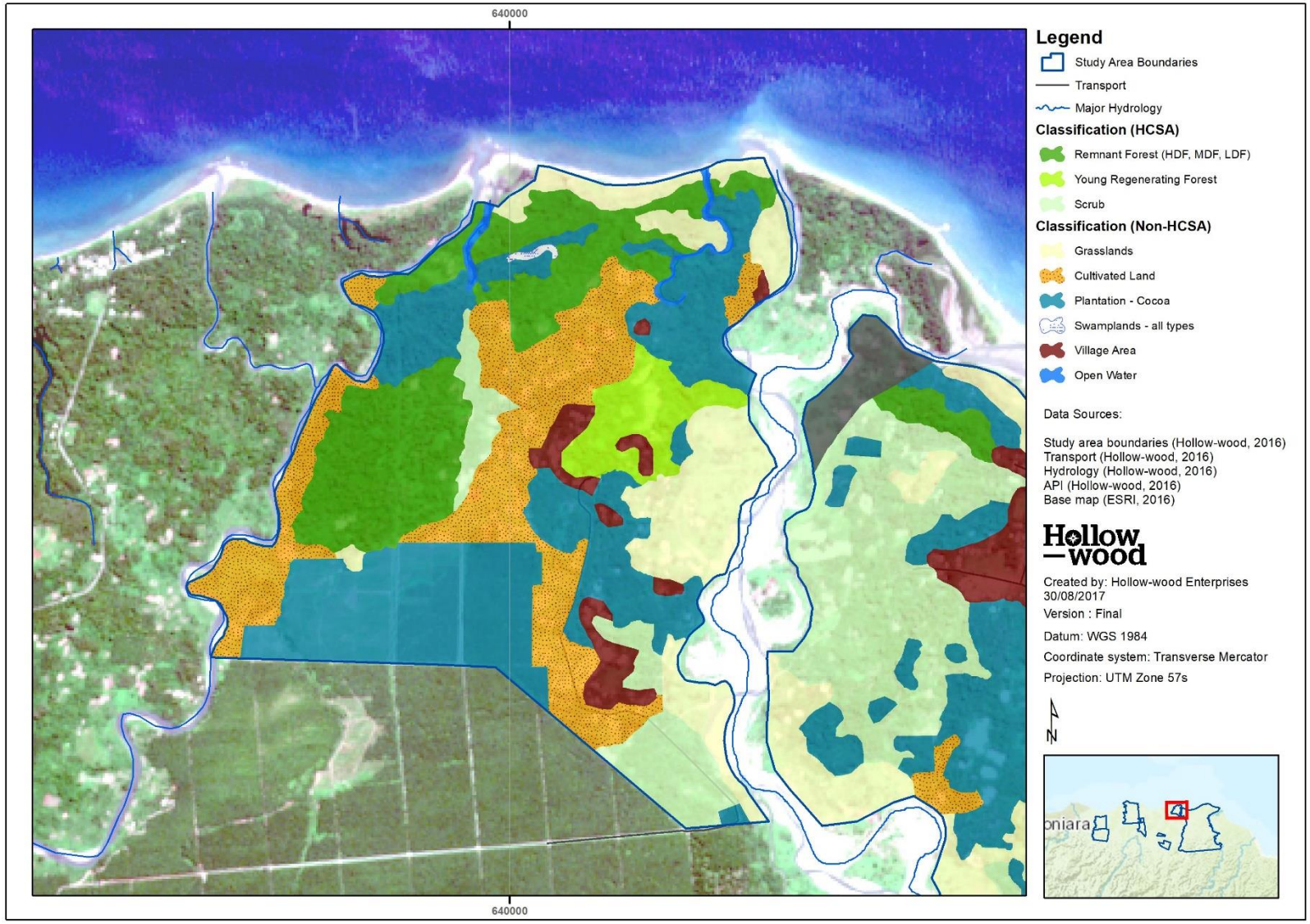
Figure 20 Image pairs developed for training purposes. Comparison of UAV (a) and Landsat 8 (b) imagery for class

'Remnant forest'. Comparison of UAV (c) and Landsat 8 (d) imagery for class 'Young forest'. Comparison of UAV (e) and

Landsat 8 (f) imagery for class ‘Cultivated land’. Comparison of UAV (g) and Landsat 8 (h) imagery for class ‘Open land’. Comparison of UAV (i) and Landsat 8 (j) imagery for class ‘Plantation’. Comparison of UAV (k) and Landsat 8 (l) imagery for class ‘Open water’. All Landsat 8 imagery is displayed using a 6, 5, 4 (False colour #1) band combination.



Map 1. Land cover classes derived from classification of Landsat 8 imagery.



Map 2. Example of land cover classes derived from interpretation of UAV imagery for the Kautoga development area.

5.3 Location of peat soils

Not applicable for this assessment. No peat soils present.

5.4 Carbon stock estimate per land cover class

The below table summarizes the estimate carbon stock per land cover class as per the classification system used by the High Carbon Stock Approach methodology. Note that the sample sizes (N) and standard errors (SE) indicated point toward the issue of being able to confidently distinguish Young Regenerating Forest. Thus while the SE for High Density Forest is quite high (due to a low N) this will not affect the estimate of carbon emissions as these forests are obvious and will not be converted, while the SE for Scrub, Young Regenerating Forest and Low Density Forest are all low corresponding to a high sample size.

Table 16 Carbon stock per land cover class

Strata	N	Stems ha^{-1}	Basal Area (m^2 ha^{-1})	Above ground Biomass (t ha^{-1})	Shoot:Root ratio	Below ground Biomass (t ha^{-1})	Total Biomass (t ha^{-1})	Carbon (t ha^{-1})	Carbon (t ha^{-1}) s.e
High Density Forest	5	728.0	56.0	681.7	0.205	139.7	821.4	386.1	67.3
Medium Density Forest	12	863.3	36.5	392.0	0.205	80.4	472.4	222.1	21.3
Low Density Forest	53	909.8	23.2	220.2	0.205	45.14	265.3	124.7	6.1
Young Regenerating Forest	58	930.0	16.2	130.3	0.205	26.7	157.0	73.8	4.4
Scrub	51	691.8	9.6	67.2	0.205	13.8	80.9	38.1	4.1
Total									

The total areas assessed for High Carbon Stock indicate the results of the High Carbon Stock Approach decision tree but do not indicate the net conversion potential of the development project. As part of implementing the HCSA methodology, and as part of being a member of the Palm Oil Innovation Group, sufficient land is set aside for "community use" so as to ensure that food security and future expansion of living areas are available. The "community use" areas were mapped through participatory means and resulted in areas being set aside by the communities. These areas are considered "enclaved" ie/removed from the potential conversion areas and excluded from the identification of GHG emissions. The results of the HCSA exercise, including the community use areas to be "enclaved" can be seen in the table below.

Table 17. HCSA land classifications and development options for gross area

Classification	Conserve (ha)	Develop (ha)	Enclave (ha)	Indicative Conserve (ha)	Indicative Develop (ha)	Grand Total (ha)
Cultivated Land	20.49	41.09	74.20	0.0	0.0	135.78
Grasslands	80.74	1437.16	265.36	0.0	0.0	1783.26
Low Density Forest	321.66	21.24	0.0	0.0	0.0	342.90
Open Water	0.0	0.0	14.34	0.0	0.0	14.34

Plantation - Cocoa	1.80	0.0	6.79	0.0	0.0	8.59
Plantation - Coconut	140.64	30.24	36.47	0.0	0.0	207.35
Plantation - Oil Palm	0.0	0.0	73.45	0.0	0.0	73.45
Sago Palm Swampland	0.0	0.0	0.89	0.0	0.0	0.89
Scrub	123.82	190.02	54.78	11.20	391.57	771.40
Village Area	3.75	0.0	101.60	0.0	0.0	105.35
Young Reg Forest	25.42	6.25	30.06	0.0	0.0	61.73
Grand Total	**718.33**	**1726.00**	**657.94**	**11.20**	**391.57**	**3505.04**

Note that the above table is indicative of the entire study area and does not include the areas that the land owners have agreed to develop into oil palm plantations. The following table summarises only the areas that the land owners have authorized for development.

Table 18. Net area authorised for development

Classification	Conserve (ha)	Develop (ha)	Indicative Conserve (ha)	Indicative Develop (ha)	Grand Total (ha)
Cultivated Land	8.42	41.09	0.0	0.0	49.51
Grasslands	26.8	1437.16	0.0	0.0	1463.96
Low Density Forest	255.46	21.24	0.0	0.0	276.7
Plantation - Coconut	121.21	30.24	0.0	0.0	151.45
Scrub	111.64	190.02	11.2	391.57	704.43
Young Regenerating Forest	25.12	6.25	0.0	0.0	31.37
Grand Total	**548.65**	**1726.00**	**11.20**	**391.57**	**2677.42**

To detail this out further in order to show the contribution of HCSA and/or HCVMA to the total absolute Conserve category the following tables are useful.

Table 19 HCVMA and HCSA Contribution per Classification

Classification	Conserve (ha)		Indicative Conserve (ha)	Indicative Develop (ha)	Develop (ha)	Grand Total (ha)
	HCSA	HCVMA				
Cultivated Land	0.0	8.42	0.0	0.0	41.09	49.51
Grasslands	0.0	26.80	0.0	0.0	1437.16	1463.96
Low Density Forest	78.32	177.13	0.0	0.0	21.24	276.70
Plantation - Coconut	0.0	121.21	0.0	0.0	30.24	151.45
Scrub	0.0	111.64	11.20	391.57	190.02	704.44
Young Regenerating Forest	0.0	25.12	0.0	0.0	6.25	31.37
Grand Total	78.32	470.33	11.20	391.57	1726.00	2677.42

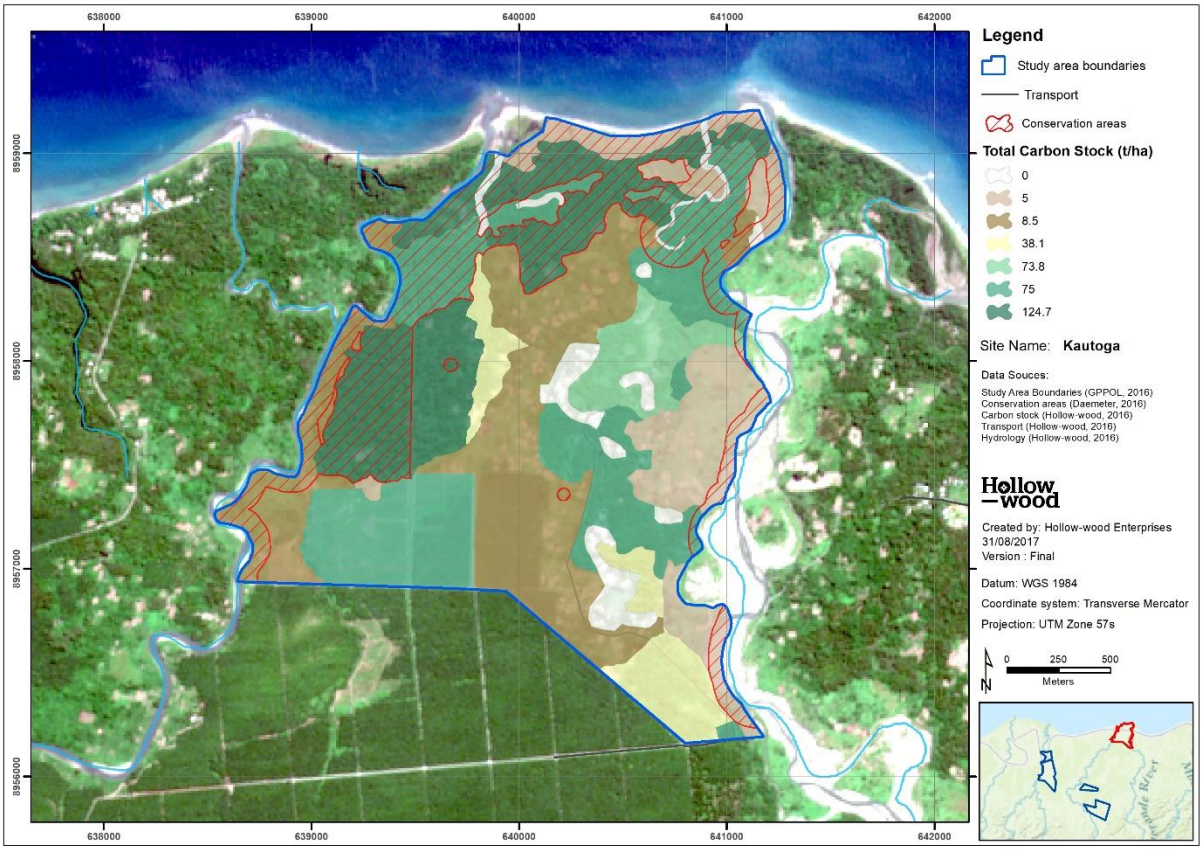
Table 20 HCVMA and HCSA per AOI

AOI	Conserve (ha)		Develop (ha)	Indicative Conserve (ha)	Indicative Develop (ha)	Grand Total (ha)
	HCSA	HCVMA				
Holy Water	0.0	10.98	87.69	0.0	0.0	98.67
Kautoga	0.0	49.10	60.31	0.0	0.0	109.41
Matepona	78.32	336.22	1038.32	11.20	391.57	1855.64
Mbalisuna East	0.0	74.03	201.76	0.0	0.0	275.79
Solrice 1	0.0	0.0	45.71	0.0	0.0	45.71
Solrice 2	0.0	0.0	292.21	0.0	0.0	292.21
Grand Total	78.32	470.33	1726.00	11.20	391.57	2677.42

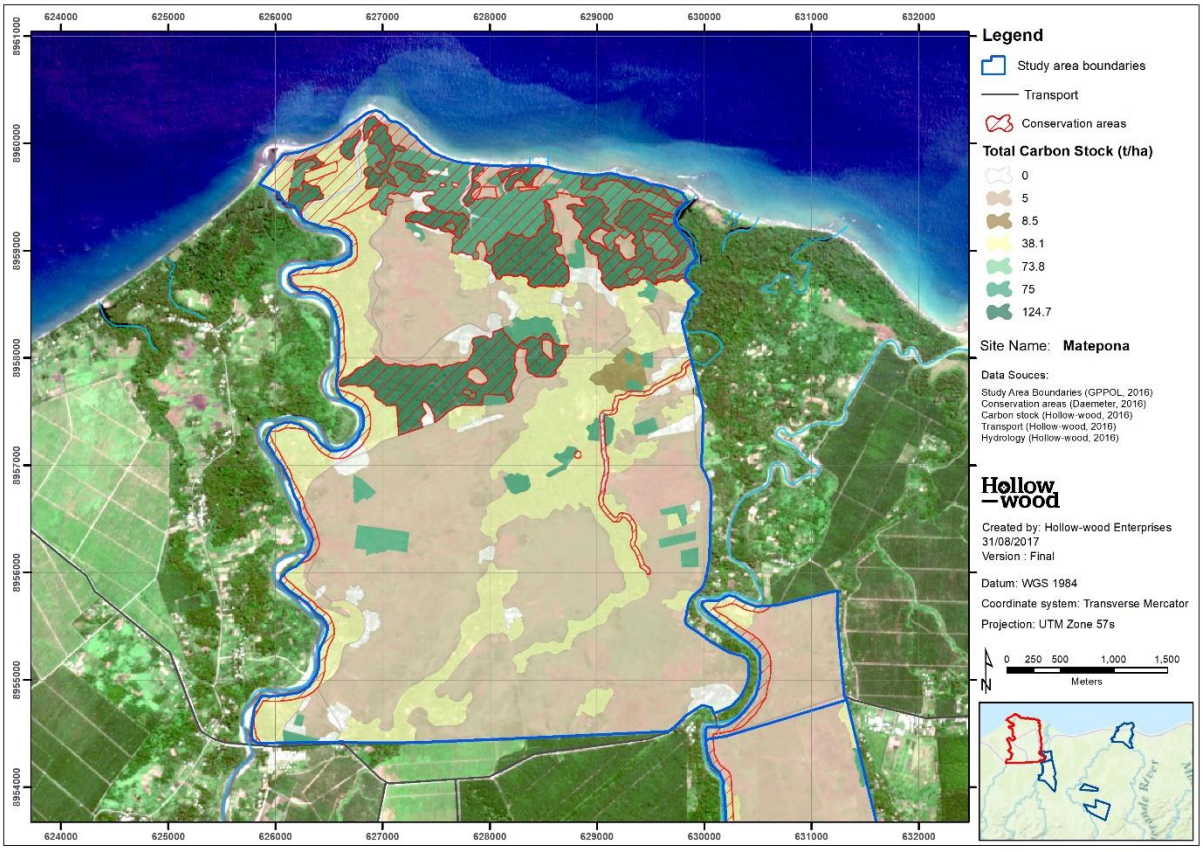
5.5 Carbon stock maps

This section reports two carbon stock map sets. Maps 5–10 report the total carbon stock estimated for the gross study areas and Maps 11-16 report on the total carbon stock estimated for the net developable areas (as discussed above).

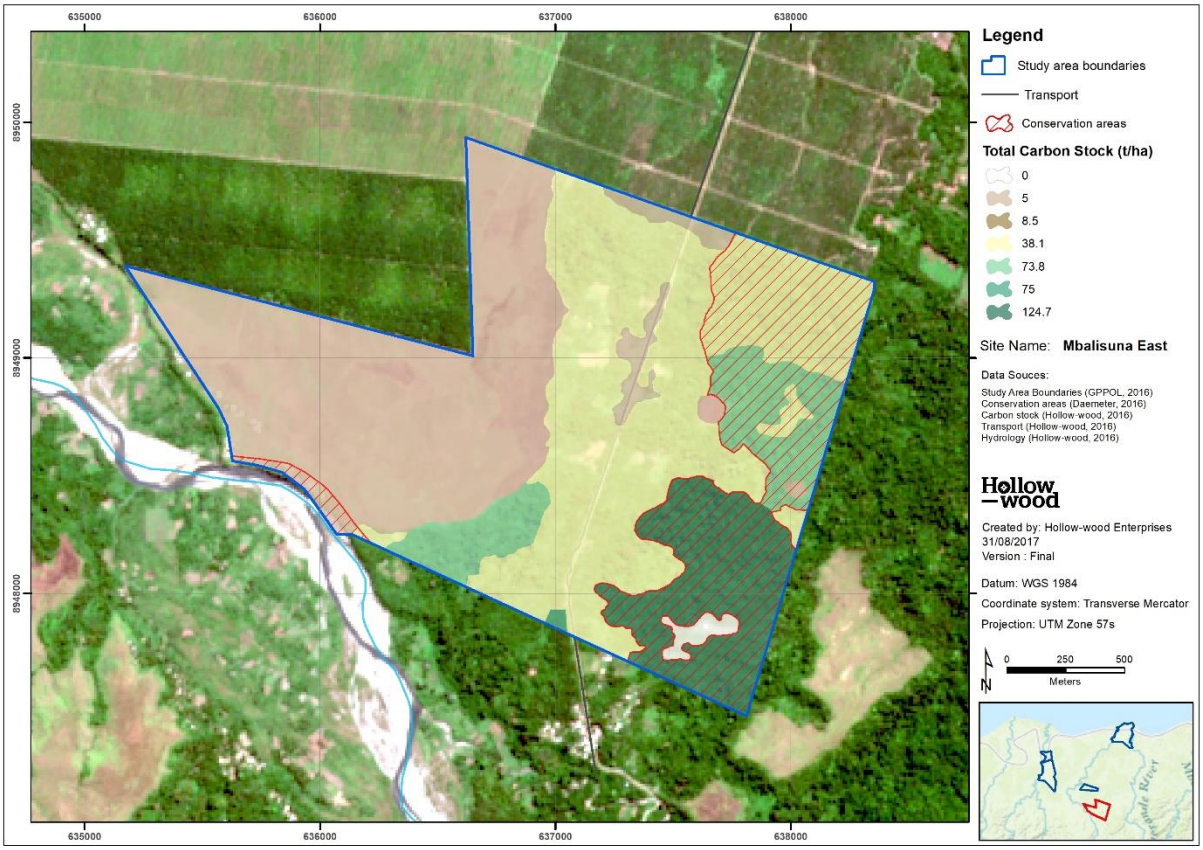
Map 3. Carbon stock estimates for the gross study area at Holy Water



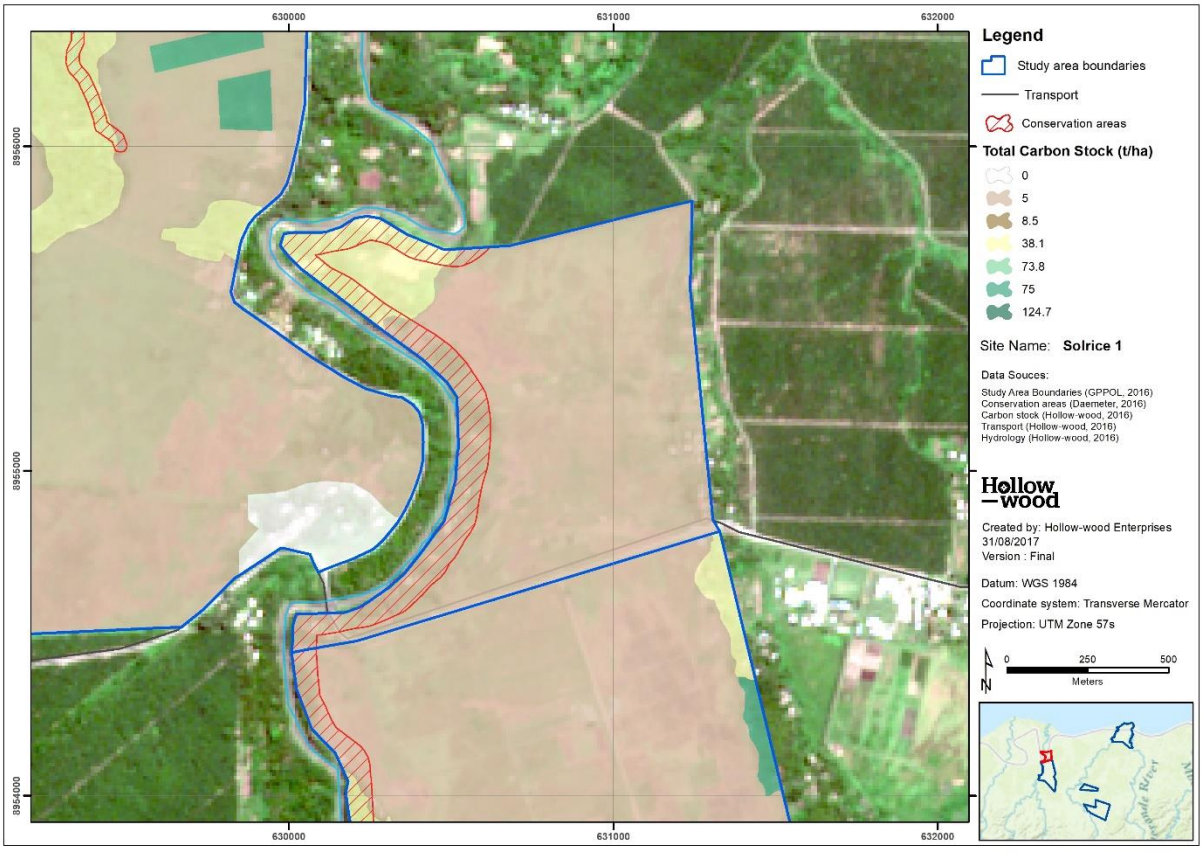
Map 4. Carbon stock estimates for the gross study area at Kautoga



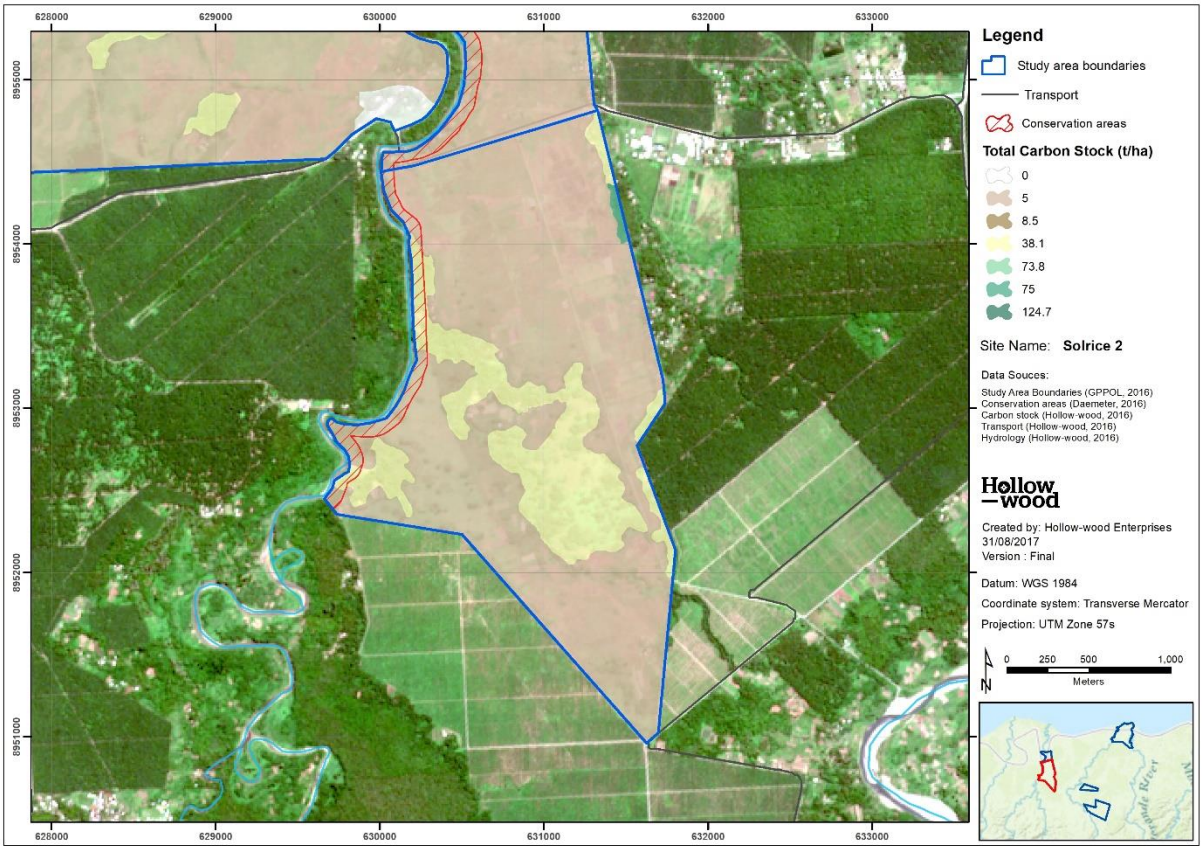
Map 5. Carbon stock estimates for the gross study area at Matepona



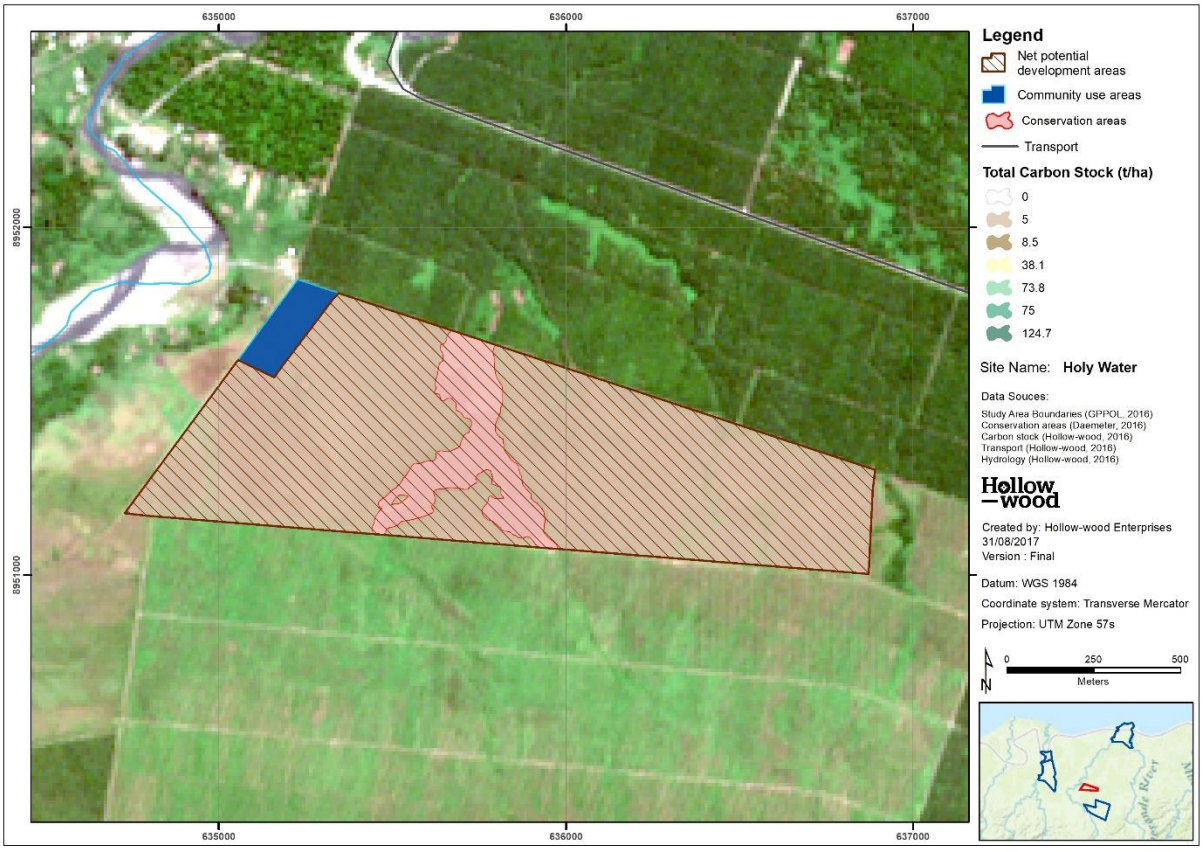
Map 6. Carbon stock estimates for the gross study area at Mbalisuna East.



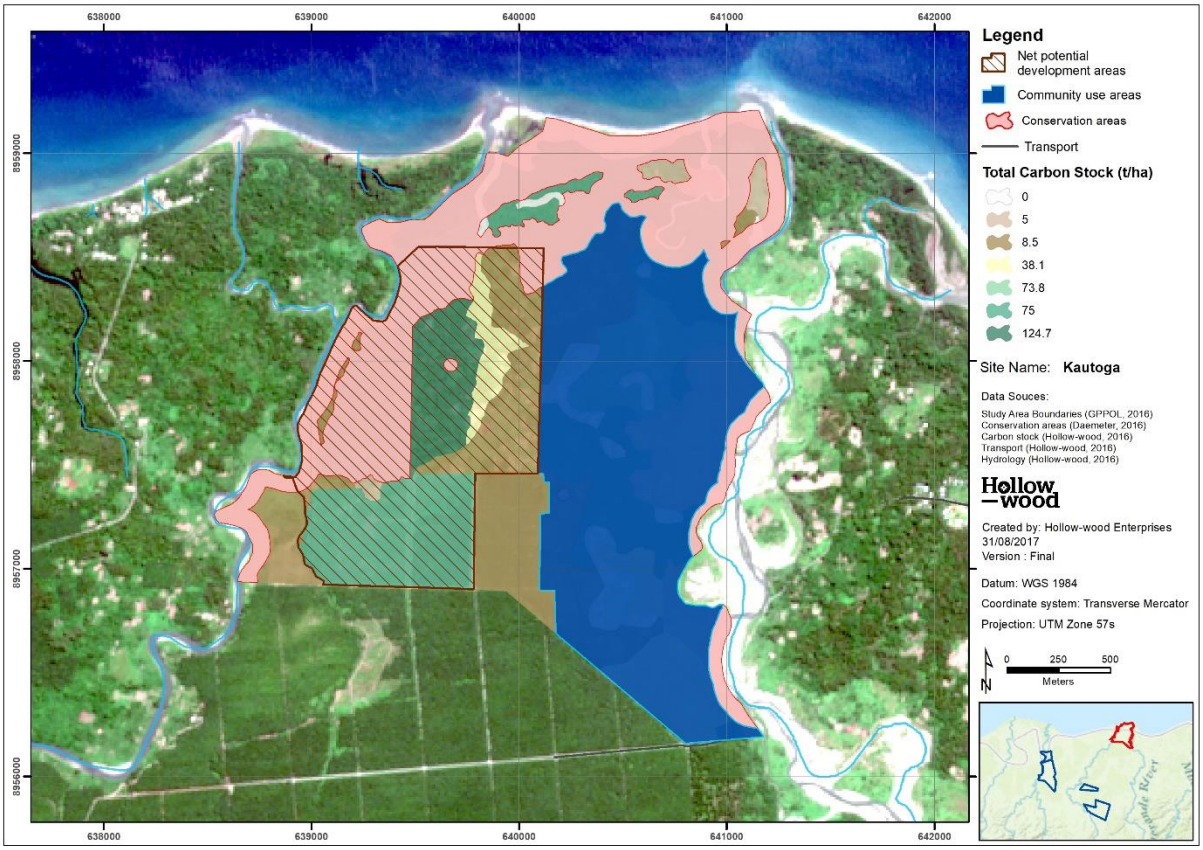
Map 7. Carbon stock estimates for the gross study area at Solrice 1



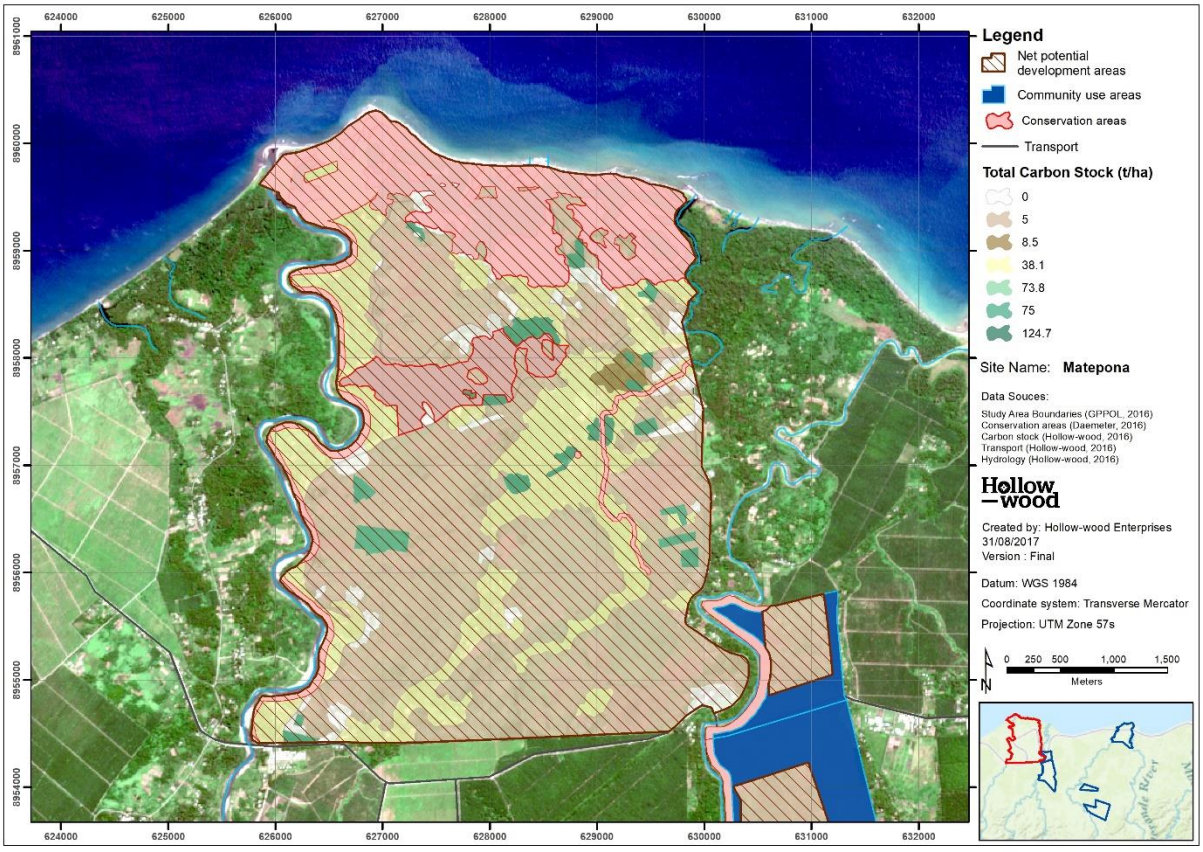
Map 8. Carbon stock estimates for the gross study area at Solrice 2



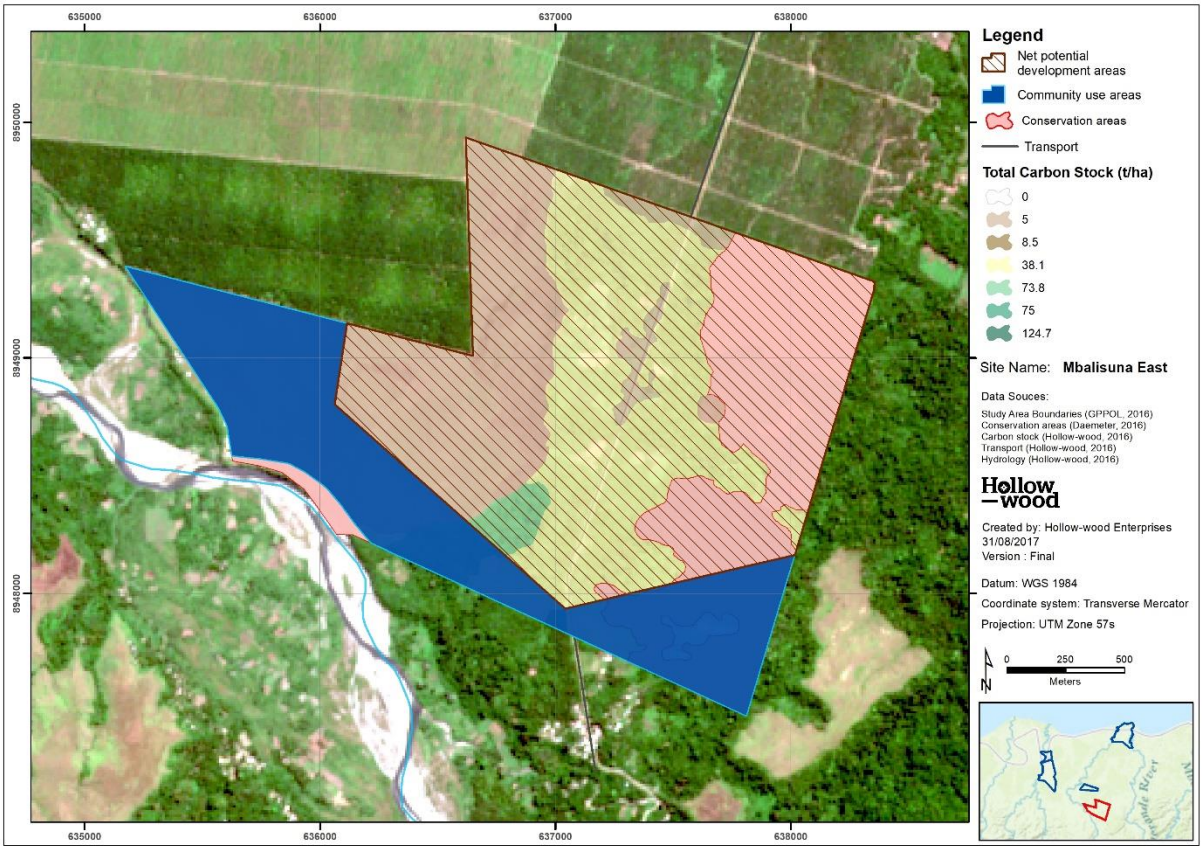
Map 9. Carbon stock estimates for the net developable area at Holy Water



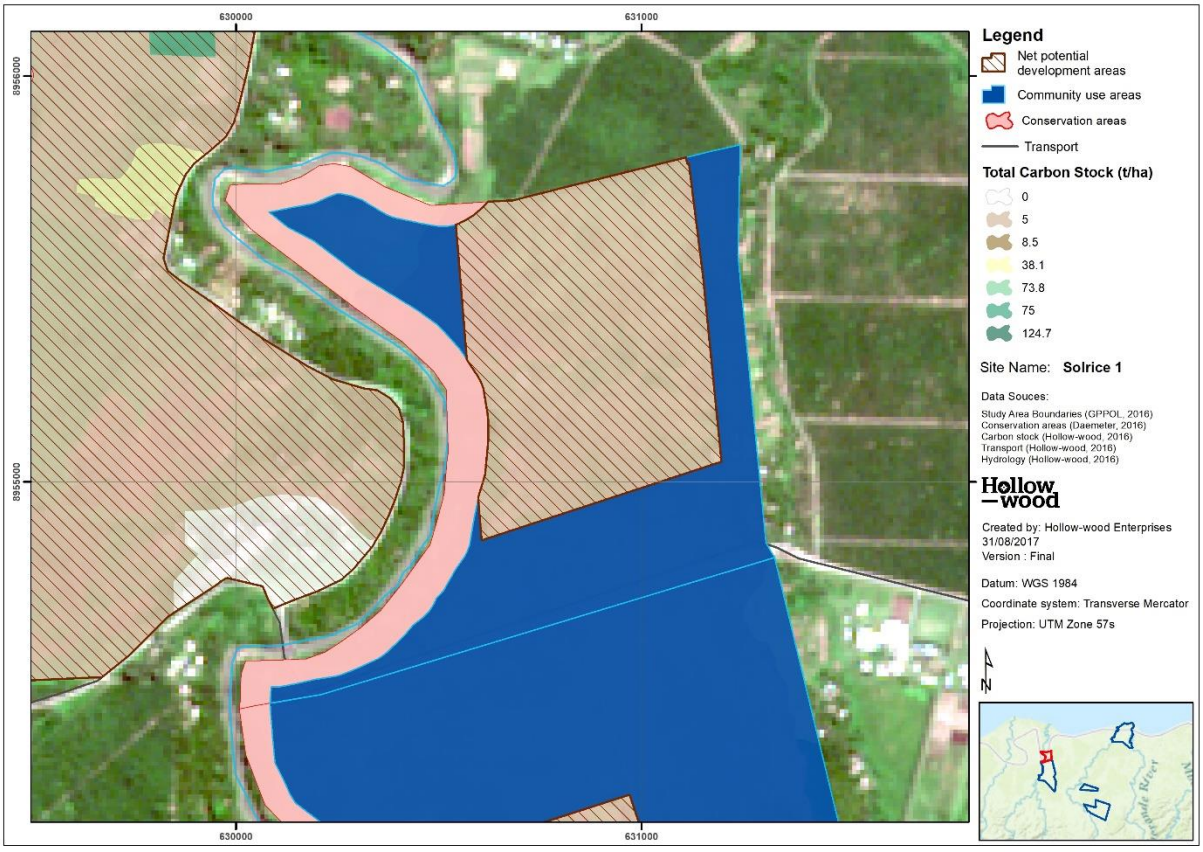
Map 10. Carbon stock estimates for the net developable area at Kautoga



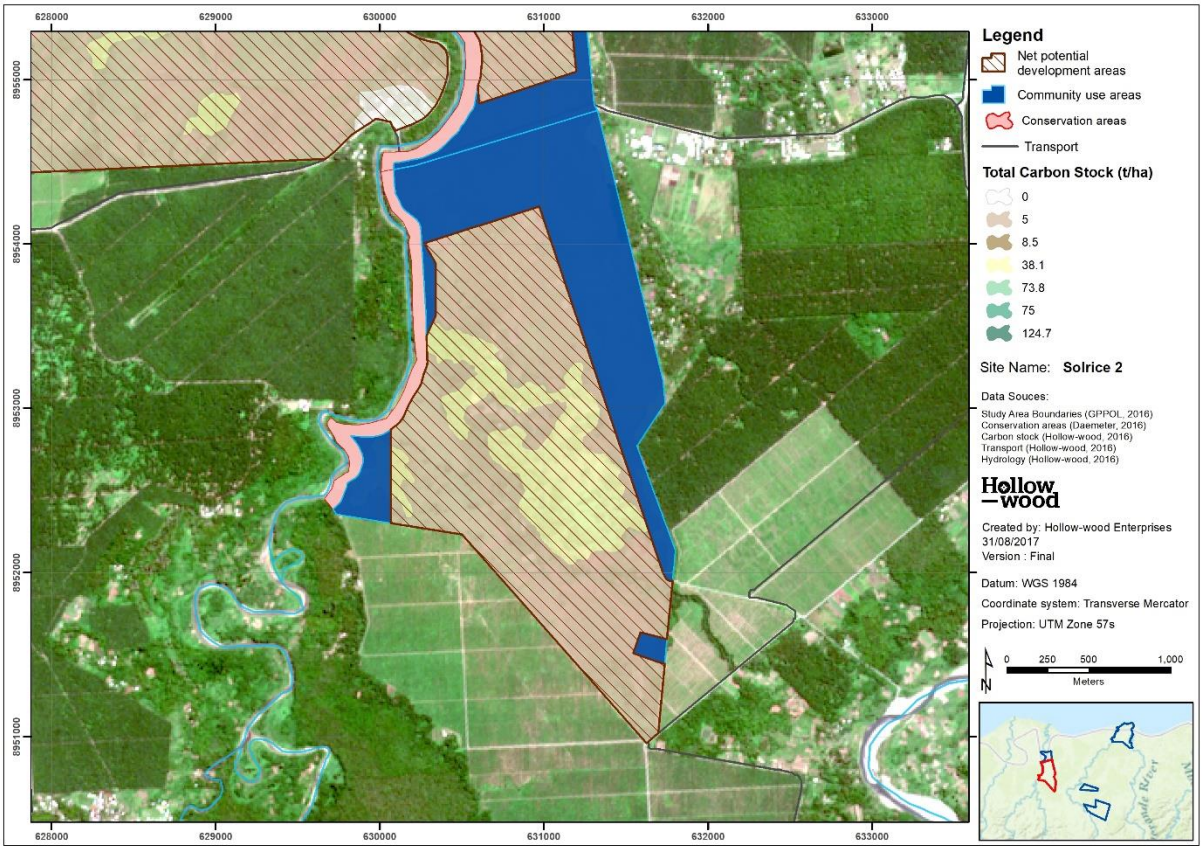
Map 11. Carbon stock estimates for the net developable area at Matepona



Map 12. Carbon stock estimates for the net developable area at Mbalisuna East



Map 13. Carbon stock estimates for the net developable area at Solrice 1



Map 14. Carbon stock estimates for the net developable area at Solrice 2.

5.6 Scenario testing through patch analysis

This section utilises the HCS forest patch analysis decision tree detailed in Chapter 6 of HCSA (2015), and is performed on areas identified as HCSA forest strata (i.e. forest area identified as either HDF, MDF, LDF or YRF). This section incorporates all of findings of HCV and SIA assessments, as such all the HCV areas are automatically earmarked as Conserve in this analysis.

Patch analysis is based on the concept of the *ecological viability* of a forest patch, and is largely a GIS based desktop exercise that utilises measurables such as patch 'core area' (i.e. how much of the patch area is exposed to edge effects) patch connectivity (i.e. how close the patch is to other patches) and patch risk (i.e. how close the patch is to human settlement or access routes) to prioritise areas for conservation and identify areas with development potential. Refer to HCSA (2015) for further detail regarding the conservation science theory supporting patch analysis.

Based on the definition reported above in Section 1.3, the landscape is considered to be of 'low forest cover' with the pathway through the patch analysis decision tree adding more weight to the conservation of medium and low priority HCS patches. As an output of patch analysis, each HCSA forest patch is assigned a class relating to development opportunity, these are as follows;

Conserve: Areas identified as either high priority patches (HPP) during Step 3 or medium priority (MPP) patches that fulfil the risk assessment requirements of Step 7.

Indicative Conserve: Patches with this class require the input of further field checking and/or a Rapid Biodiversity Assessment (RBA), as seen in Steps 8-10 in the decision tree. These areas may also be identified for conservation during HCV assessment. Potential areas of HCV 4 (i.e. ecosystem services) may be counted in this class

Indicative Develop: These areas are generally highly disturbed ecosystems and have not been considered HCSA forest or small low priority patches (LPP) that may have operational constraints or

high biodiversity values as per Steps 9 – 11 in the decision tree. The development potential of areas in this category will be subject to the outcome of HCV assessment (potential social constraints) or will be excluded due to slope, elevation, riparian buffers or the presence of peatlands/swamplands

Develop: Area in this category are considered available for development. This includes areas of grasslands and existing plantation old plantation estate, such as coconuts, hardwood or cocoa.

Patches classified as medium priority (MPP) are subject to a risk analysis that uses the proximity of MPPs to public roads, settlements and waterways that are utilised for navigation or transport. This is a GIS exercise, with landscape features being buffered by distances prescribed in Step 7 of the decision tree. Settlements and roads were the main focus of the risk analysis, with all of the study areas are within either 1km of a road or 2km of a settlement, making this a high risk landscape.

Excessive slope (i.e. that greater than 5^{o}) is an operational constraint needing to be factored into decision making, although the paucity of topographic data available for this study made this process difficult within the GIS environment. Slope analysis was performed using the Synthetic Aperture Radar (SAR) derived ASTER DEM as an input, then using the 'slope' (spatial analyst) tool within ArcGIS to convert elevation values to slope values.

The slope dataset created during this process is indicative at best. Due to the combination of spatial resolution (30m pixels) and data capture method (i.e. SAR), surface features such as forest canopy (surface roughness) may be falsely interpolated during the analysis as ground slope. While the ASTER DEM is useful to understand relative elevation differences, its use in higher resolution, operational planning is limited.

5.7 Identification of all likely significant sources of GHG emissions and sequestration related to the proposed development

The total areas assessed for High Carbon Stock as represented in Figure 24 indicate the results of the High Carbon Stock Approach decision tree but do not indicate the net conversion potential of the development project. As part of implementing the HCSA methodology, and as part of being a member of the Palm Oil Innovation Group, sufficient land is set aside for "community use" so as to ensure that food security and future expansion of living areas are available. The "community use" areas were mapped through participatory means and resulted in areas being set aside by the communities. These areas are considered "enclaved" ie/removed from the potential conversion areas and excluded from the identification of GHG emissions. The results of the HCSA exercise, including the community use areas to be "enclaved" can be seen in the table below.

Table 21 HCSA land classifications and development options for gross area

Classification	Conserve (ha)	Develop (ha)	Enclave (ha)	Indicative Conserve (ha)	Indicative Develop (ha)	Grand Total (ha)
Cultivated Land	20.49	41.09	74.20			135.78
Grasslands	80.74	1437.16	265.36			1783.26
Low Density Forest	321.66	21.24				342.90
Open Water			14.34			14.34
Plantation - Cocoa	1.80		6.79			8.59
Plantation - Coconut	140.64	30.24	36.47			207.35
Plantation - Oil Palm			73.45			73.45
Sago Palm Swampland			0.89			0.89
Scrub	123.82	190.02	54.78	11.20	391.57	771.40

Village Area	3.75		101.60			105.35
Young Reg Forest	25.42	6.25	30.06			61.73
Grand Total	**718.33**	**1726.00**	**657.94**	**11.20**	**391.57**	**3505.04**

Note that the above table is indicative of the entire study area and does not include the areas that the land owners have agreed to develop into oil palm plantations. The following table summarizes only the areas that the land owners have authorized for development.

Table 22 Net area authorized for development

Classification	Conserve (ha)	Develop (ha)	Indicative Conserve (ha)	Indicative Develop (ha)	Grand Total (ha)
Cultivated Land	8.42	41.09			49.51
Grasslands	26.8	1437.16			1463.96
Low Density Forest	255.46	21.24			276.7
Plantation - Coconut	121.21	30.24			151.45
Scrub	111.64	190.02	11.2	391.57	704.43
Young Regenerating Forest	25.12	6.25			31.37
Grand Total	**551.77**	**1726.00**	**11.20**	**391.57**	**2677.42**

Map and description of all areas of significant carbon stocks

The above areas have been mapped and are provided in greater detail for future management purposes. All of the maps are included in detail in Annex 2.

5.8 Land conversion scenarios

In order to assess the emissions potential of the proposed conversion the net areas to be managed as per Table 20 are tested through 3 different scenarios. Each conversion scenario makes a different assumption regarding the type of conservation type which will be retained or converted into oil palm. All of the scenarios assume that there will be no methane capture during the first rotation of the oil palm plantation, though this may change depending on financing. The scenarios that were tested area as follows.

Table 23 Land conversion scenarios

Scenario 1	Only areas indicated as “Conserve” are conserved. All Develop, Indicative Conserve and Indicative Develop are developed. No Methane capture is installed in the next 5 years.
Scenario 2	All areas classified as “Conserve” and “Indicative Conserve” are conserved. All Develop and Indicative Develop are developed. No Methane capture is installed in the next 5 years.
Scenario 3	All areas classified as “Conserve” and “Indicative Conserve” and “Indicative Develop” are Conserved. No Methane capture is installed in the next 5 years.

The resulting amounts of hectares potentially converted or retained are summarized in the following tables.

Table 24 Conversion scenario 1

Classification	Conserve	Indicative	Indicative	Develop	Total	Total	Grand

		Conserve	Develop		Conserve	Develop	Total
Cultivated Land	8.42			41.09	8.42	41.09	49.51
Grasslands	26.80			1437.16	26.80	1437.16	1463.96
Low Density Forest	255.46			21.24	255.46	21.24	276.70
Plantation – Coconut	121.21			30.24	121.21	30.24	151.45
Scrub	111.64	11.20	391.57	190.02	111.64	592.80	704.44
Young Regenerating Forest	25.12			6.25	25.12	6.25	31.37
Grand Total	548.65	11.20	391.57	1726.00	548.65	2128.77	2677.42

Table 25 Conversion scenario 2

Classification	Conserve	Indicative Conserve	Indicative Develop	Develop	Total Conserve	Total Develop	Grand Total
Cultivated Land	8.42			41.09	8.42	41.09	49.51
Grasslands	26.80			1437.16	26.80	1437.16	1463.96
Low Density Forest	255.46			21.24	255.46	21.24	276.70
Plantation – Coconut	121.21			30.24	121.21	30.24	151.45
Scrub	111.64	11.20	391.57	190.02	122.84	581.60	704.44
Young Regenerating Forest	25.12			6.25	25.12	6.25	31.37
Grand Total	548.65	11.20	391.57	1726.00	559.85	2117.57	2677.42

Table 26 Conversion scenario 3

Classification	Conserve	Indicative Conserve	Indicative Develop	Develop	Total Conserve	Total Develop	Grand Total
Cultivated Land	8.42			41.09	8.42	41.09	49.51
Grasslands	26.80			1437.16	26.80	1437.16	1463.96
Low Density Forest	255.46			21.24	255.46	21.24	276.70
Plantation – Coconut	121.21			30.24	121.21	30.24	151.45
Scrub	111.64	11.20	391.57	190.02	514.42	190.02	704.44
Young Regenerating Forest	25.12			6.25	25.12	6.25	31.37
Grand Total	548.65	11.20	391.57	1726.00	951.42	1726.00	2677.42

The following table summarizes the 3 scenarios and highlights the selected development scenario.

Table 27 Summary of conversion scenarios

	Scenario 1		**Scenario 2**		**Scenario 2**	
Classification	Total Conserve	Total Develop	Total Conserve	Total Develop	Total Conserve	Total Develop
Cultivated Land	8.42	41.09	8.42	41.09	8.42	41.09
Grasslands	26.80	1437.16	26.80	1437.16	26.80	1437.16
Low Density Forest	255.46	21.24	255.46	21.24	255.46	21.24
Plantation - Coconut	121.21	30.24	121.21	30.24	121.21	30.24
Scrub	111.64	592.80	122.84	581.60	514.42	190.02
Young Regenerating Forest	25.12	6.25	25.12	6.25	25.12	6.25
Grand Total	548.65	2128.77	559.85	2117.57	951.42	1726.00

Note that the above are meant only to communicate the total potential conversion potential under each scenario. Because Matepona will be developed by independent smallholders it is not clear yet which areas for development will be converted. In order to give a conservative estimate of the greenhouse gas emissions, it is assume that all those areas in Matepona set aside for development will be developed. It is however not likely that this will happen as the total area available for conversion in Matepona far exceeds their possible management capacity.

5.9 Results of the Green House Gas Emissions Scenarios Modelling

The land conversion scenarios were utilized as basic inputs into modelling the potential Green House Gas emissions resulting from the implementation of each scenario. The following tables summarize the results of modelling obtained by using the RSPO New Development Greenhouse Gas Calculator RSPO-PRO-T04-003 V2.0 ENG and utilizing the above land cover classifications coupled with the carbon density values found during the High Carbon Stock study. For vegetation types, grasslands and coconut, default values were used. Note that for each scenario a different amount of land is assumed to be put into conservation. The following table summarizes net field emissions and sinks results of the 3 land conversion scenarios.

Table 28 Summary of GHG Emissions Scenarios

	SCENARIO 1			SCENARIO 2			SCENARIO 3		
	t CO2e	*t CO2e/ha*	t CO2e/t FFB	t CO2e	t CO2e/ha	t CO2e/t FFB	t CO2e	t CO2e/ha	t CO2e/t FFB
Land clearing	*5207.56*	*2.58*	0.12	5144.98	2.56	0.12	2956.83	1.81	0.08
Crop sequestration	*-18890.11*	*-9.36*	-0.44	-18790.73	-9.36	-0.44	-15315.97	-9.36	-0.44
Fertilisers	1035.78	0.51	0.02	1030.34	0.51	0.02	839.81	0.51	0.02
N2O	1556.76	0.77	0.04	1548.57	0.77	0.04	1262.21	0.77	0.04
Field fuel	558.12	0.28	0.01	555.19	0.28	0.01	452.52	0.28	0.01
Peat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Conservation credit	-5029.29	-2.49	-0.12	-5131.96	-2.56	-0.12	-8721.35	-5.33	-0.25
Total	-15561.18	-7.71	-0.36	-15643.62	-7.79	-0.37	-18525.96	-11.32	-0.53
Mill emissions & credit	tCO2e	t CO2e/ha	tCO2e/tFFB	tCO2e	t CO2e/ha	tCO2e/tFFB	tCO2e	t CO2e/ha	tCO2e/tFFB
POME	8440.24	4.18	0.20	8395.84	4.18	0.20	6843.29	4.18	0.20
Mill fuel	321.36	0.16	0.01	319.67	0.16	0.01	260.56	0.16	0.01
Purchased electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Credit (excess electricity exported)	-305.97	-0.15	-0.01	-305.97	-0.15	-0.01	-305.97	-0.19	-0.01
Credit (sale of biomass for power)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	8455.64	4.19	0.20	8409.54	4.19	0.20	6797.88	4.16	0.19
Total emissions, tCO2e (field and mill)	-7105.54			-7234.08			-11728.08		
Allocation:									
t CO2e/t CPO	-0.55			-0.56			-1.12		
t CO2e/t PK	-0.55			-0.56			-1.12		

5.10 Elements to maintain carbon stocks and minimize GHG emissions

The greatest contributor to reduction of GHG emissions from the new development is through avoided emissions that would have been derived from land use change through the application of the High Carbon Stock Approach. This has excluded from development any vegetation type with a carbon density higher than that of "scrub" or patches of "young regenerating forests" with a core less than 10ha or outside of the 200 meter proximity of significant carbon stock or biodiversity value. This has greatly reduced the potential emissions from land use change. The management of these areas to be leased to NPBOL in order to maximize carbon sequestration of these areas will help offset some of the other emissions coming from the operations. While there are plans for the development of a biogas facility, this is pending available capital expenditure and local conditions (ie/national grid and cost sharing agreement) thus cannot be committed to in any definite time frame. All further options, ie/replacing diesel, sourcing local fertilizer, are not an option at this location. The following figures illustrate the emissions of Scenario 2 as estimated by the GHG calculator.

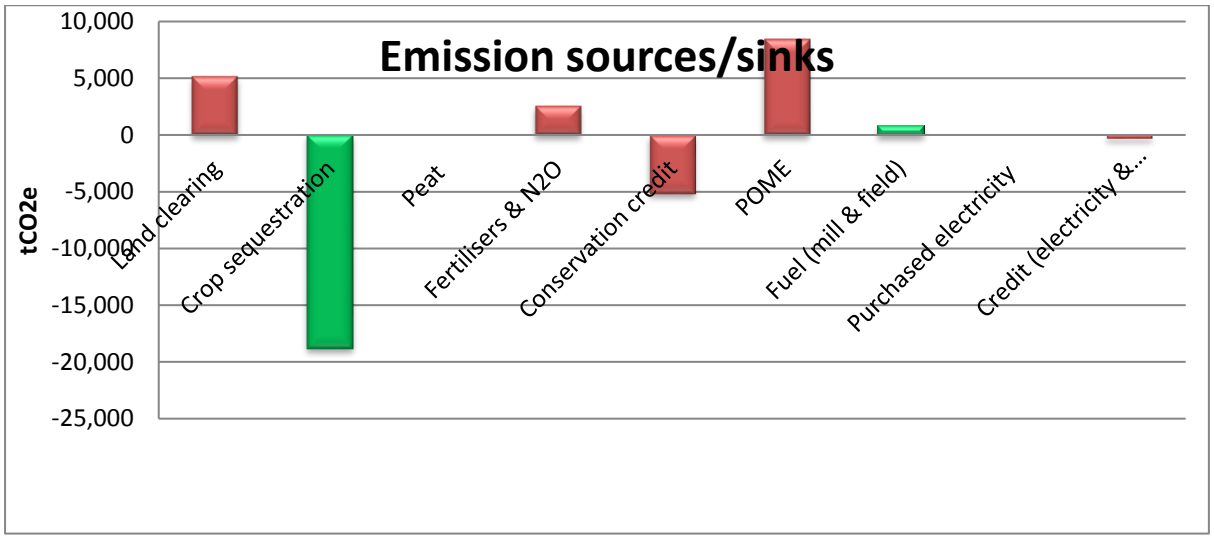


Figure 21 Summary of emissions and sinks associated with scenario 2

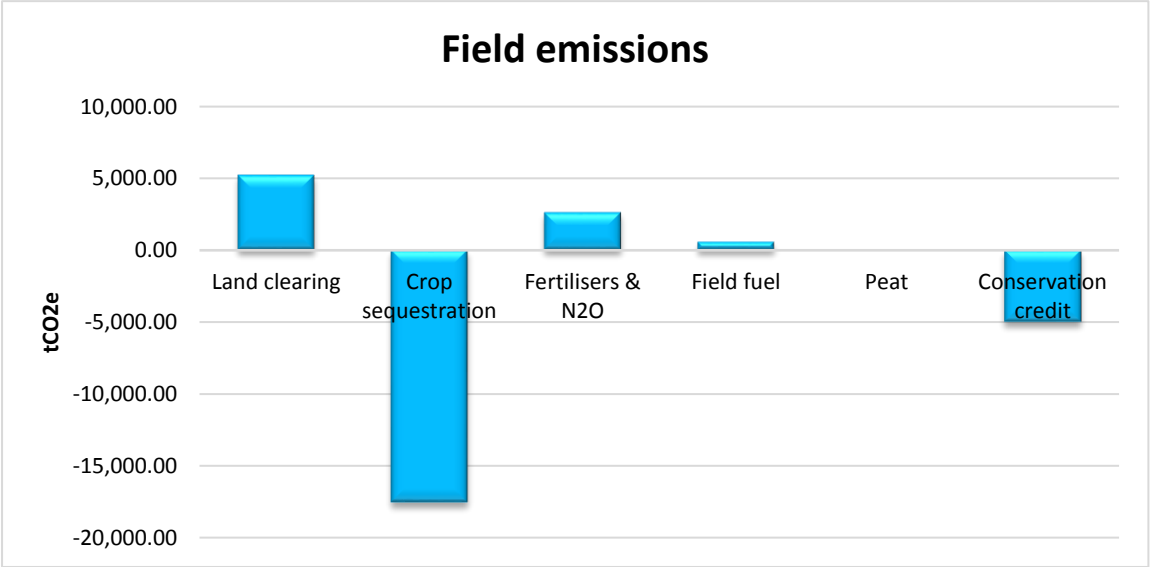


Figure 22 Summary of field emissions associated with scenario 2

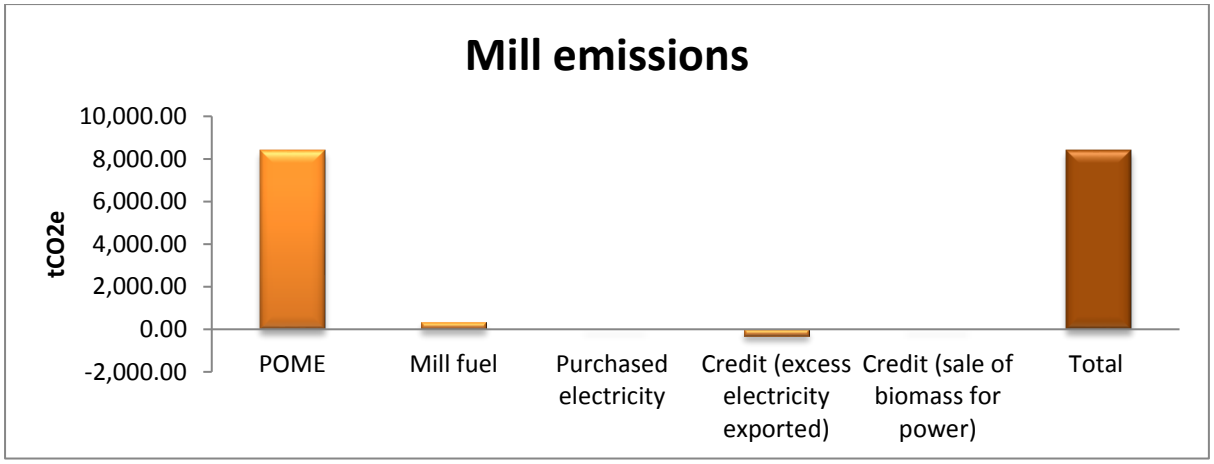


Figure 23 Summary of mill emissions associated with scenario 2

5.11 Explanation for the selection of optimal scenario with relevant spatial map

The selection of scenario 2 is the result of a long process of engagement with the land owners. During this process information regarding the biophysical limitations to development of their lands, ie/ HCVMA or HCSA, were shared with them and the implications that this would have on their options for income generation were discussed. Utilizing this information the landowners took an informed decision to indicate which lands they would set aside for their own use and which lands they would authorize NBPOL to develop. Note that for the case of Matepona the landowners have opted for a smallholder model. This has resulted in the current analysis assuming that all of the areas that have no biophysical constraints will be developed into smallholder estates and that there will be no conversion of HCVMA or HCSA areas into oil palm. Note however that the setting aside of "community use" areas and the management of HCVMA and HCSA is not assured by NBPOL in that case as for these areas land rights will not be transferred to NBPOL. While NBPOL will work proactively with these communities to promote the sustainable management of the HCVMA and HCSA areas within Matepona this NPP does not assume the liability of any future potential conversion of these areas.

Other measures that may be taken into consideration to mitigate the net GHG emissions are methane capture at the palm oil mill, local sourcing of fertilisers, reducing usage of inorganic fertilisers, reducing fuel consumption when deemed economically feasible as per Principle 3 of the RSPO.

5.12 GHG Notification Statement

This is a Confirmation by the Grower that the above has been undertaken using the latest available version of the RSPO GHG Assessment Procedure for estimating the carbon stock of above ground and below ground biomass for land earmarked for new oil palm development and that the potential net GHG emission arising from the development has been estimated. In addition, the Grower confirms that the assessment includes a plan to minimise net GHG emissions which takes into account avoidance of land areas with high carbon stocks and/or sequestration options.

6.0 Land Use Change Analysis

6.1 Methodology

The creation of Land use cover maps and the change analysis was conducted by an external independent consultant firm: Kokusai Kogyo, Ltd. Japan Asia Group9. Land use cover maps of 6 sites were created, and a systematic land use change analysis was conducted utilizing global datasets (Landsat). The land cover maps were created by visual interpretation of the available imagery. Segmentation was done prior to the interpretation process using Orfeo Tool Box, and the boundaries were revised by hand based on the visual interpretation. A Land Cover map of 2017 was created first as a base map, and the past maps were created by comparing to the map of 2017. Revision of the map was done based on the visual interpretation by comparing satellite image of different years, and also referring to the Hansen loss year data. Google Earth historical imagery was used to confirm land cover classifications used. Minimum mapping unit was set as 0.5 ha. Land used type used by Hansell and Wall (1976) was used for land use classification.

Table 29 Land Use Classification Used

Veg Type	Vegetation
Dt	Open lands
Fld	forest
Gm	Grassland
Wc	Scrublands
Rv	River
O	Agriculture land
Qa	Plantation

6.2 Land cover in 1976

The entire Guadalcanal Plans, including the proposed areas, has had its physical geography, climate, soils, vegetation and agriculture described and mapped at a scale of 1:4,300 in a comprehensive study carried out by the Lands Resources Division of the Ministry of Overseas Development of United Kingdom Government (Hansell and Wall, 1976). This study provides a snapshot of what the land cover and vegetation types where at that time. The maps that were produced were subsequently digitized and overlaid with the areas proposed for development.

[9] URL: http://www.kkc.co.jp/english/company/history.html

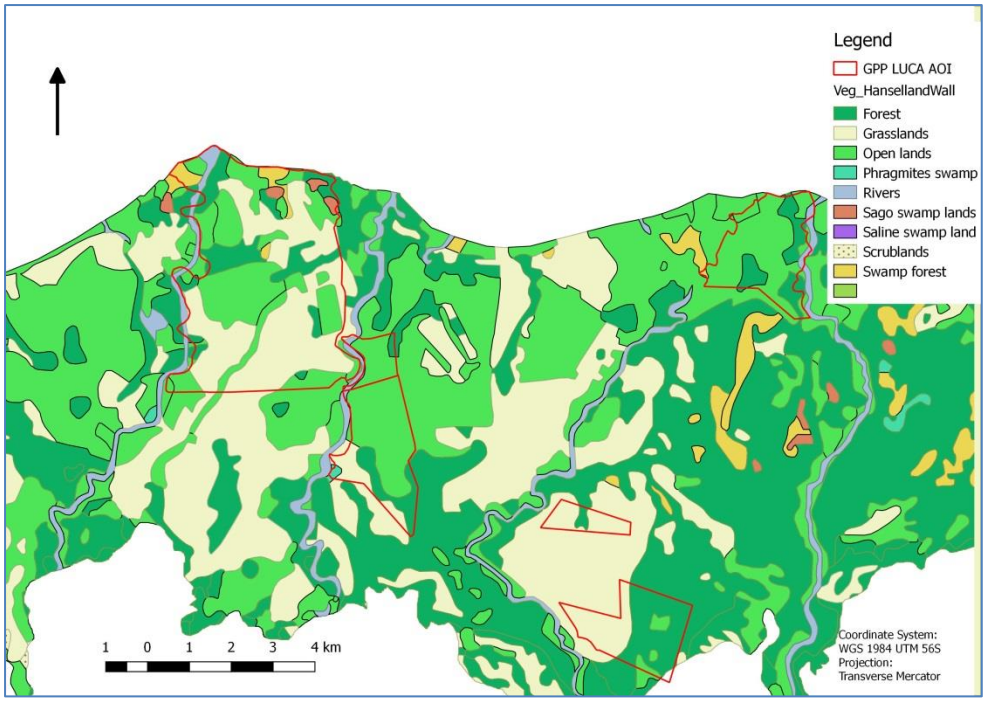


Figure 24 Map of Proposed Areas for Conversion over Vegetation Types in 1976

It is notable that the great majority of the areas proposed for current day conversion into oil palm plantations were already considered as Grasslands or Open lands in 1976. There were however, substantial areas that were considered Forest, mostly in Kautoga and Mbalisuna East. These are the areas that are coloured dark green in the map above are classified as being “Fld” or in a very limited area “Sm” as can be seen in the table below:

Table 30 Vegetation types within the proposed area

Vegetation	**Area (ha)**
Open lands	1475.9
Forest	709.93
Grasslands	1157.18
Rivers	58.87
Phragmites swamp	5.96
Swamp forest	64.08

Sago swamp	28.38
Total	3500.3*

*Note the slight difference in total area as compared to Table 1 which is due to rubber sheeting of the original maps from Hansell and Wall.

Looking further into the description of these forest types as per Hansell and Wall, note the Fld and Fhd are secondary forests. The following descriptions of these vegetation types are taken directly from Hansell and Wall:

"Type Fld: *disturbed forest* Extensive areas of disturbed forest have an characteristically broken, irregular canopy and a mixture of large-crowned emergent trees occurring as scattered individuals in a matrix of smaller, fine-crowned, often secondary trees. Disturbance may be due to human factors or the influence of cyclones, both of which seem to give rise to this forest type. It commonly occurs adjacent to old settlements and forms part of the pattern of regrowth after cultivation.

Type Sm: *mixed species forest* This is the most widespread of the swamp forest types and is found on all islands. It is recognizable by its broken canopy with irregular-sized crowns and with gaps filled by the small crowns of regrowth trees. The canopy contains a range of tree species with the composition varying in different areas; some of the more common tree species are given in the description of the mixed swamp vegetation formation. "

Taken from Land Resources Volume 1 page 97-98. Note that the only forest type present in 1976 that was arguably a primary forest back then is Type Sm: mixed species forest. The extent of this in the proposed conversion area is very restricted (2.28ha) and has been identified as a forest of High Conservation Value in subsequent studies carried out recently.

6.3 Image and Land Cover Characterization 2000-2017

Landsat images for the following time periods were obtained and used in the analysis:

Table 31 Time periods of land cover analysis

Requirement	Image obtained
(i) Period 1: Nov 2005-Nov 2007. The initial date is 1st November 2005 (as the baseline) [2] and the cut-off date is 31st November 2007. The cut-off date of Period 1 constitutes the initial date of Period 2.	Landsat 7; 18/06/05
(ii) Period 2: Dec 2007-Dec 2009. The initial date is 1st December 2007 and the cut-off date is 31st December 2009. The cut-off date of Period 2 constitutes the initial date of Period 3.	Landsat 7; 26/06/09
(iii) Period 3: 1st Jan 2010 [3] - 9th May 2014[4]. The initial date is 1st January 2010 and the cut-off date is 9th May 2014. The cut-off date of Period 3 constitutes the initial date of Period 4.	Landsat 7; 15/03/14
(iv) Period 4: the period after 9th May 2014. The initial date is 10th May 2014	Landsat 7; 07/03/17

For image in 2005, only the Landsat-7 ETM+ SLC-off10 data could be obtained. Therefore, sub images taken in the same year were used to fill the gap. All land cover maps were obtained using visual interpretation and applying the Hansell and Wall vegetation classification. An added category, "plantation" was used where necessary. In addition to the above Hansen data was used for analysing forest cover in 2000 and land use changes during 2000-2015 at the sites. For the large area of loss within each site after 2005, public released high resolution imagery of Google Earth was used to confirm the condition of the area before November, 2005. The following tables summarize the results of the land cover classifications over the required time periods for all of the proposed development areas.

Table 32 Summary of Land Cover 2005-2017 in Hectares

Holy_water	**2005 (ha)** Landsat 7; 18/06/05	**2009 (ha)** Landsat 7; 26/06/09	**2014 (ha)** Landsat 7; 15/03/14	**2017 (ha)** Landsat 7; 07/03/17
Open lands	91.29	91.29	91.29	91.29
Forest	10.77	10.77	10.77	10.77
total	102.06	102.06	102.06	102.06
Kautoga	**2005**	**2009**	**2014**	**2017**

[10] Due to the loss of Scan Line Corrector (SLC) of Landsat 7, the images taken by the satellite after May 2003 have some data gaps

Agriculture land	4.08	2.49	2.49	6.32
Forest	286.70	288.29	288.29	284.46
Grassland	21.45	21.45	21.45	21.45
Open lands	6.06	6.06	6.06	6.06
Phragmites swamp	11.81	11.81	11.81	11.81
Plantation	99.93	99.93	99.93	99.93
River	12.46	12.46	12.46	12.46
Swamp forest	31.31	31.31	31.31	31.31
total	473.80	473.80	473.80	473.80
Matepona	**2005**	**2009**	**2014**	**2017**
Agriculture land	1027.62	1020.04	1018.58	1026.62
forest	655.80	663.37	664.84	658.15
Grassland	148.74	148.74	148.74	148.74
Plantation	25.93	25.93	25.93	25.93
River	23.03	23.03	23.03	19.05
Scrublands	99.25	99.25	99.25	101.87
Total	1980.36	1980.36	1980.36	1980.36
Mbalisuna_E	**2005**	**2009**	**2014**	**2017**
Agriculture land	15.85	23.40	16.97	18.41
Forest	217.95	194.75	211.81	210.37
Grassland	140.89	140.89	133.38	133.38
Plantation	0.00	0.00	3.52	3.52
River	0.72	0.72	0.72	0.72
Scrublands	12.61	28.27	21.64	21.64
total	388.04	388.04	388.04	388.04
Sol Rice_1	**2005**	**2009**	**2014**	**2017**

Agriculture land	39.85	106.17	106.17	106.17
Forest	30.11	30.11	30.11	30.11
Grassland	50.50	54.04	54.04	54.04
Open lands	250.29	264.18	264.18	264.18
Scrublands	87.99	4.26	4.26	4.26
total	458.75	458.75	458.75	458.75
Solice_2	**2005**	**2009**	**2014**	**2017**
Agriculture land	0.00	0.00	17.73	22.66
Open lands	92.66	92.66	74.93	74.93
Scrublands	9.92	9.92	9.92	4.99
total	102.58	102.58	102.58	102.58

In addition to the land cover classification an analysis of tree cover loss was conducted utilizing Hansen data, the top row shows hectares and the bottom percentage of total lost.

Table 33 Hansen tree cover loss data

Holy Water	Area (ha)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Ha	102.1			0.3		0.11	0.19									2.54	3.15
%				0.3		0.11	0.19									2.49	3.09
Kautoga	Area (ha)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Ha	473.8		0.23	0.38	0.15	3.34	0.58	6.47	1.37	0.3	4.25	0.53	0.55	53.43	13.53	6.43	91.54
%			0.05	0.08	0.03	0.7	0.12	1.37	0.29	0.06	0.9	0.11	0.12	11.28	2.86	1.36	19.32
Matepona	Area (ha)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Ha	1980		0.3	0.99	0.66	0.39	0.95	1.7	2.2	0.99	4.63	1.29	3.04	3.95	7.08	18.76	46.93
%			0.02	0.05	0.03	0.02	0.05	0.09	0.11	0.05	0.23	0.07	0.15	0.2	0.36	0.95	2.37
Mbalisuna East	Area (ha)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Ha	388	0.13				1.83		1.44	4.4	1.67	3.78		3.6	2.14	5.6	1.06	25.65
%		0.03				0.47		0.37	1.13	0.43	0.97		0.93	0.55	1.44	0.27	6.61

Sol Rice 1	Area (ha)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Ha	458.8	0.01		3.29		0.38	0.14	0.23	0.76	0.08	1.1	0.15	0.15	0.46	6.38	6.85	19.97
%		0		0.72		0.08	0.03	0.05	0.17	0.02	0.24	0.03	0.03	0.1	1.39	1.49	4.35

Sol Rice 2	Area (ha)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Ha	102.6			0.08		0.61				0.19	0.15			0.61	0.15	1.84	3.62
%				0.07		0.59				0.18	0.15			0.59	0.15	1.8	3.53

6.4 Land Cover Change Analysis

All of the land cover changes are considered due to non-corporate factors as these lands have not been leased to NBPOL yet. In general there have been very little changes to the land cover over the time period analysed. Tree cover losses greater than 5% over the whole time were only observed in Kautoga and Mbalisuna East were lost. In the case of Kautoga Large area of tree cover loss happened in 2013 was due to the plantation harvesting. The area was confirmed to have been oil palm and coconut plantation in 2003 by the high resolution imagery on Google Earth. It has been confirmed by management that this area was replanted in 2013-14 which is clearly visible in the tree cover loss data. The land cover analysis does not show this difference as it is a replacement of a plantation. The tree cover loss found in Mbalisuna East is most probably due to shifting cultivation as absolute land cover does not change significantly, suggesting that abandoned gardens are reverting to forest while new areas are being opened up. In general terms it can be concluded that there is very little land use change over the time period analysed and that none of this was driven by corporate interests. All of the images utilized in this assessment is provided in Annex 1 and 2 of this report.

6.5 Corporate and non-corporate clearance divided into vegetation coefficient from specific period of time - in hectares

This assessment has occurred on customary/private land in an area where there has been no oil palm establishment or land clearing to date. Due to the above-mentioned reasons, the following sections are deemed to be not applicable and will not be reported n as part of this analysis;

- RaCP vegetation coefficients not applicable for this assessment
- Environmental remediation reporting not applicable as no land clearing or oil palm establishment has occurred in this landscape.
- RaCP vegetation coefficients not applicable for this assessment
- No compensation liability for this assessment as no land clearing or oil palm establishment has occurred in this landscape.

6.6 Conclusion

The areas proposed for development were not primary forest at November 2005. This conclusion has been arrived at through the extensive field studies carried out in the 1970's as part of the Land Resource Studies carried out by the UK government. Subsequent HCV studies have proven that the current existing forests on these areas are logged over forests. This has been ascertained through the current species composition and lack of primary forest species. The image analysis carried shows there has been very little tree cover loss

which indicates that the current existing forests were already degraded/logged over before 2000. The existing tree cover losses are isolated cases of shifting cultivation and in one case an oil palm plantation replant.

6.7 Landsat Images and Land Cover Maps

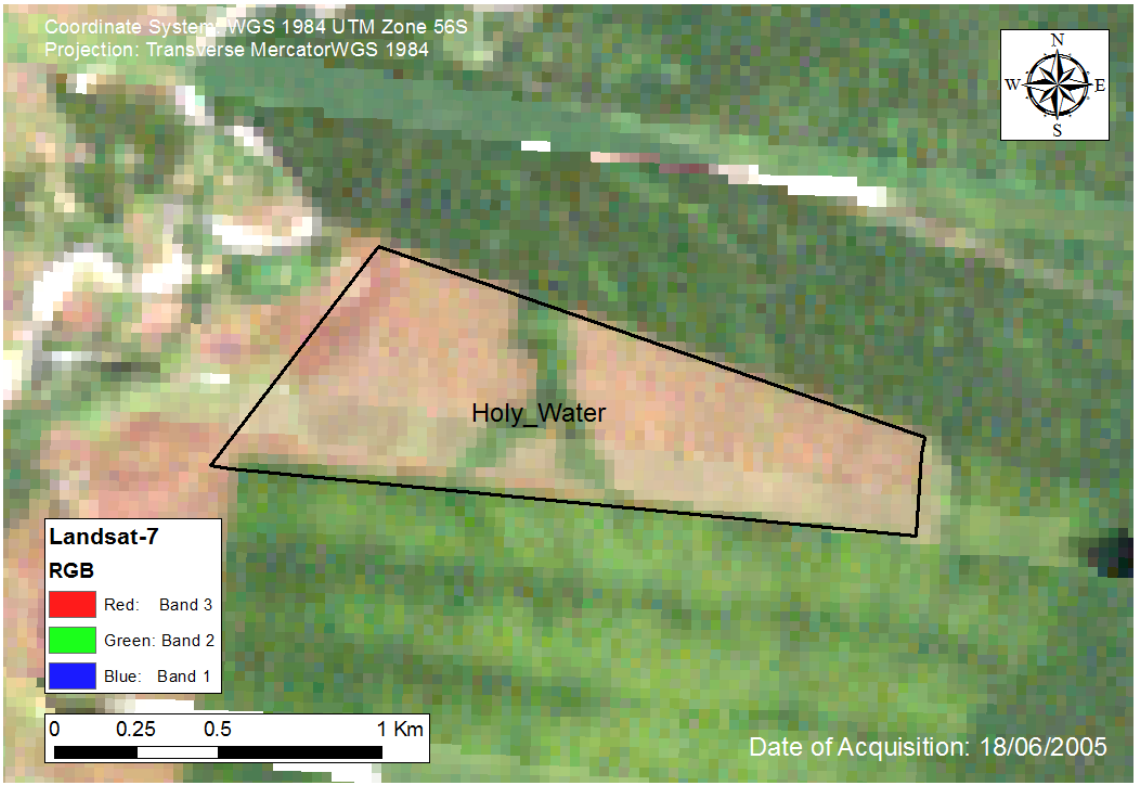


Figure 25 Landsat Image of Holy Water 18/06/05

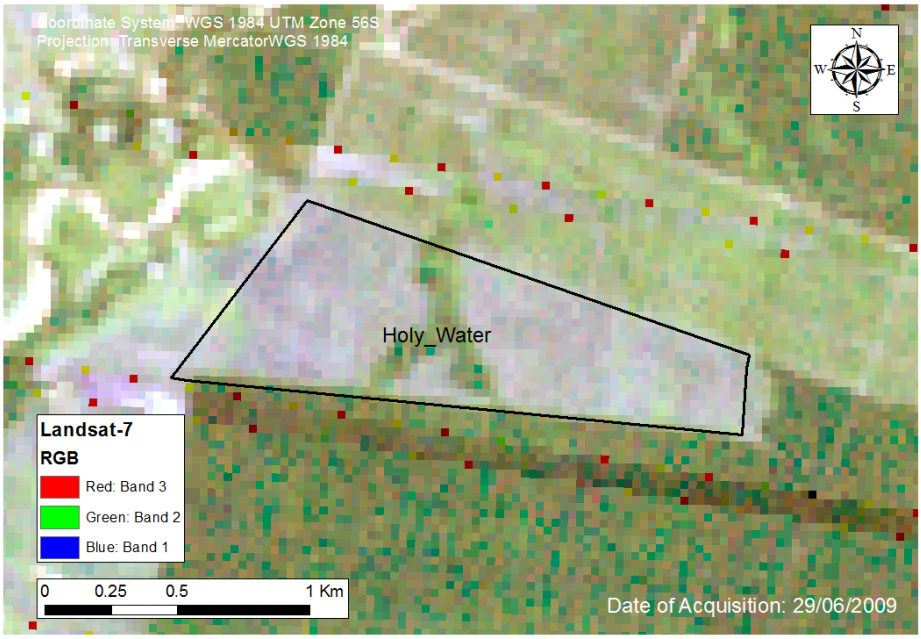


Figure 26 Landsat Image of Holy Water 29/06/09

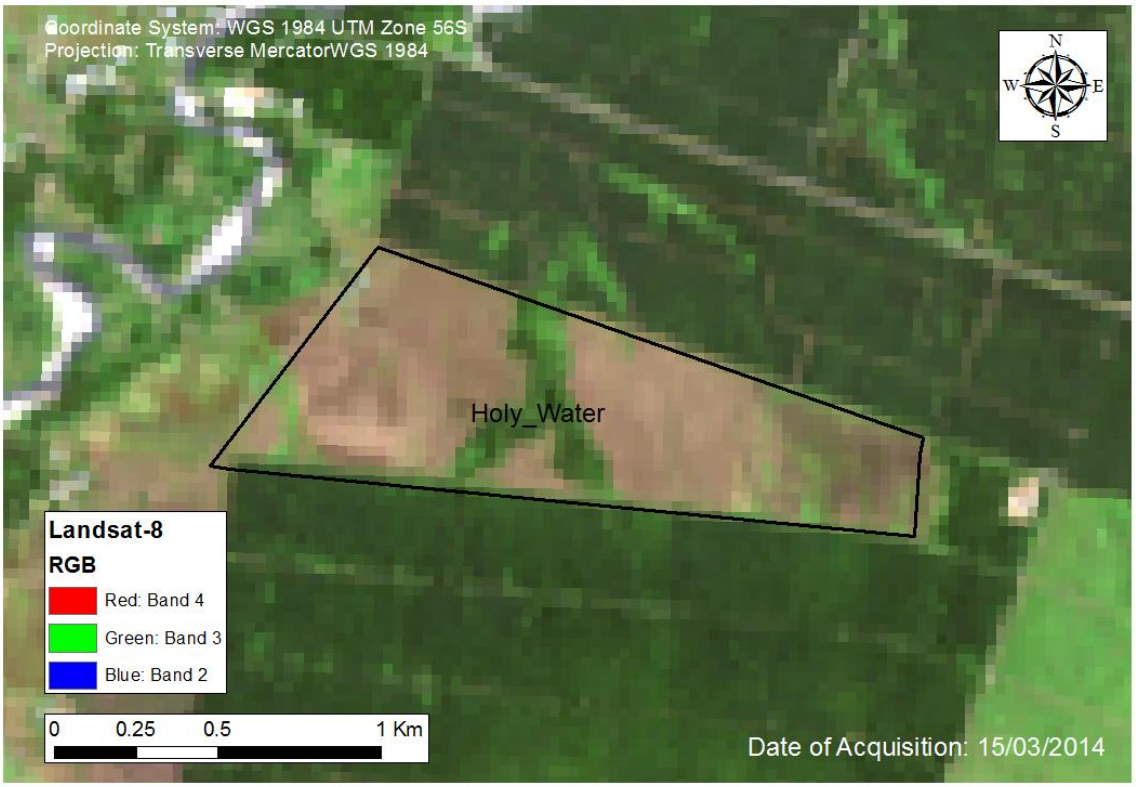


Figure 27 Landsat Image of Holy Water 15/03/14

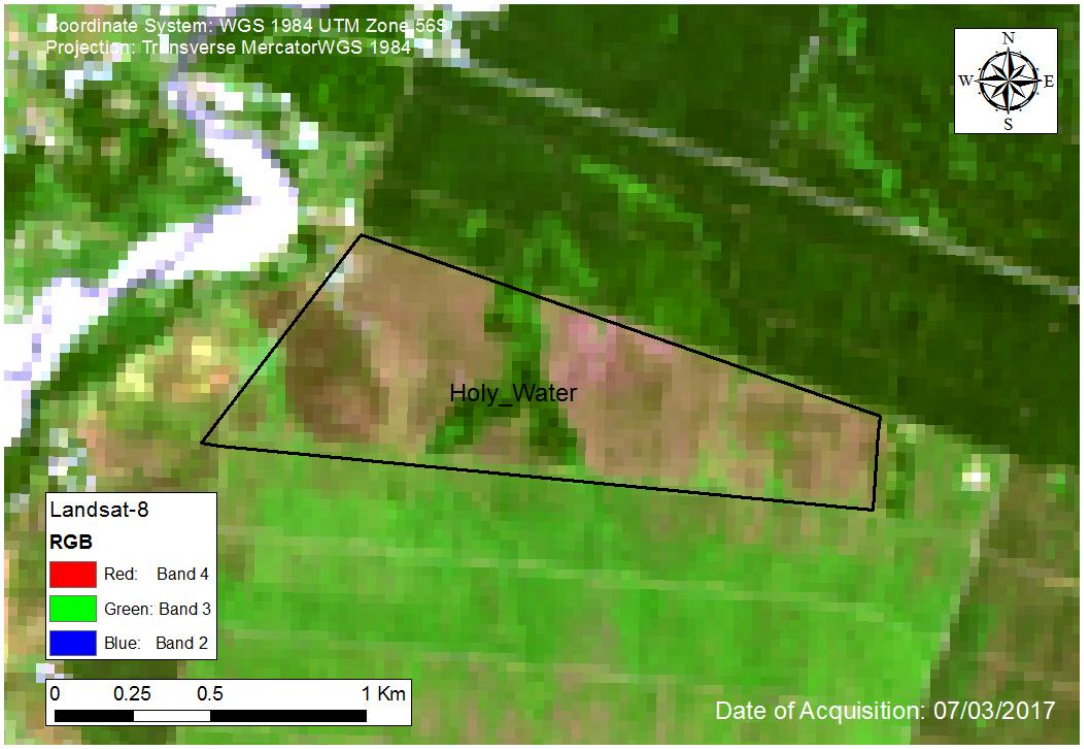


Figure 28 Landsat Image of Holy Water 07/03/17

Figure 29 Land Cover Map of Holy Water for 18/06/05

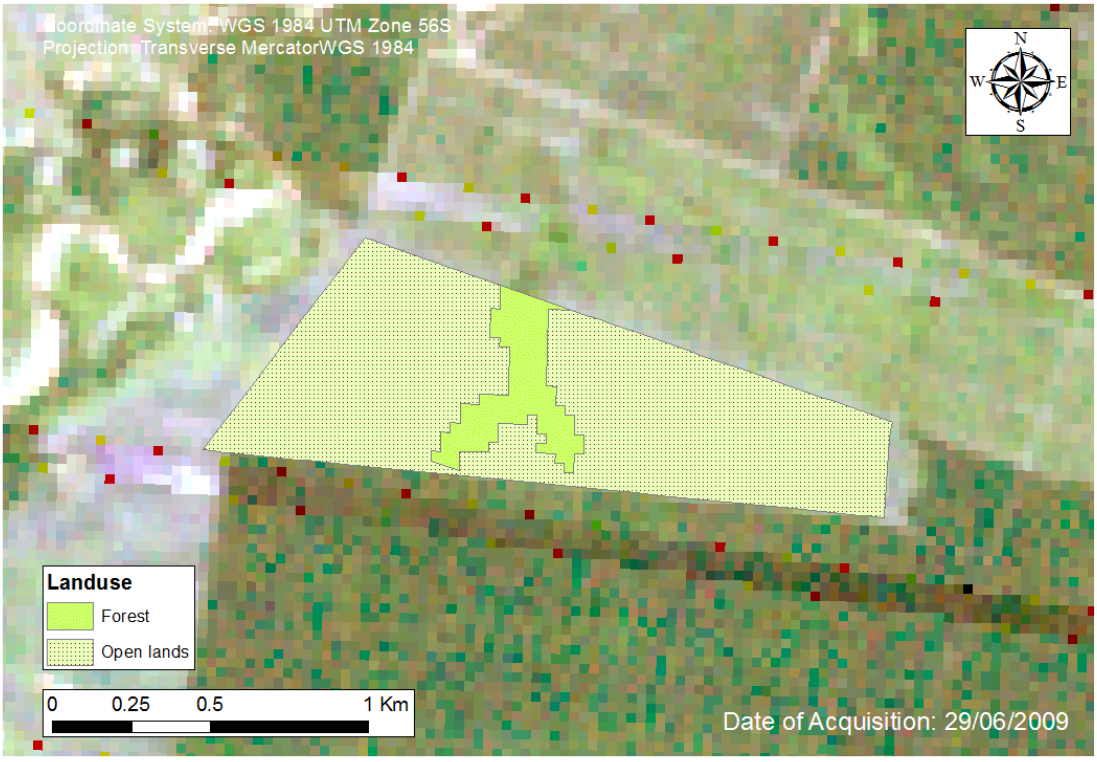


Figure 30 Land Cover Map of Holy Water for 29/06/09

Figure 31 Land Cover Map of Holy Water for 15/03/14

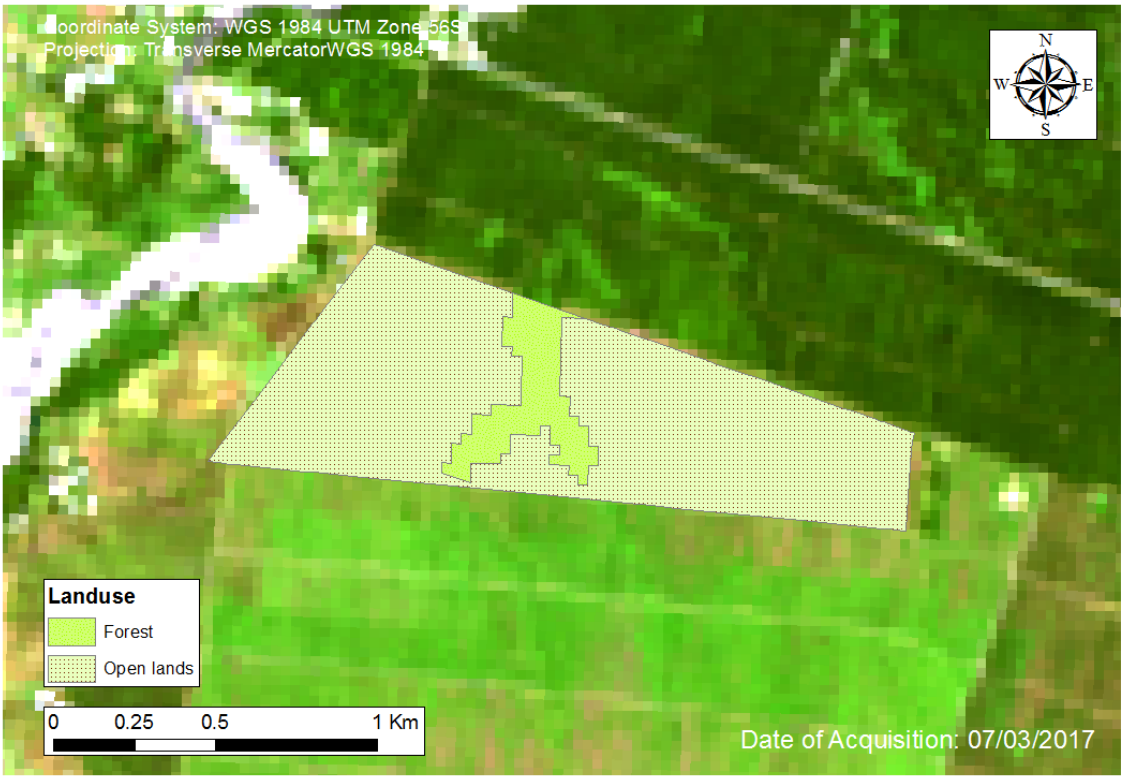


Figure 32 Land Cover Map of Holy Water for 07/03/17

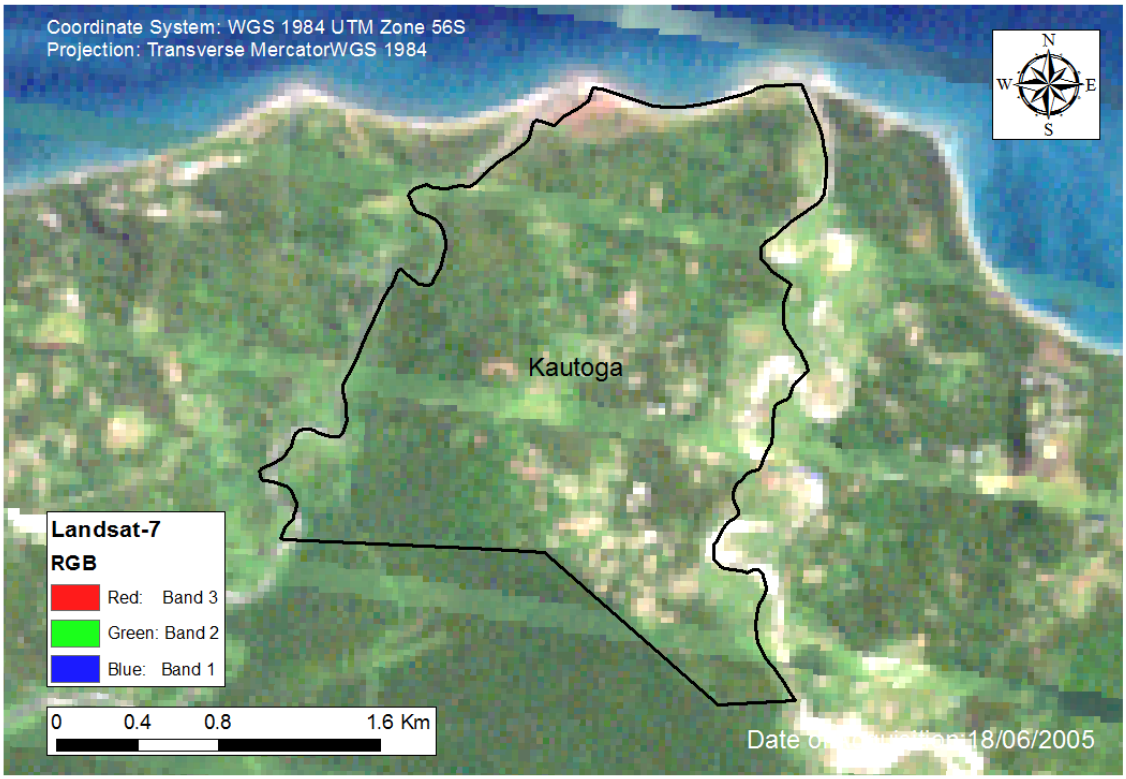


Figure 33 Landsat Image of Kautoga 18/06/05

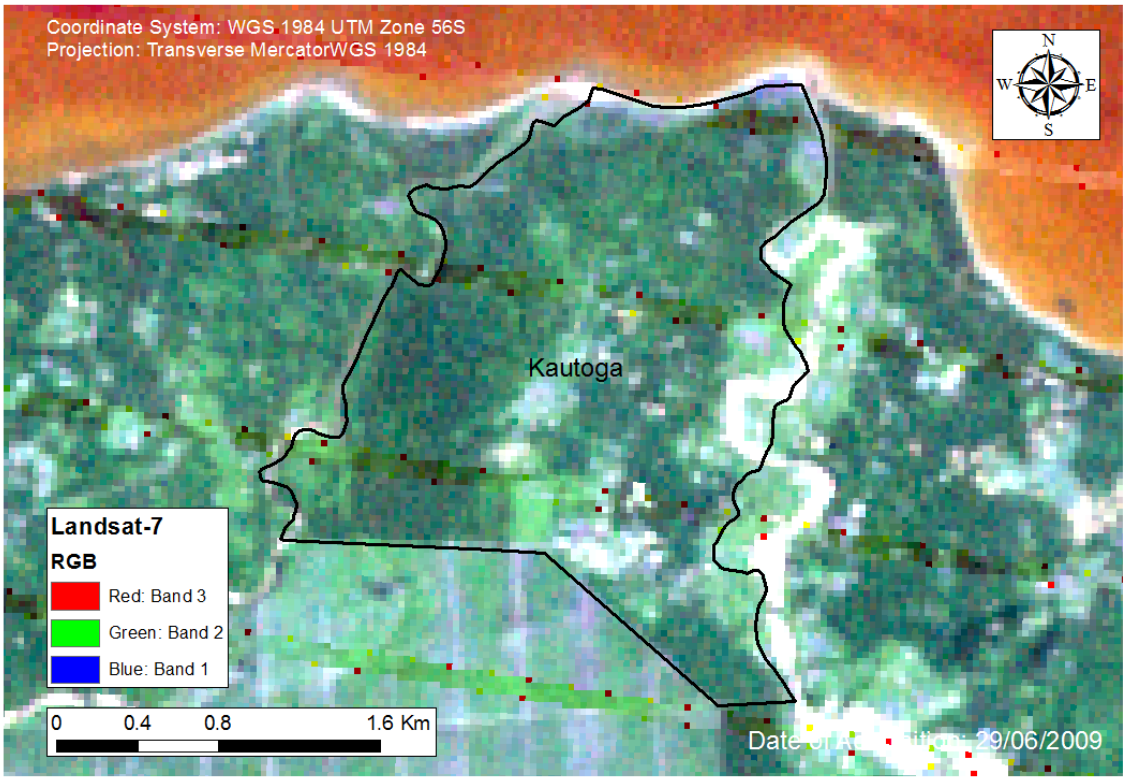


Figure 34 Landsat Image of Kautoga 29/06/09

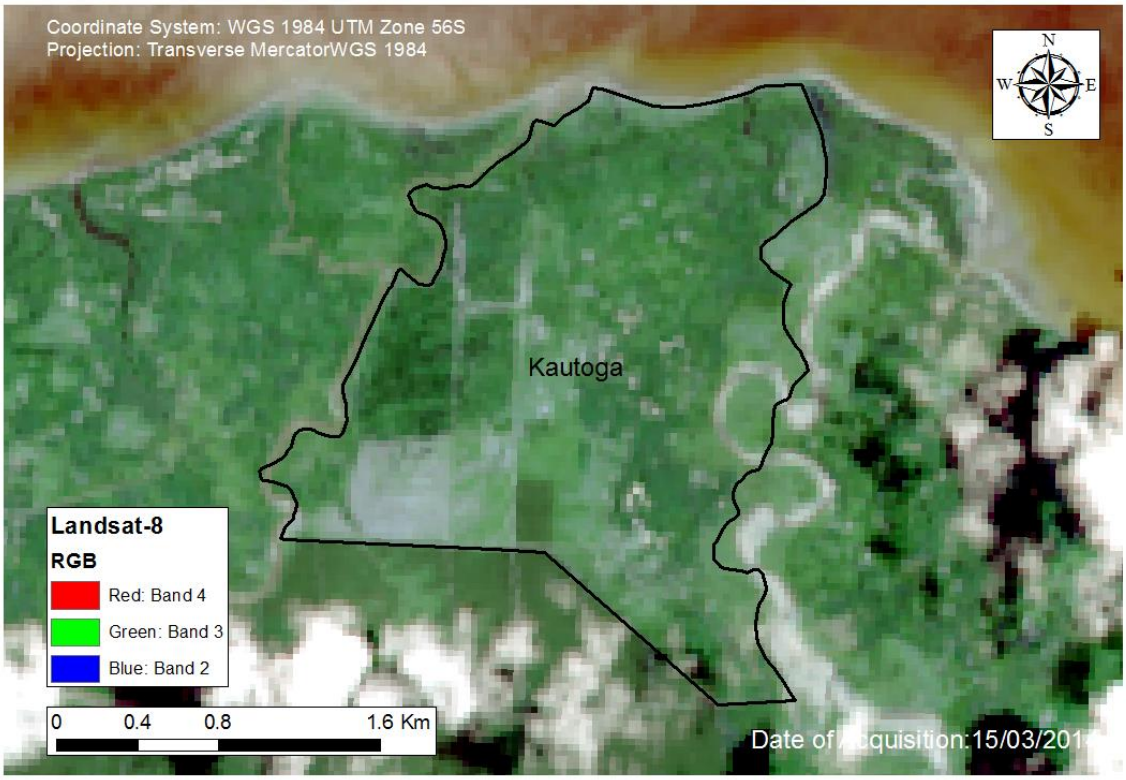


Figure 35 Landsat Image of Kautoga 15/03/14

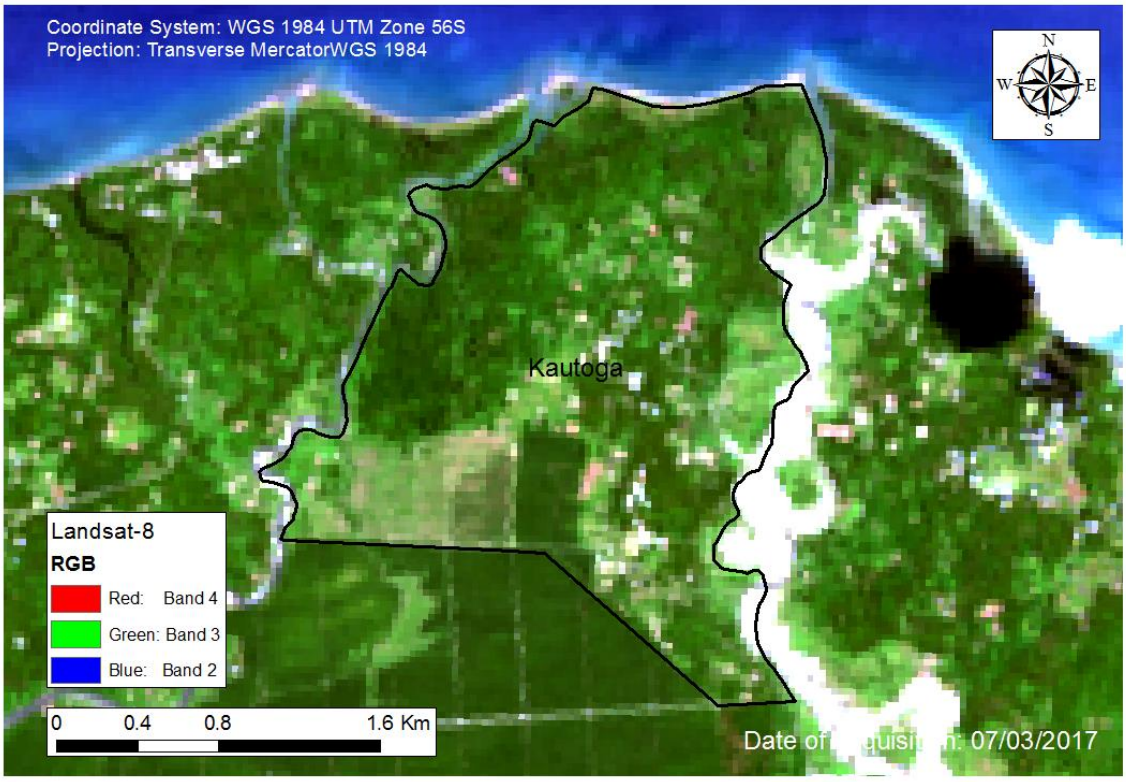


Figure 36 Landsat Image of Kautoga 07/03/17

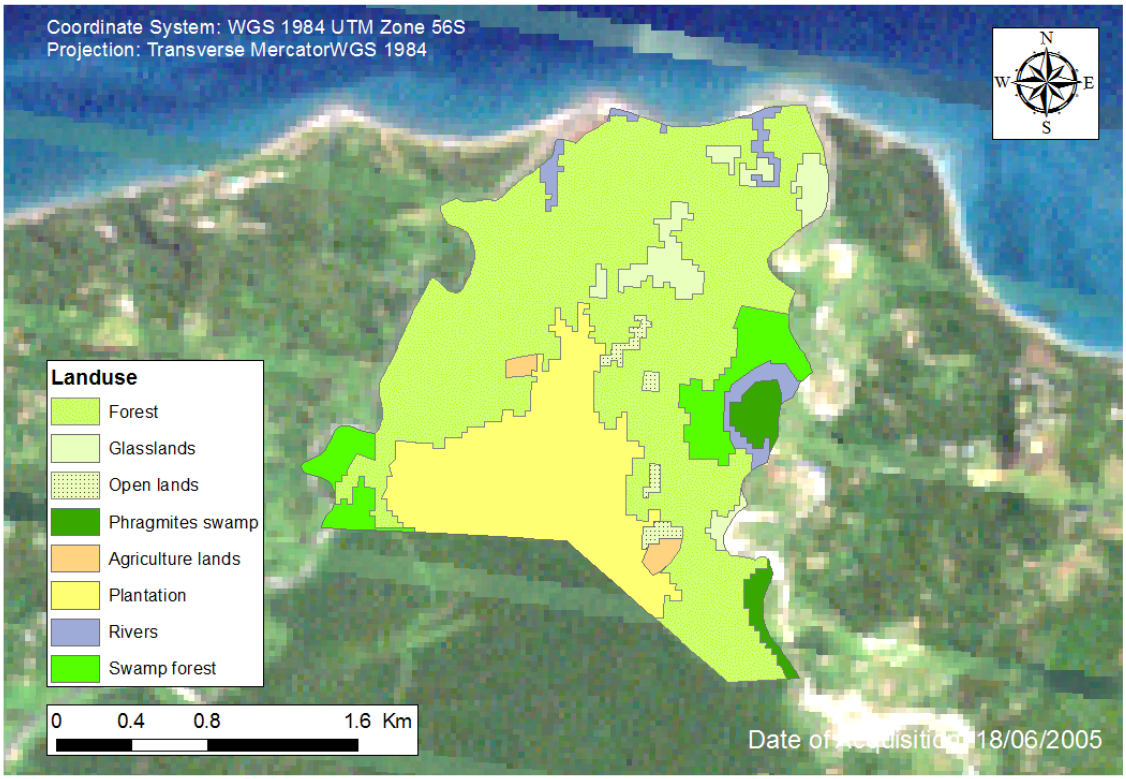


Figure 37 Land Cover Map of Kautoga 18/06/05

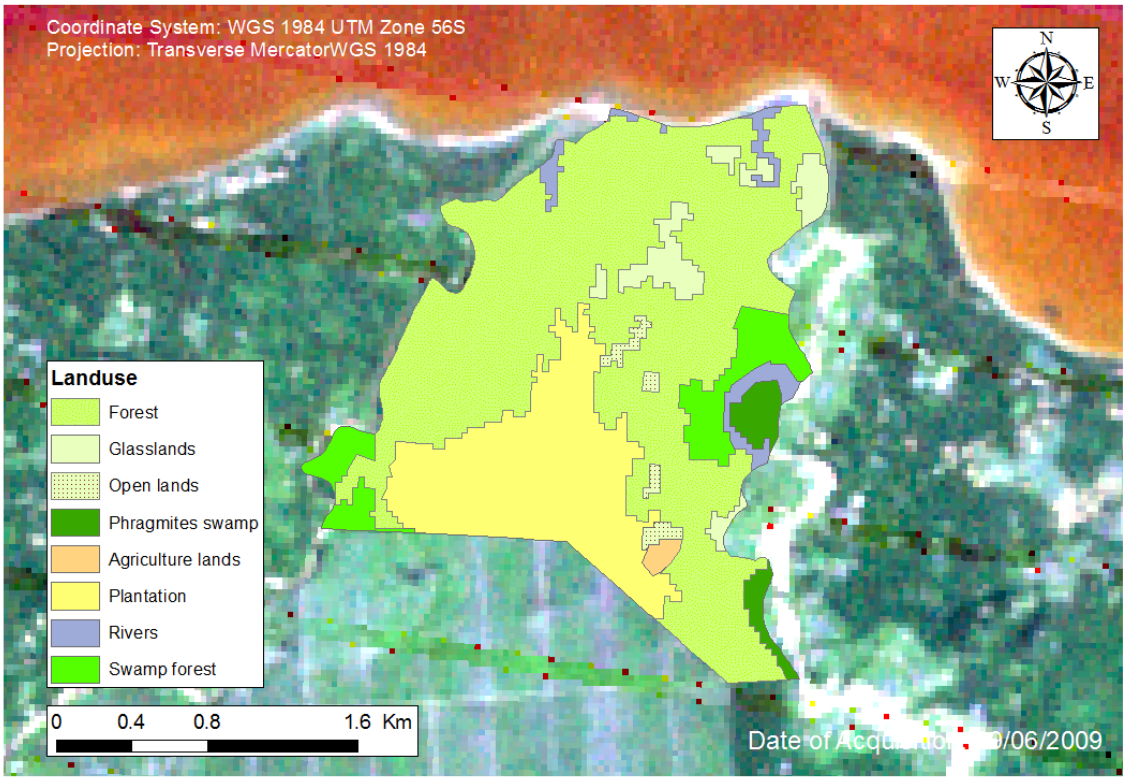
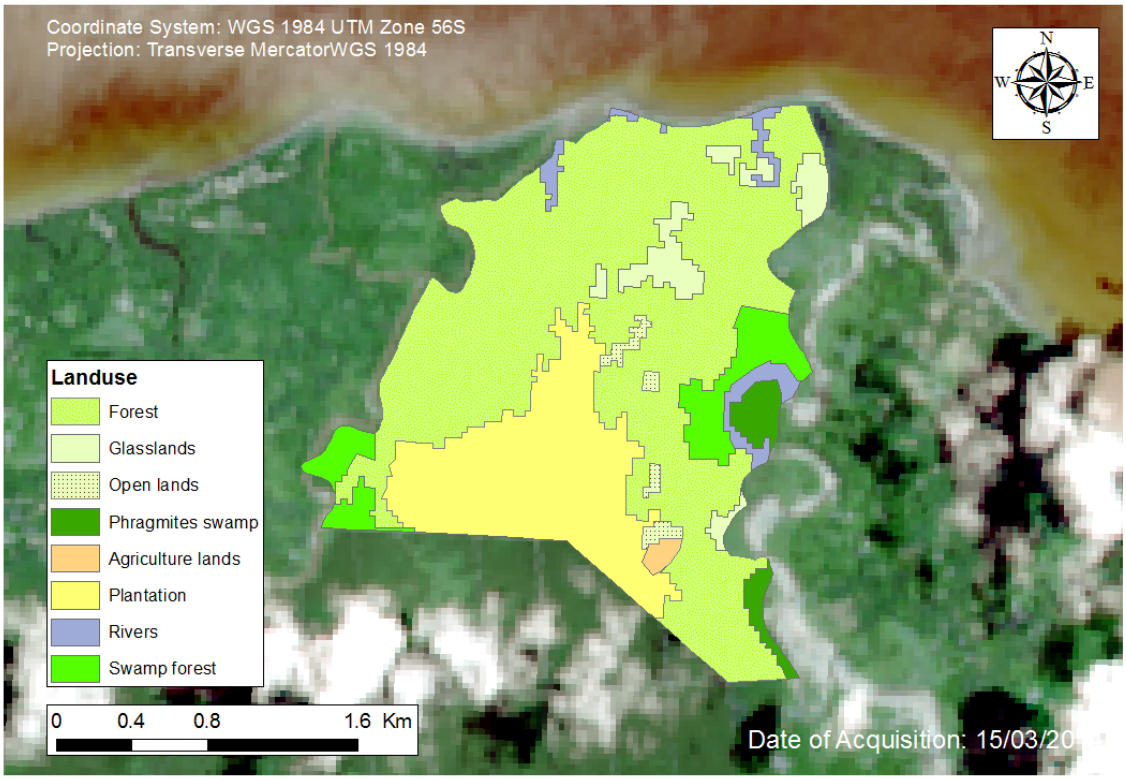


Figure 38 Land Cover Map of Kautoga for 29/06/09



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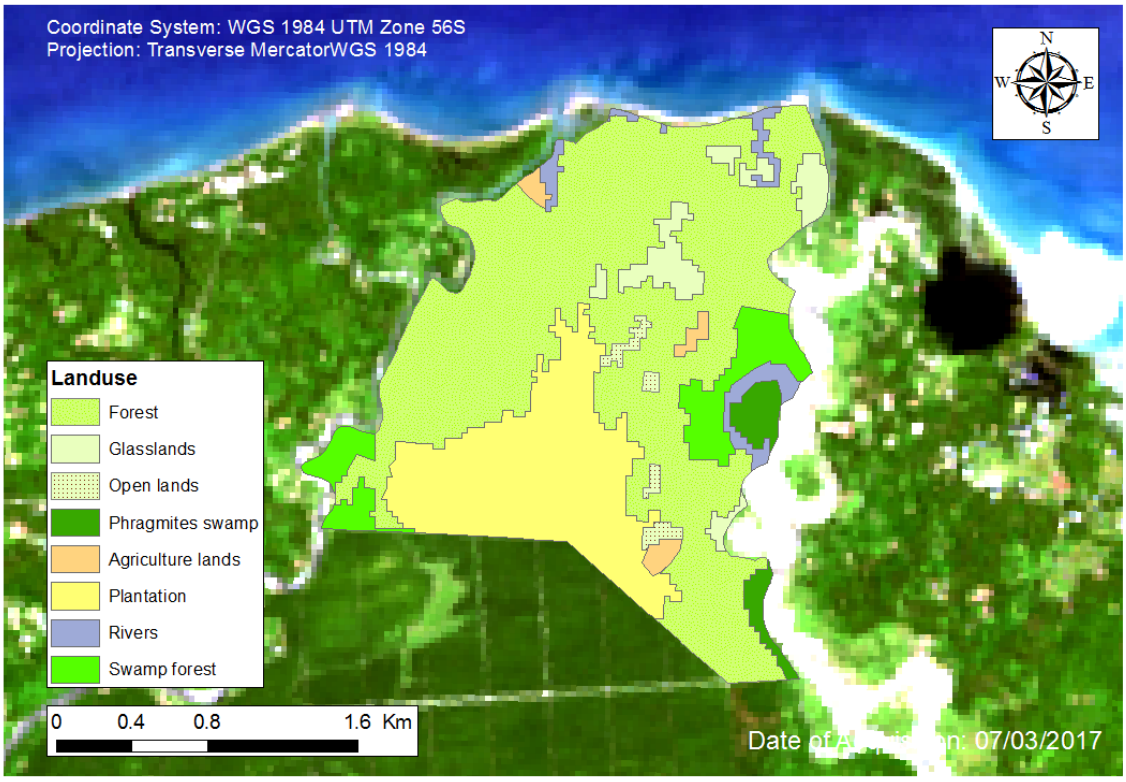

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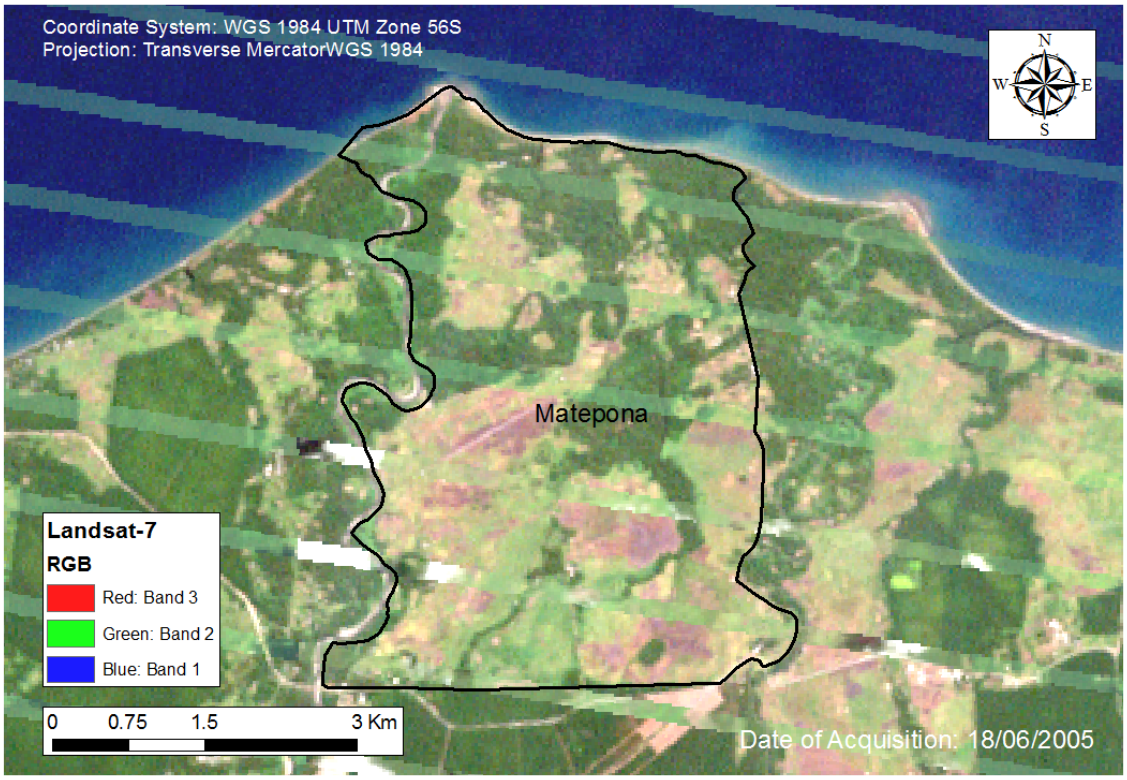


Figure 41 Landsat Image of Matepona for 18/06/05

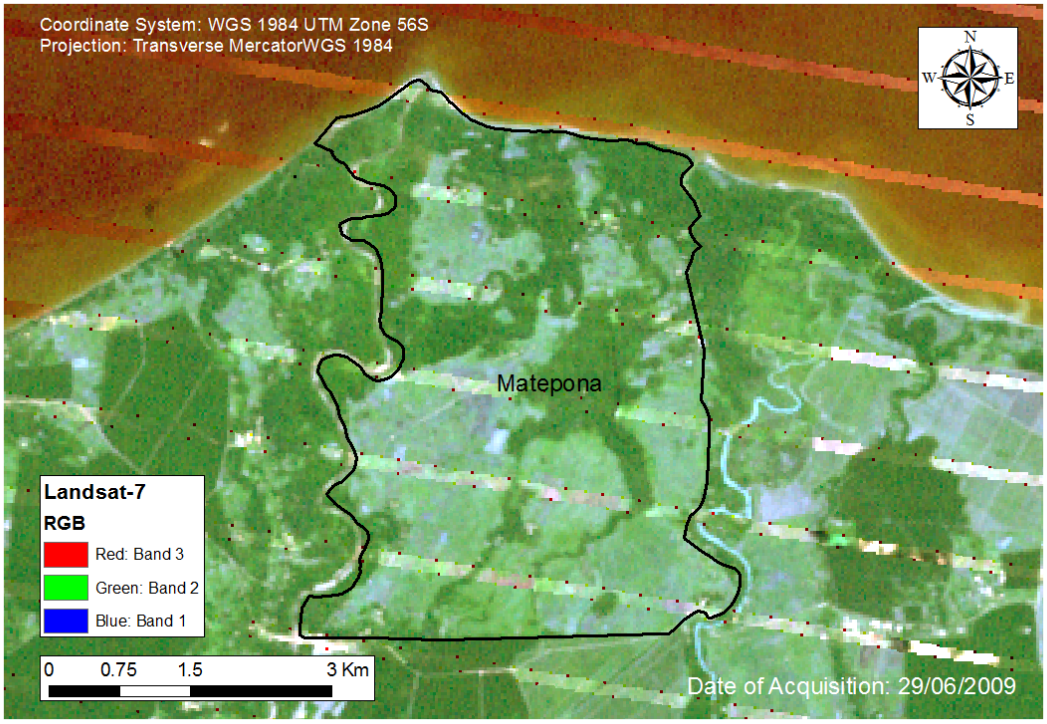


Figure 42 Landsat Image of Matepona for 29/06/09

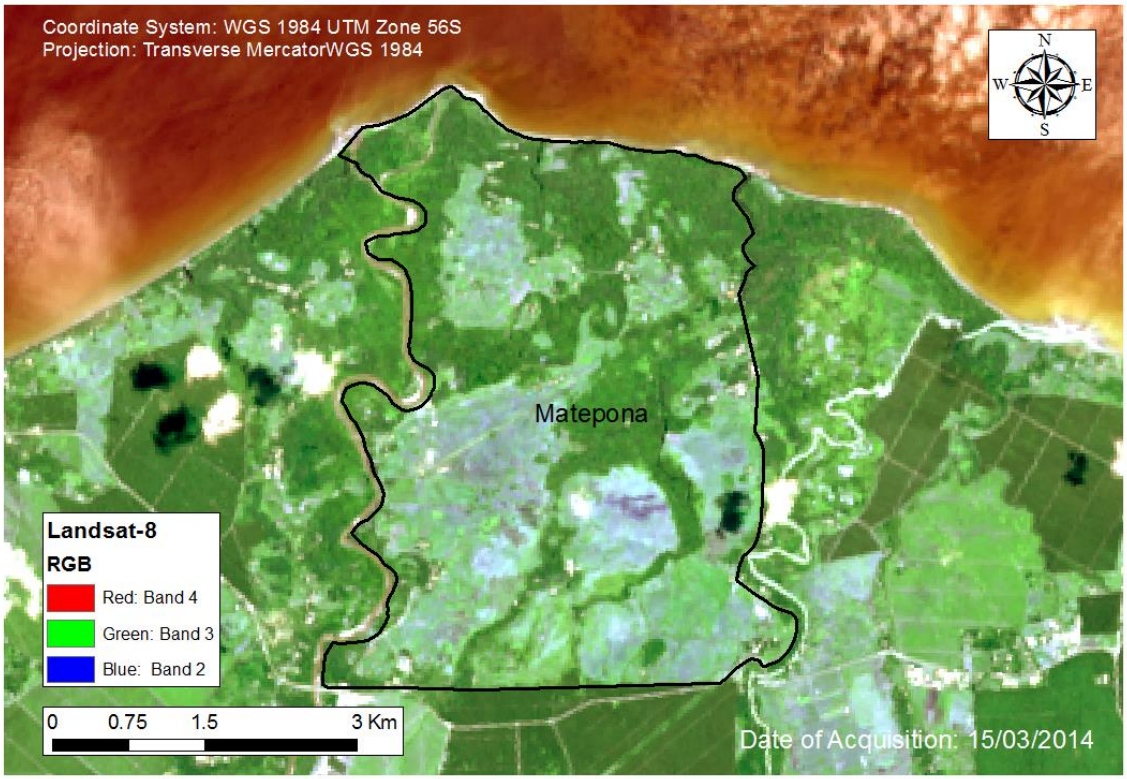


Figure 43 Landsat Image of Matepona for 15/03/14

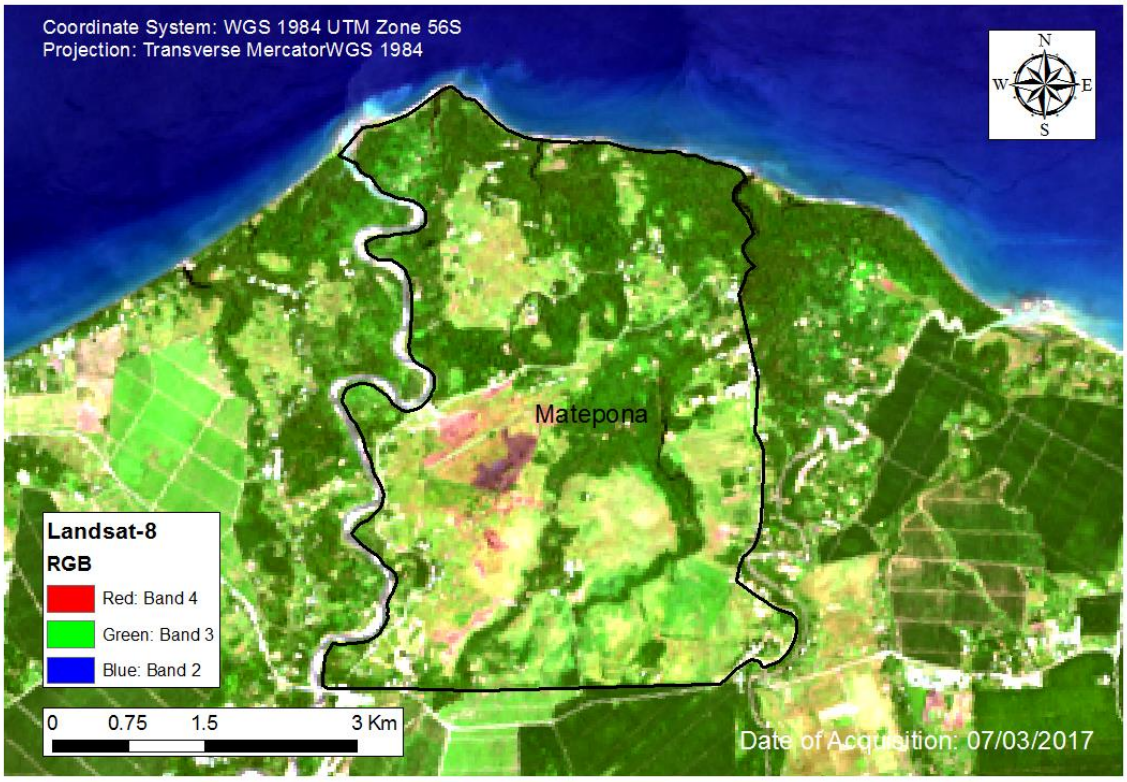
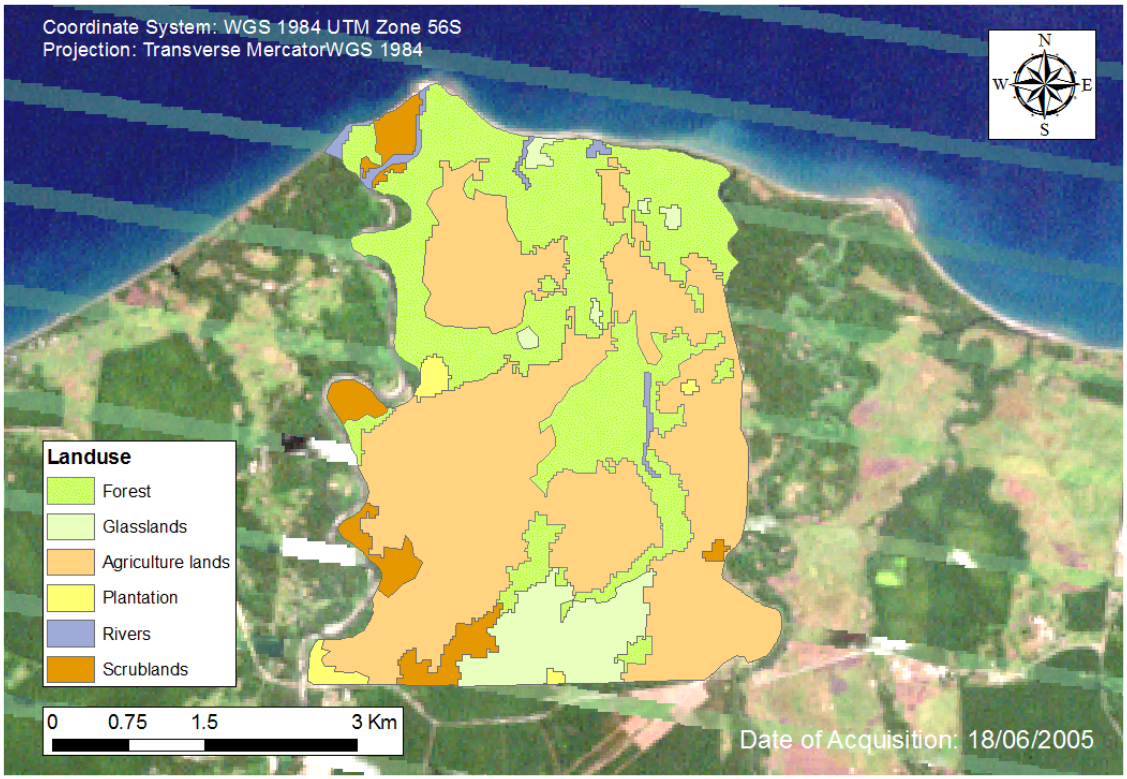


Figure 44 Landsat Image of Matepona for 07/03/17



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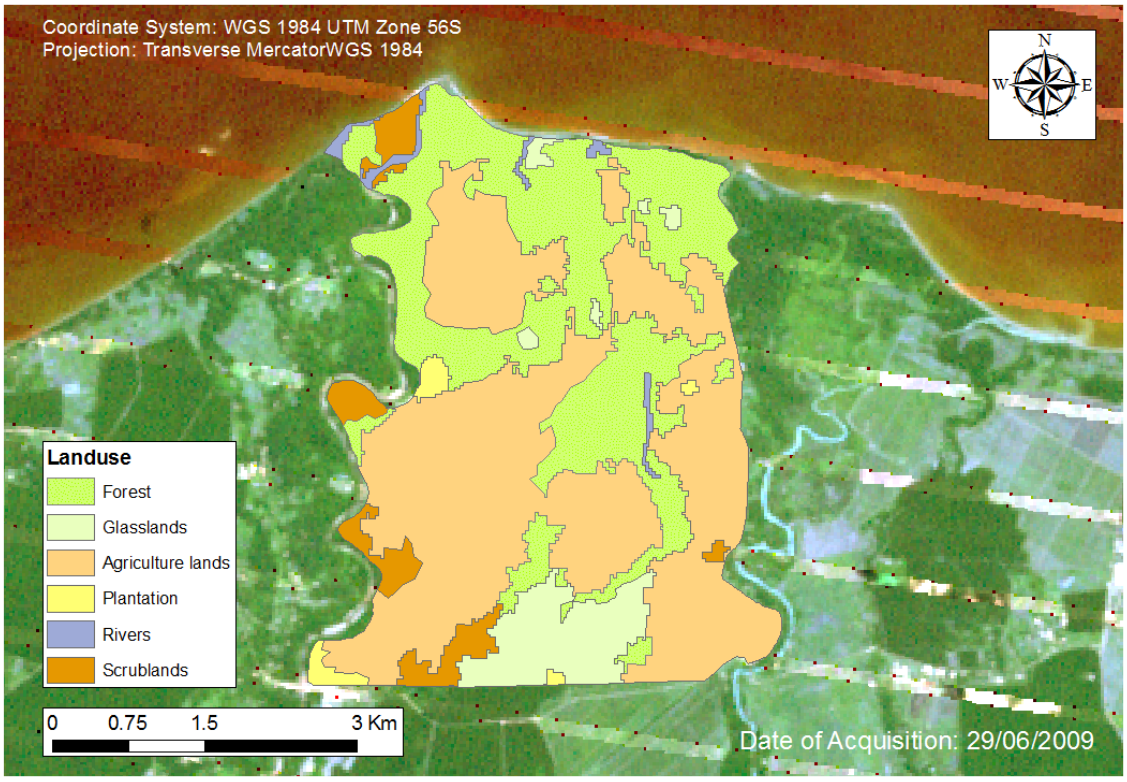


Figure 46 Land Cover Map of Matepona for 29/06/09

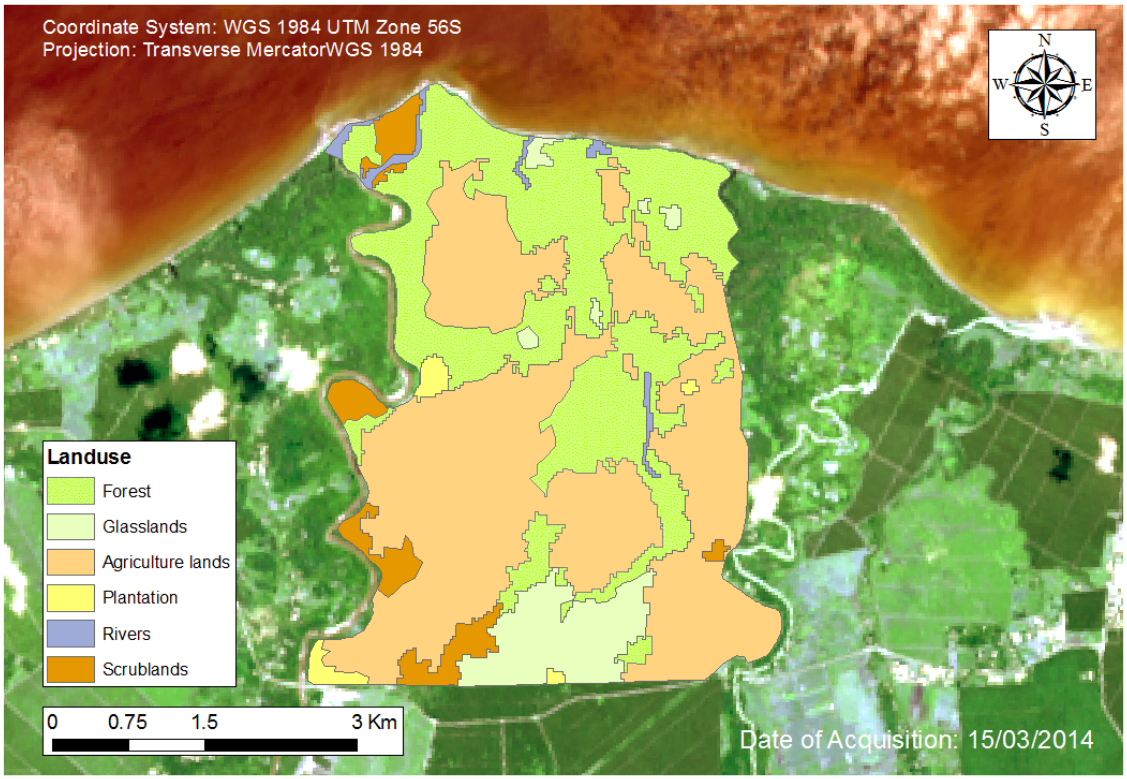


Figure 47 Land Cover Map of Matepona for 15/03/14

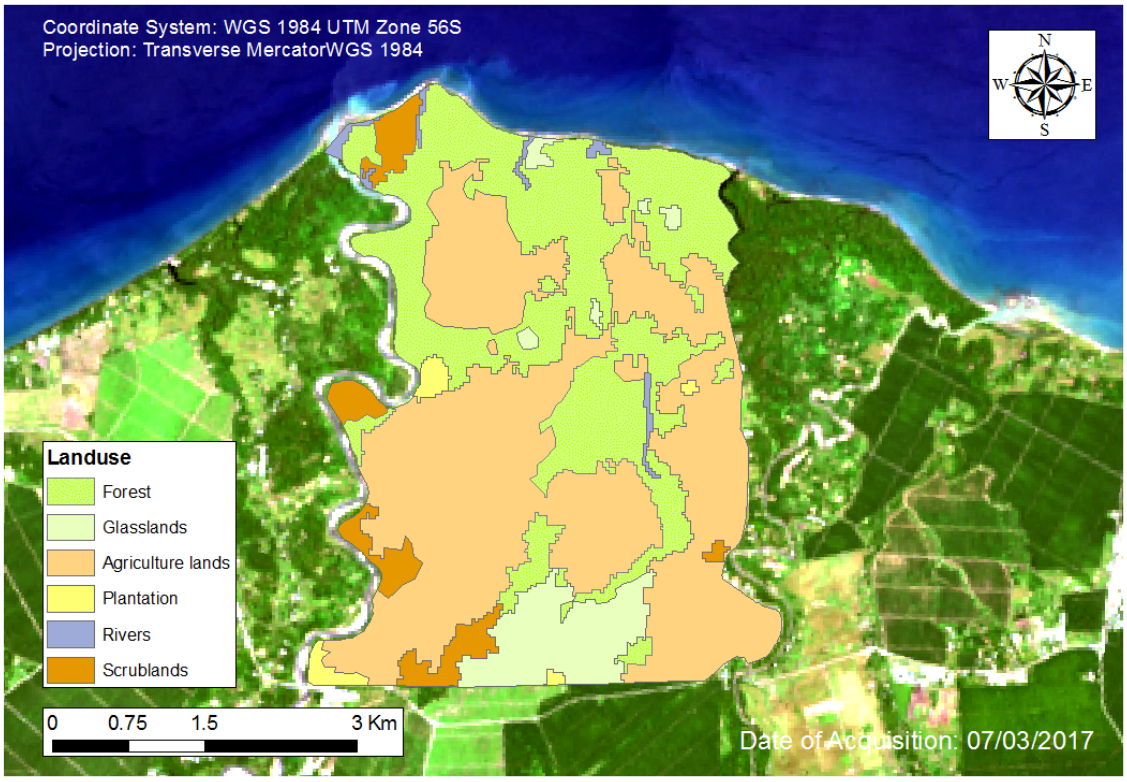


Figure 48 Land Cover Map of Matepona for 07/03/17

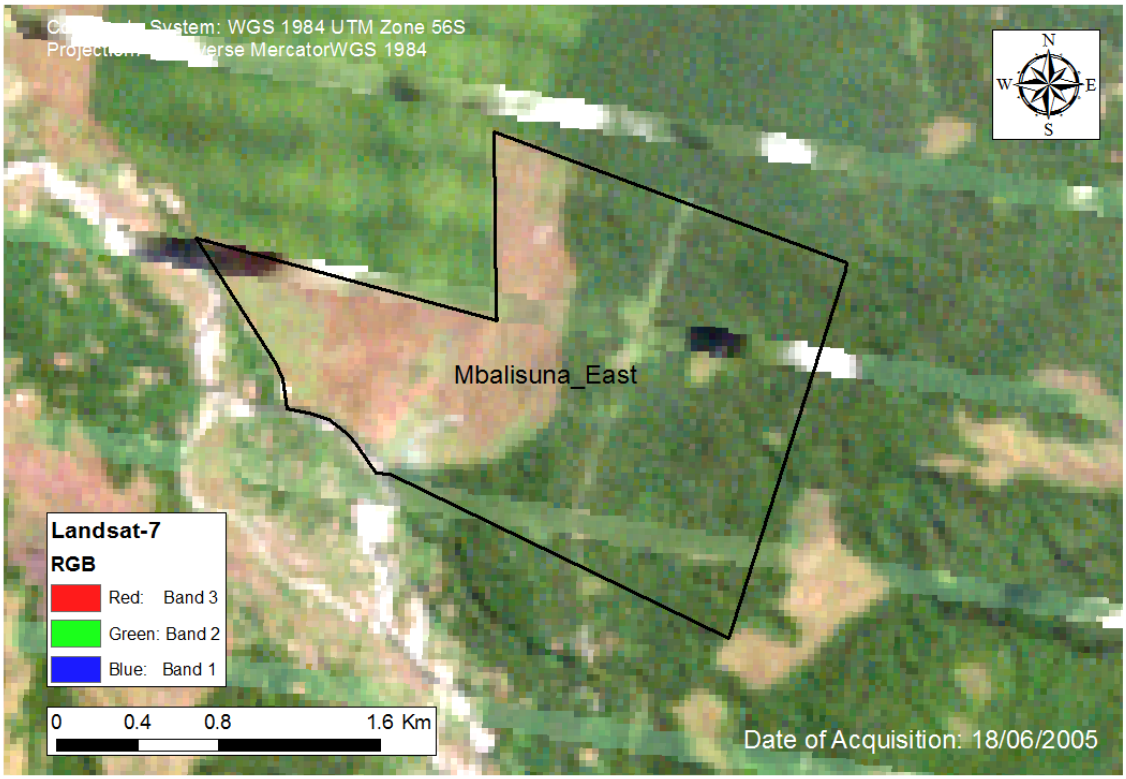
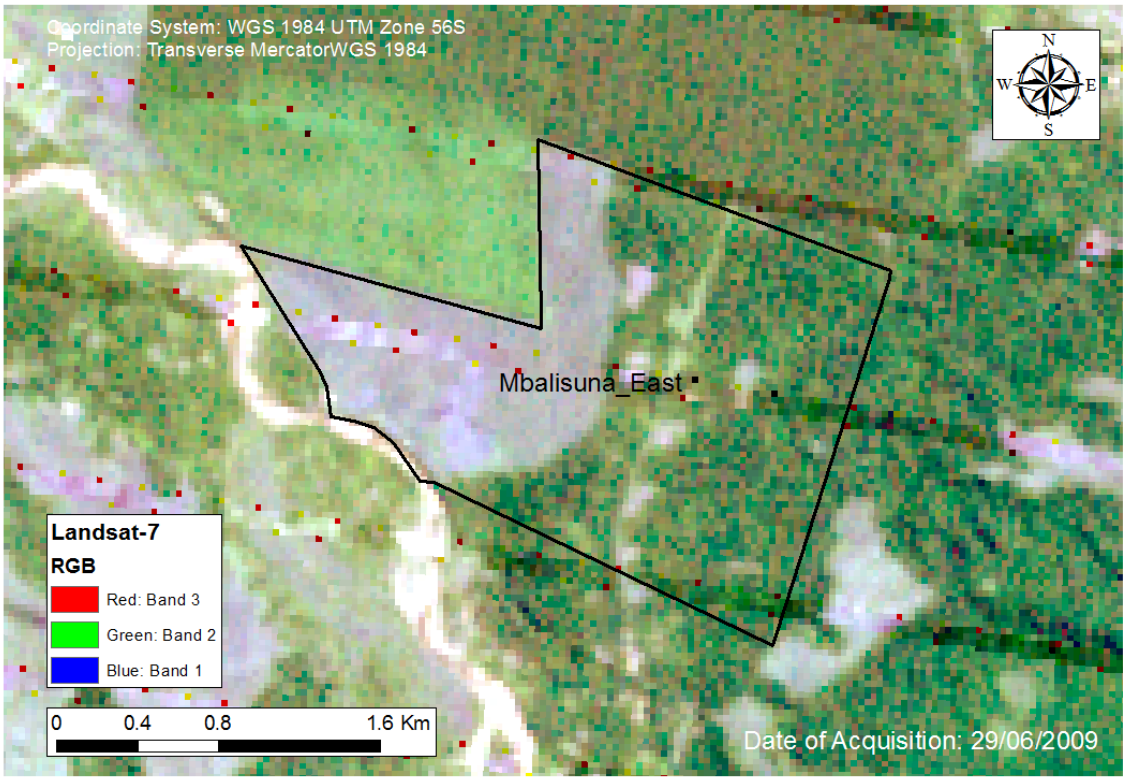


Figure 49 Landsat Image of Mbalisuna East for 18/06/05



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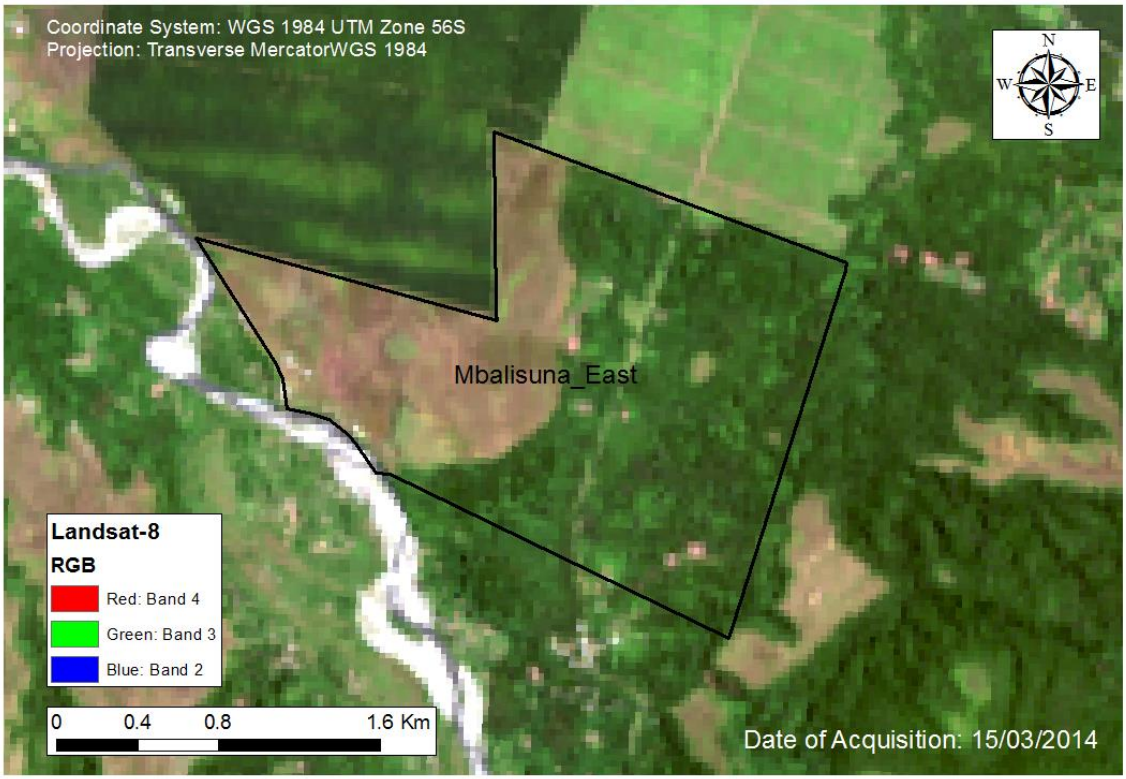


Figure 51 Landsat Image of Mbalisuna East for 15/03/14

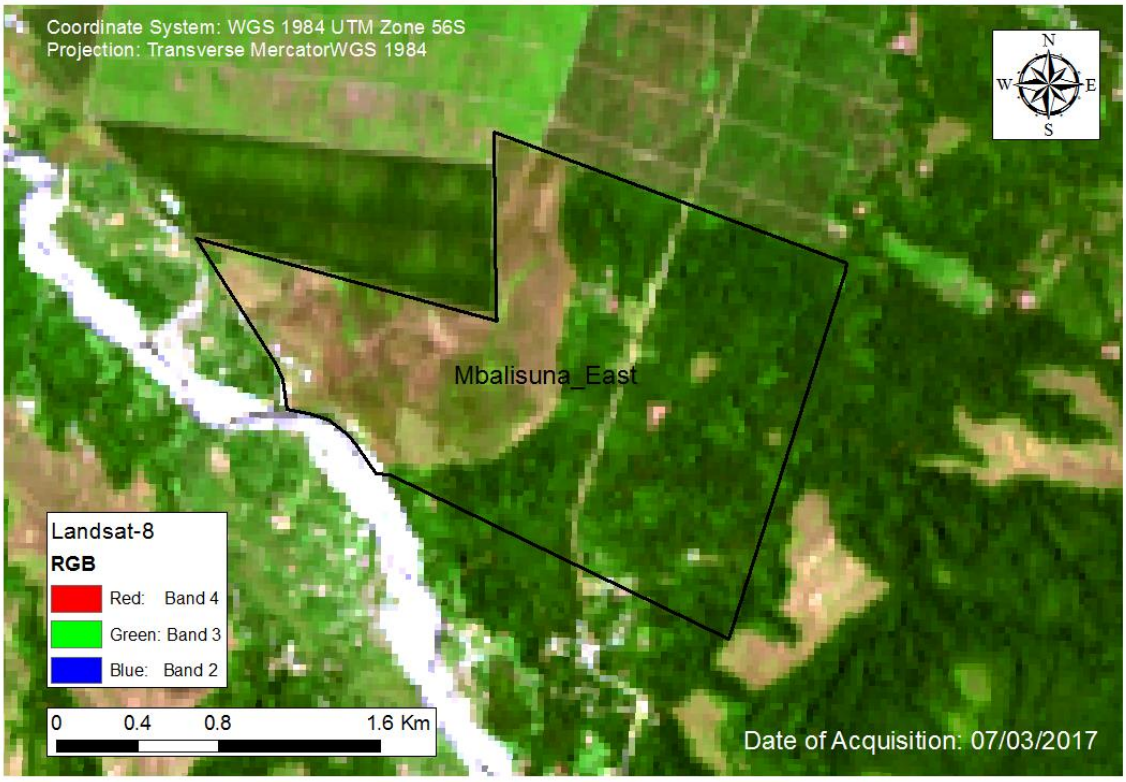


Figure 52 Landsat Image of Mbalisuna East for 07/03/17

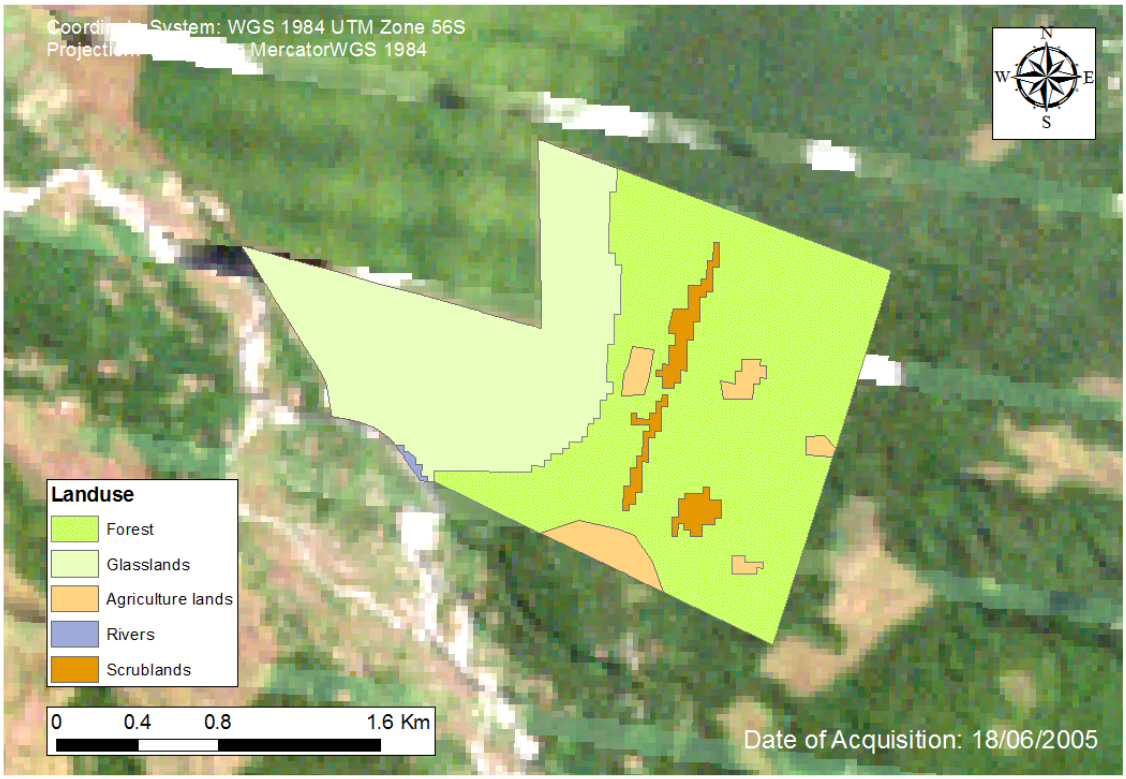


Figure 53 Land Cover Map of Mbalisuna East for 18/06/05

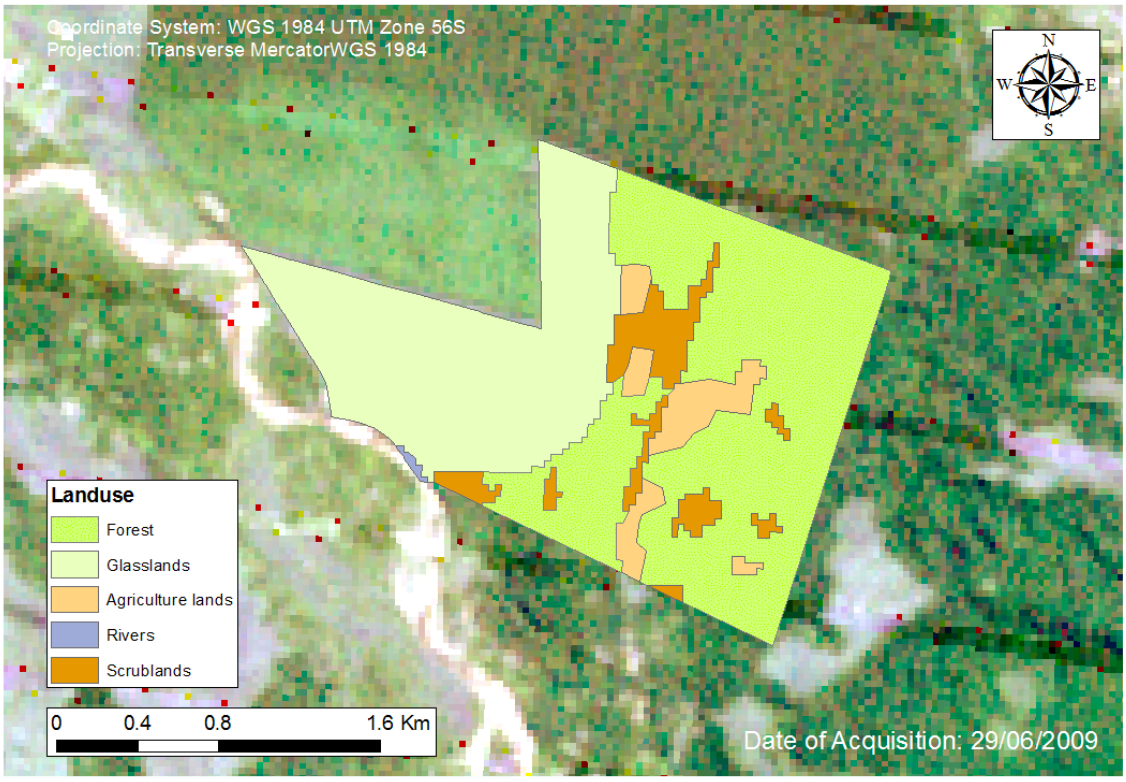


Figure 54 Land Cover Map of Mbalisuna East for 29/06/09

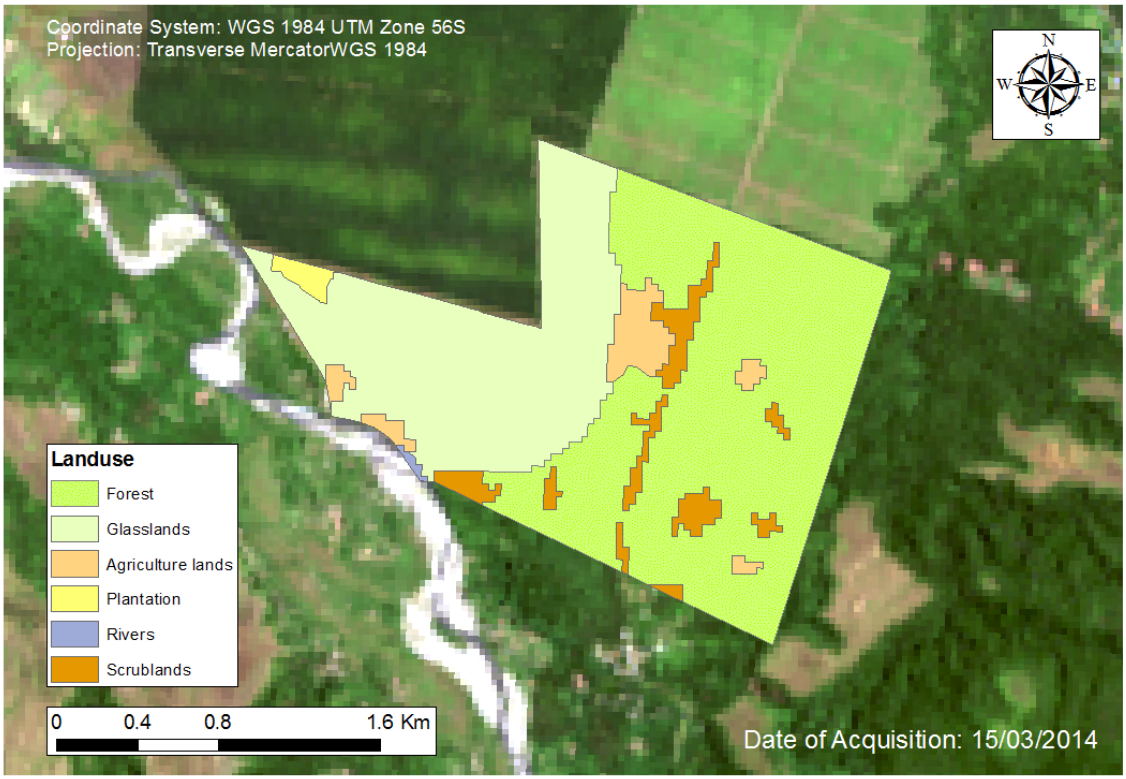


Figure 55 Land Cover Map of Mbalisuna East for 15/03/14

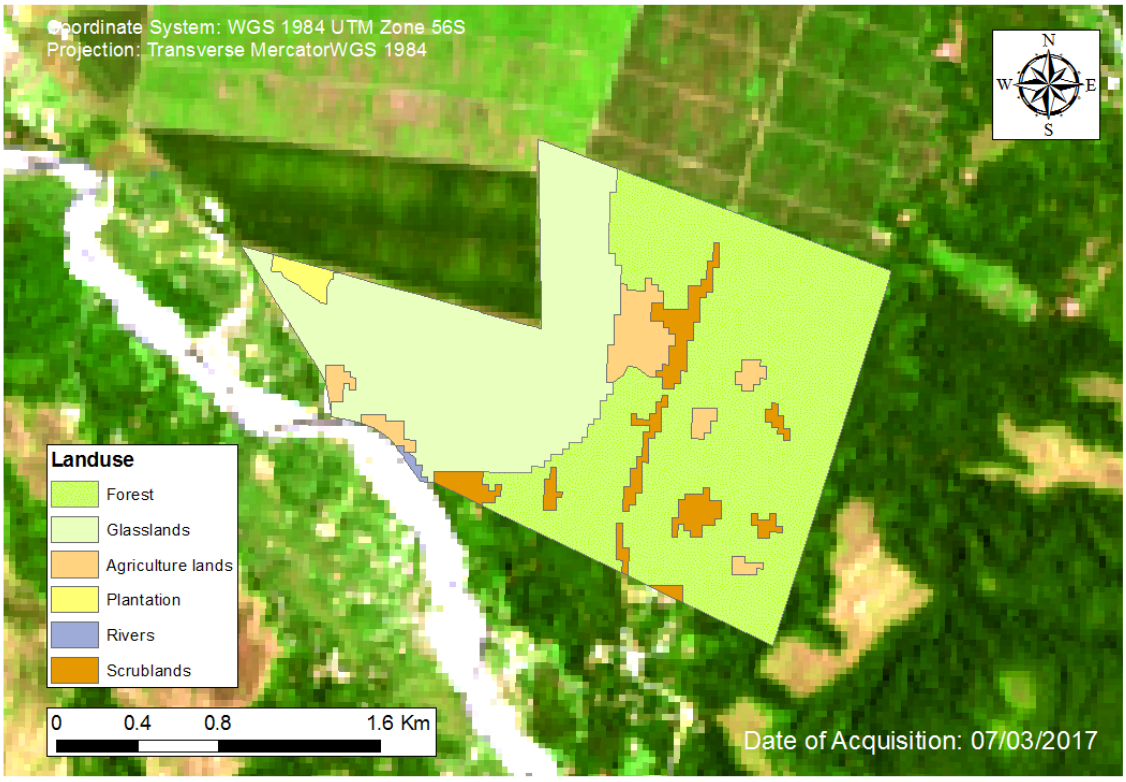


Figure 56 Land Cover Map of Mbalisuna East for 07/03/17

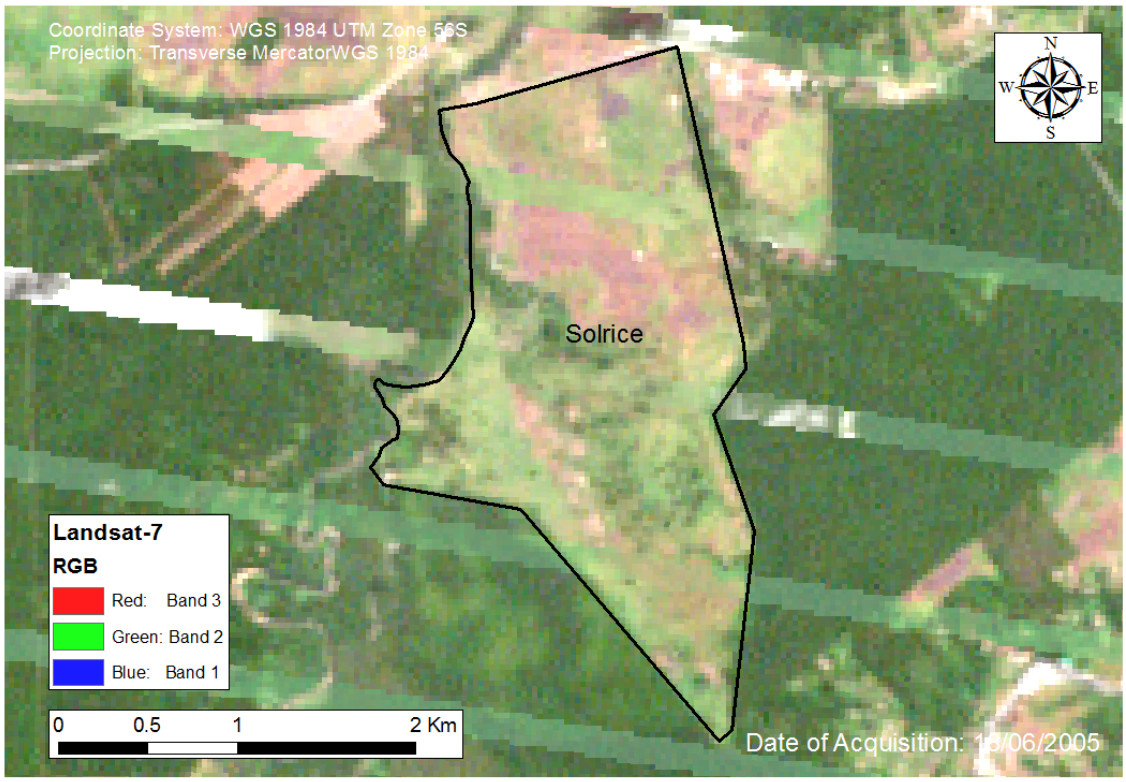


Figure 57 Landsat Image of Solrice 2 for 18/06/05

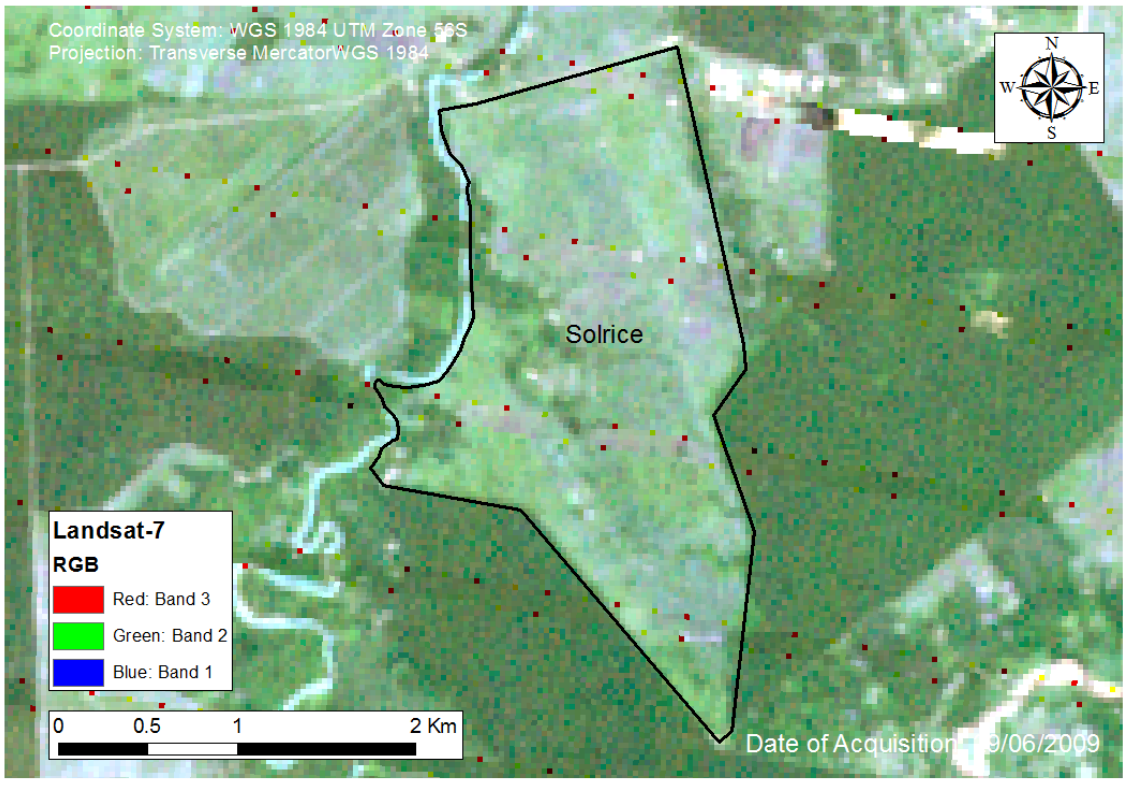


Figure 58 Landsat Image of Solrice 2 for 29/06/09

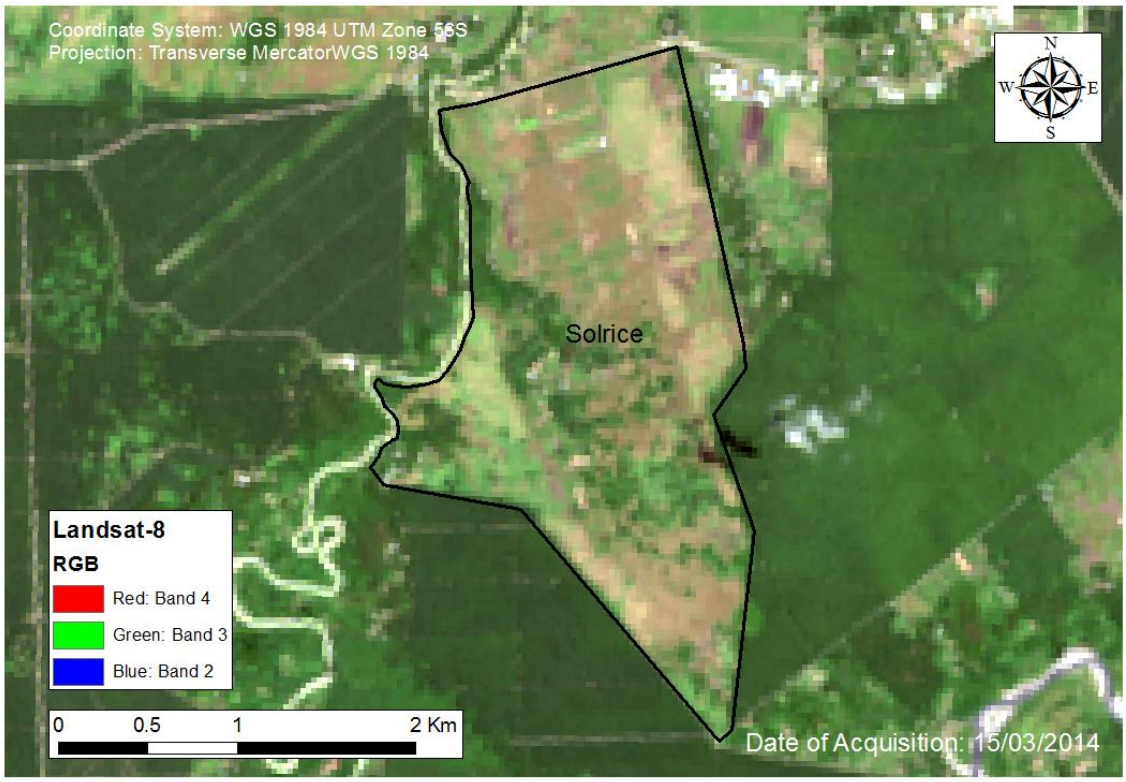
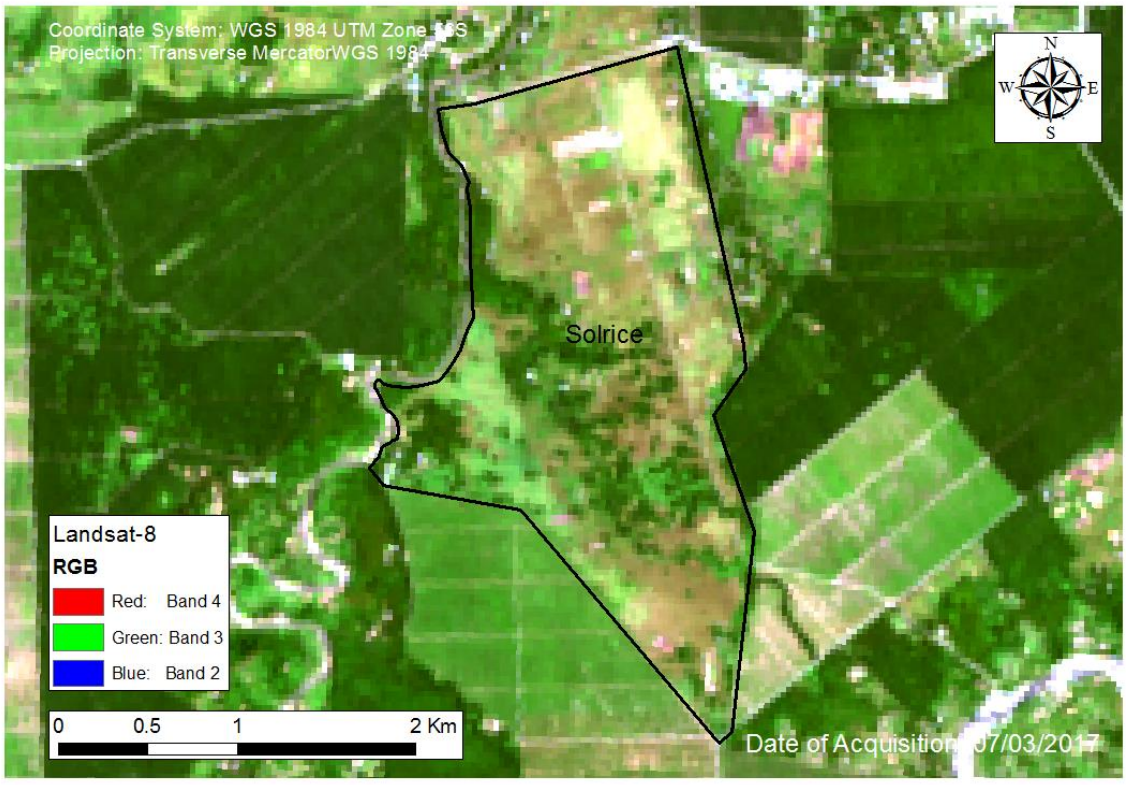


Figure 59 Landsat Image of Solrice 2 for 15/03/14



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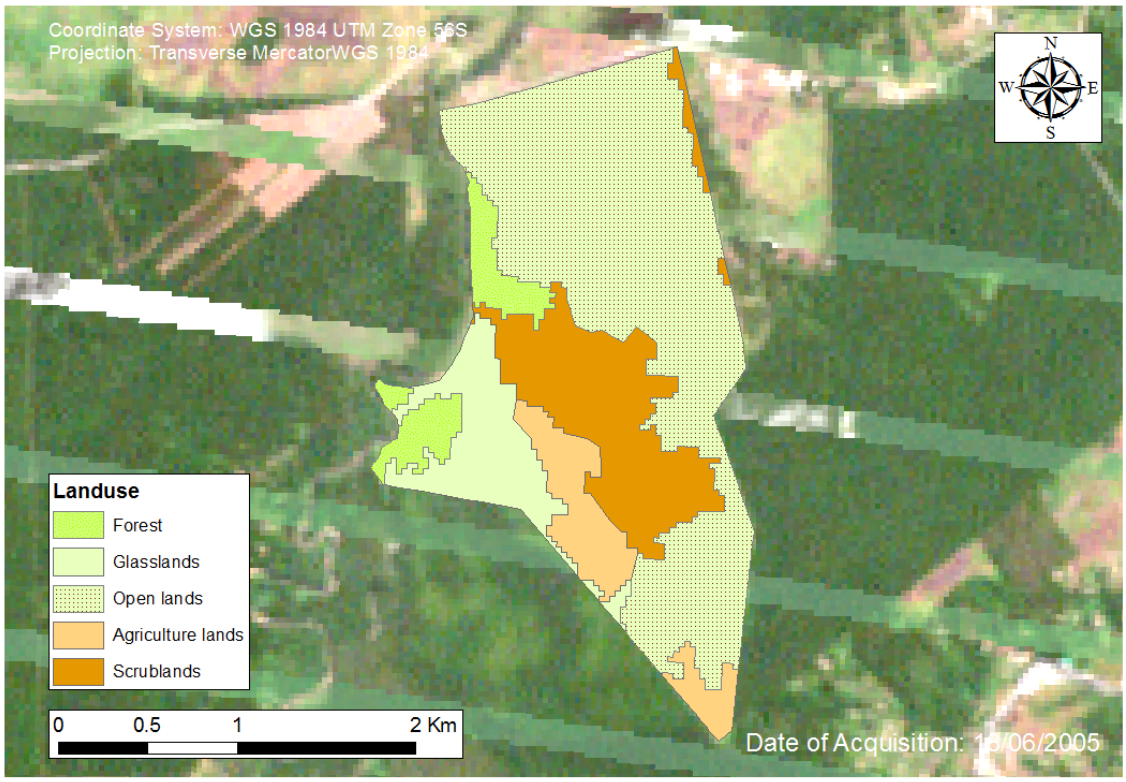


Figure 61 Land Cover Map of Solrice 2 for 18/06/05

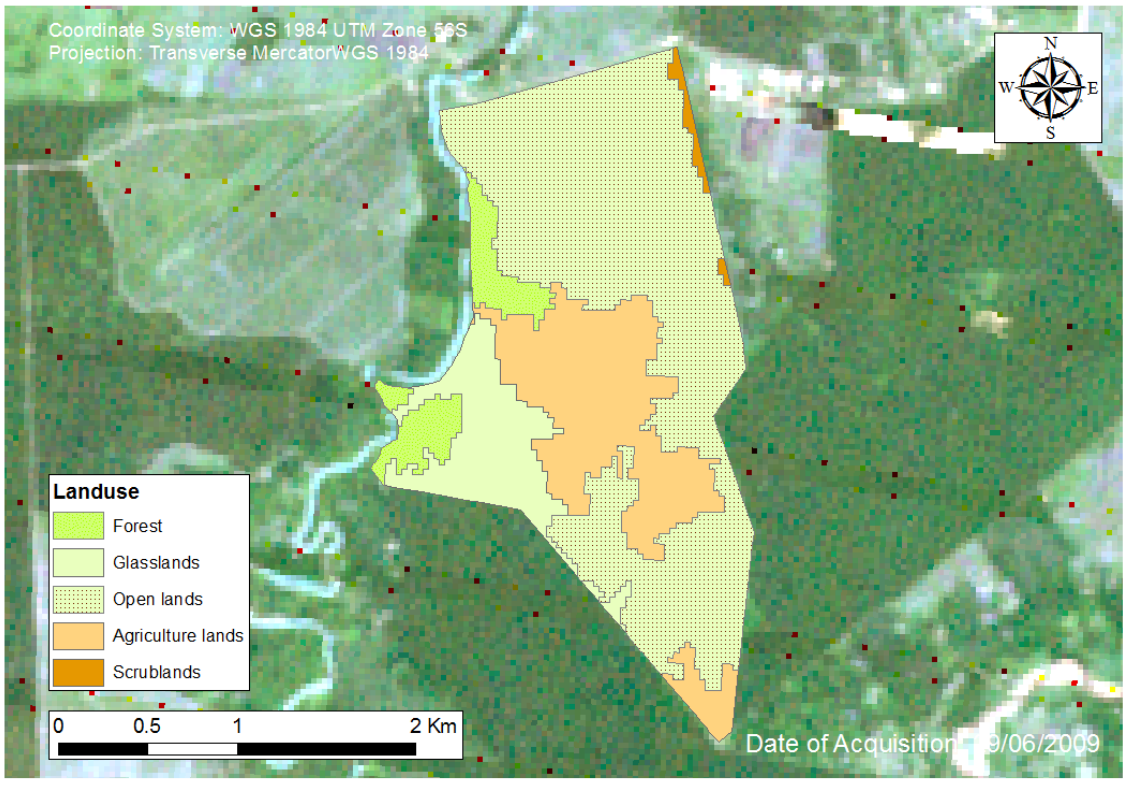


Figure 62 Land Cover Map of Solrice 2 for 26/06/096

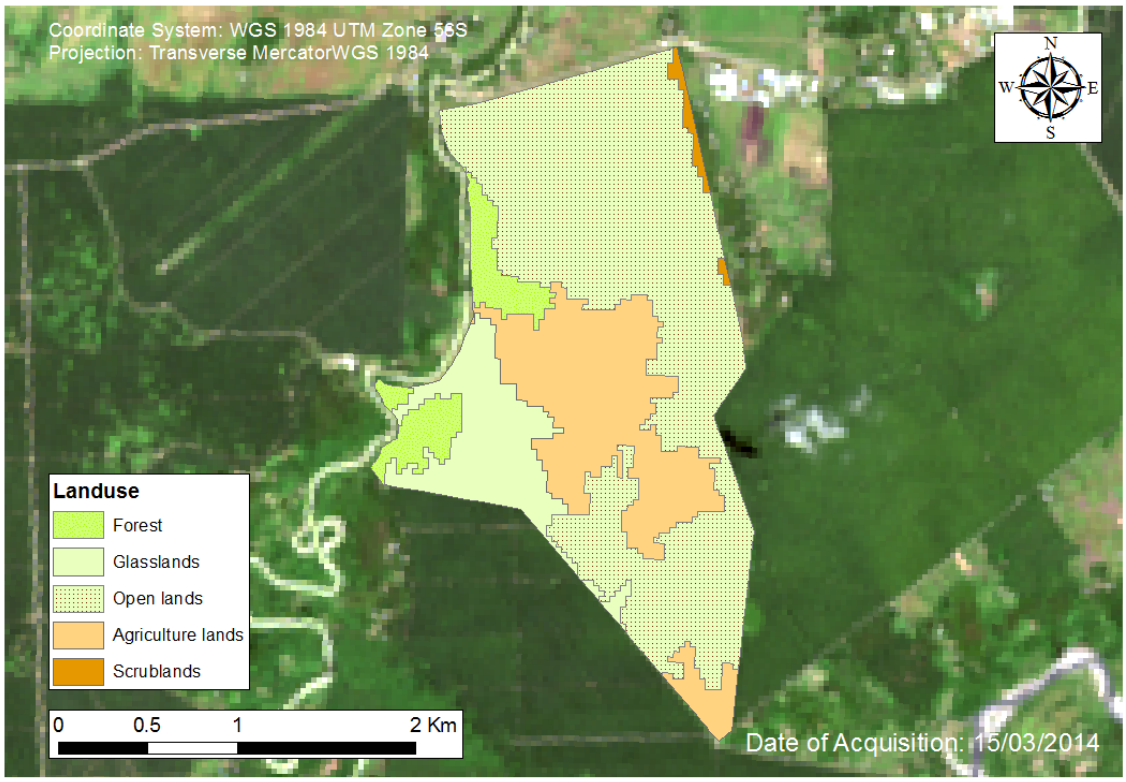


Figure 63 Land Cover Map of Solrice 2 for 15/03/14

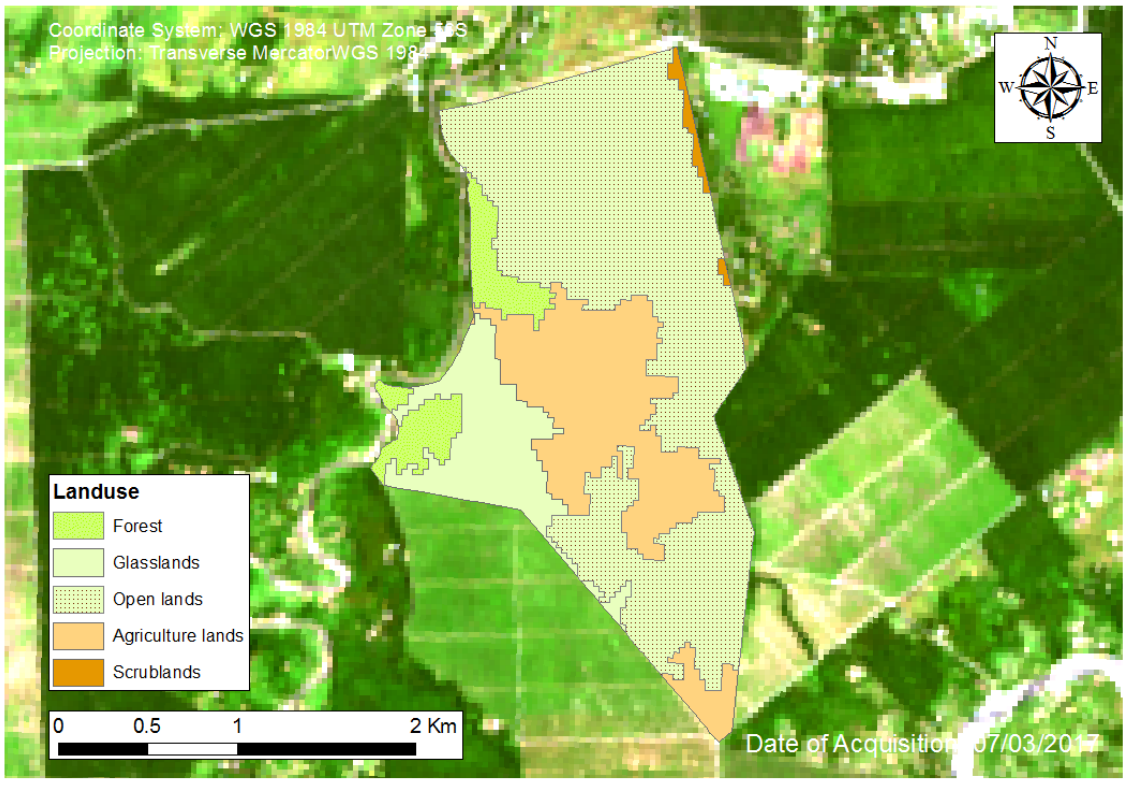


Figure 64 Land Cover Map of Solrice 2 for 07/03/17

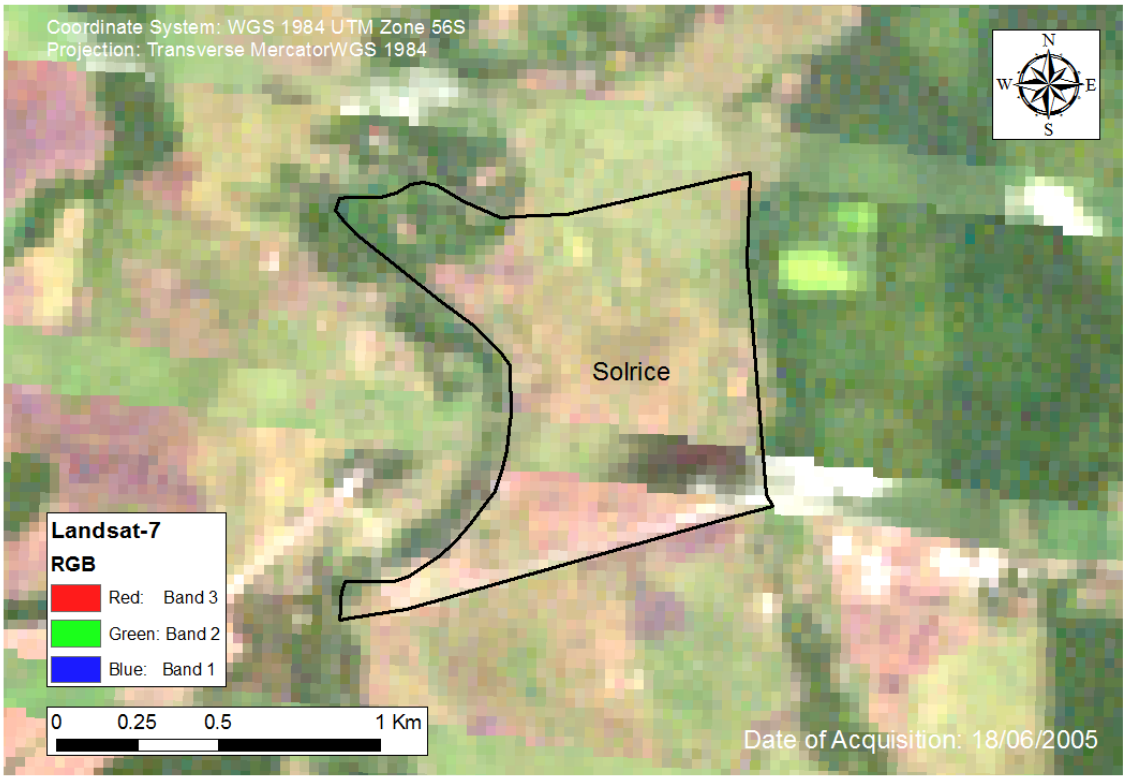
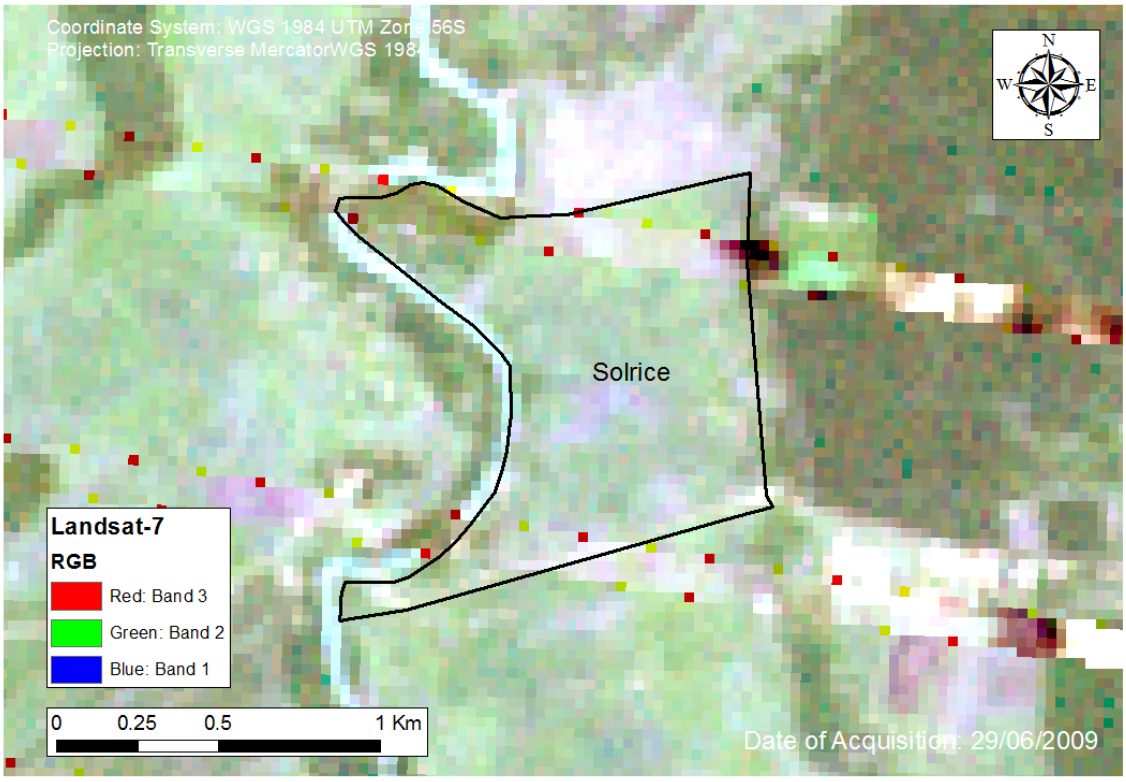


Figure 65 Landsat Image of Solrice 1 for 18/06/05



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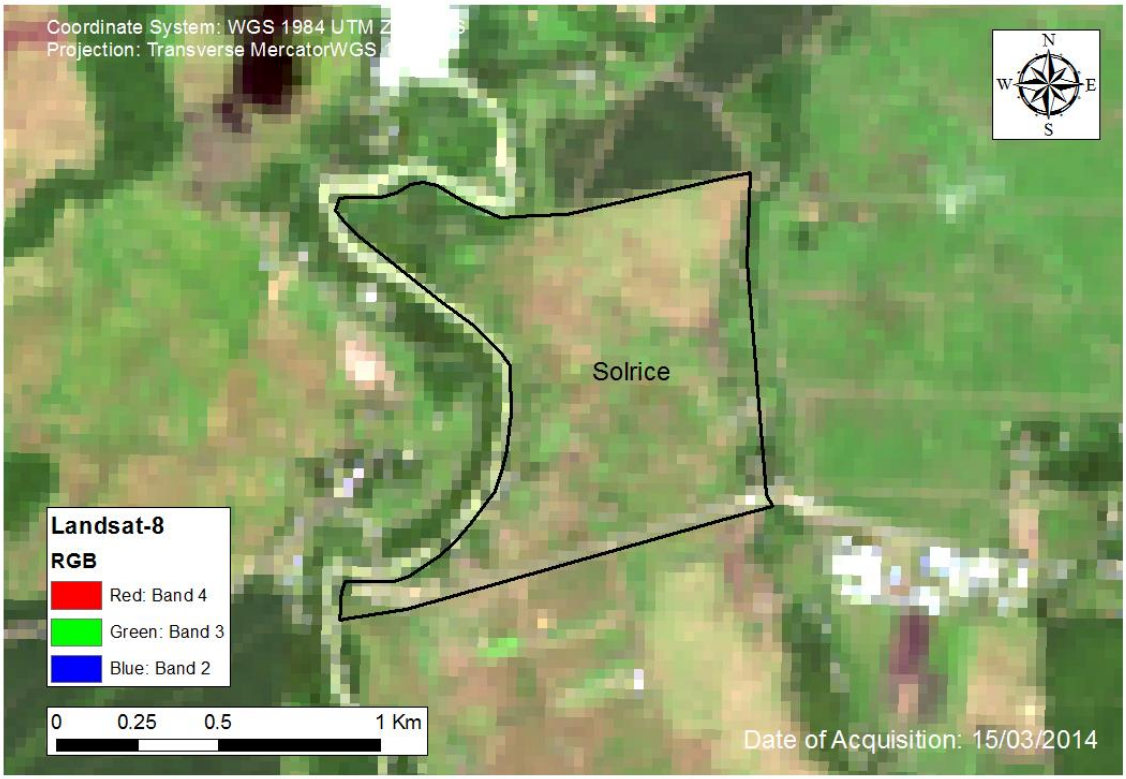

Figure 67 Landsat Image of Solrice 1 for 15/03/14

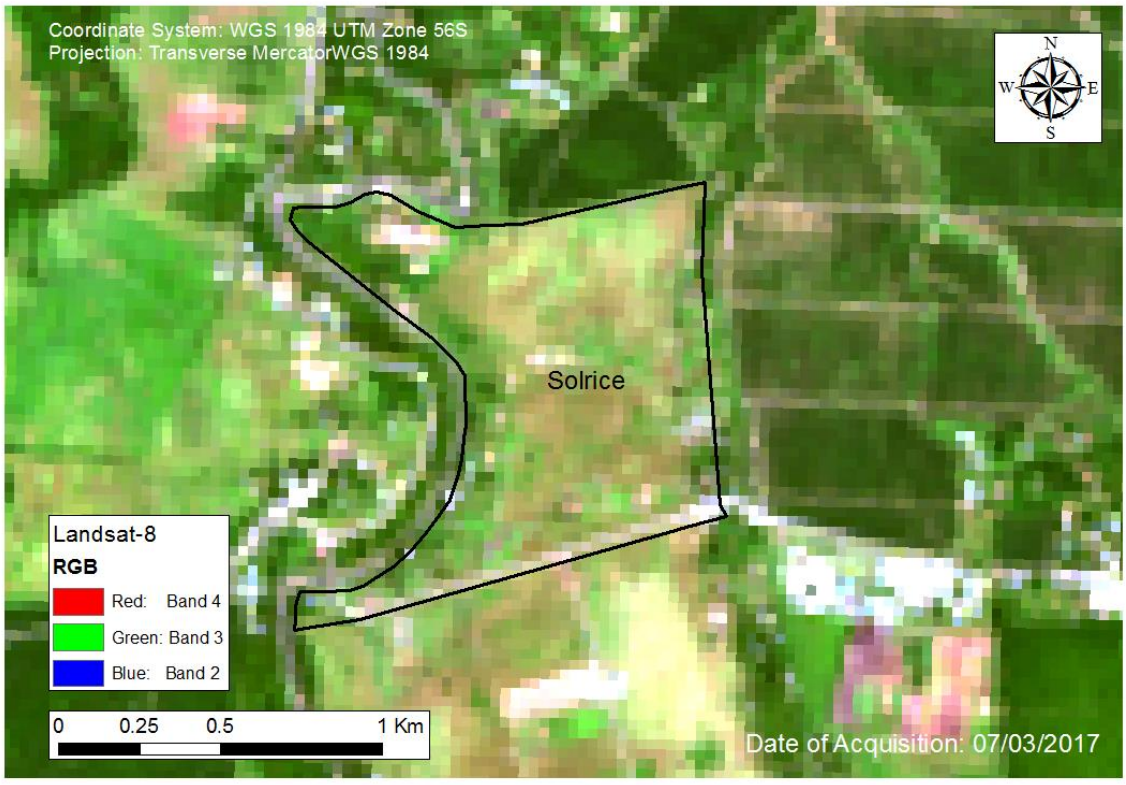

Figure 68 Landsat Image of Solrice 1 for 07/03/17

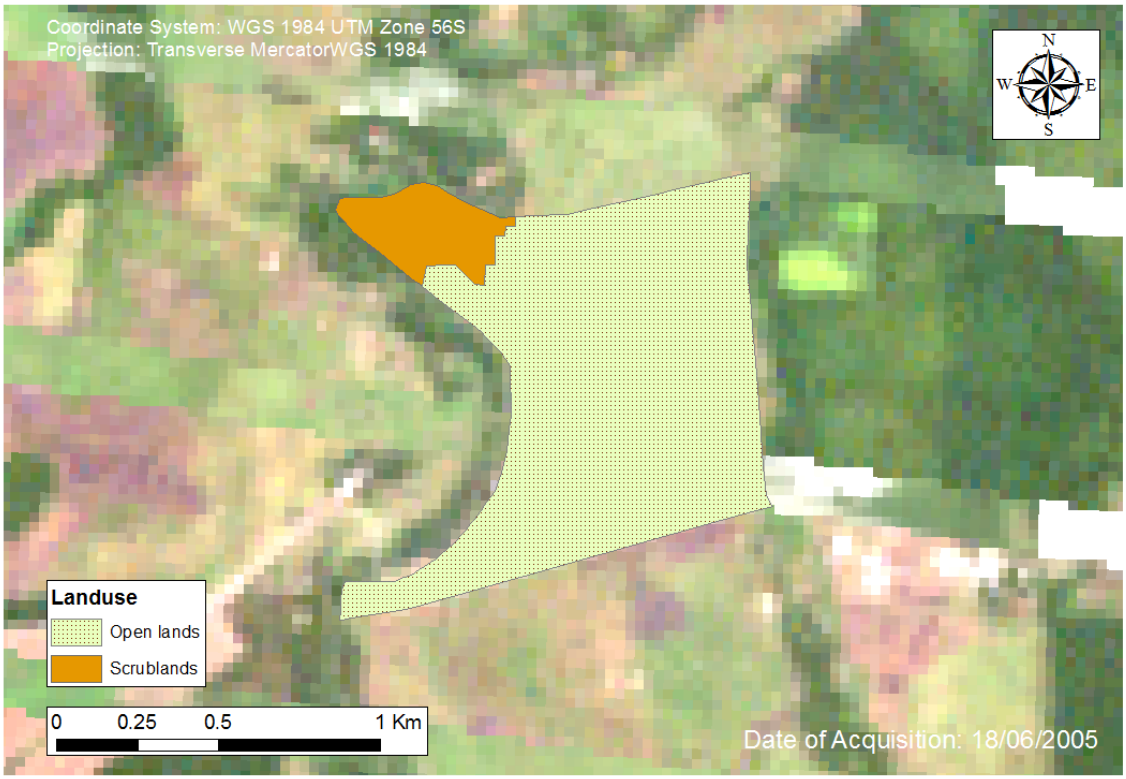

Figure 69 Land Cover Map of Solrice 1 for 18/06/05

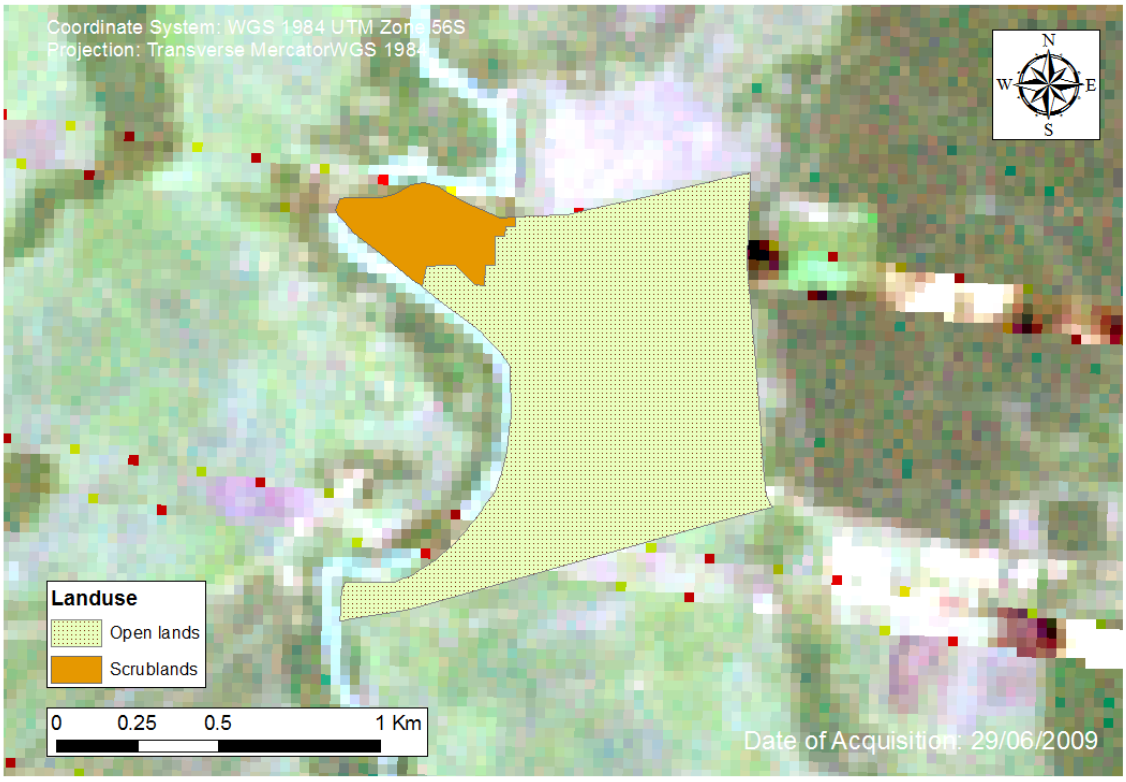

Figure 70 Land Cover Map of Solrice 1 for 29/06/09

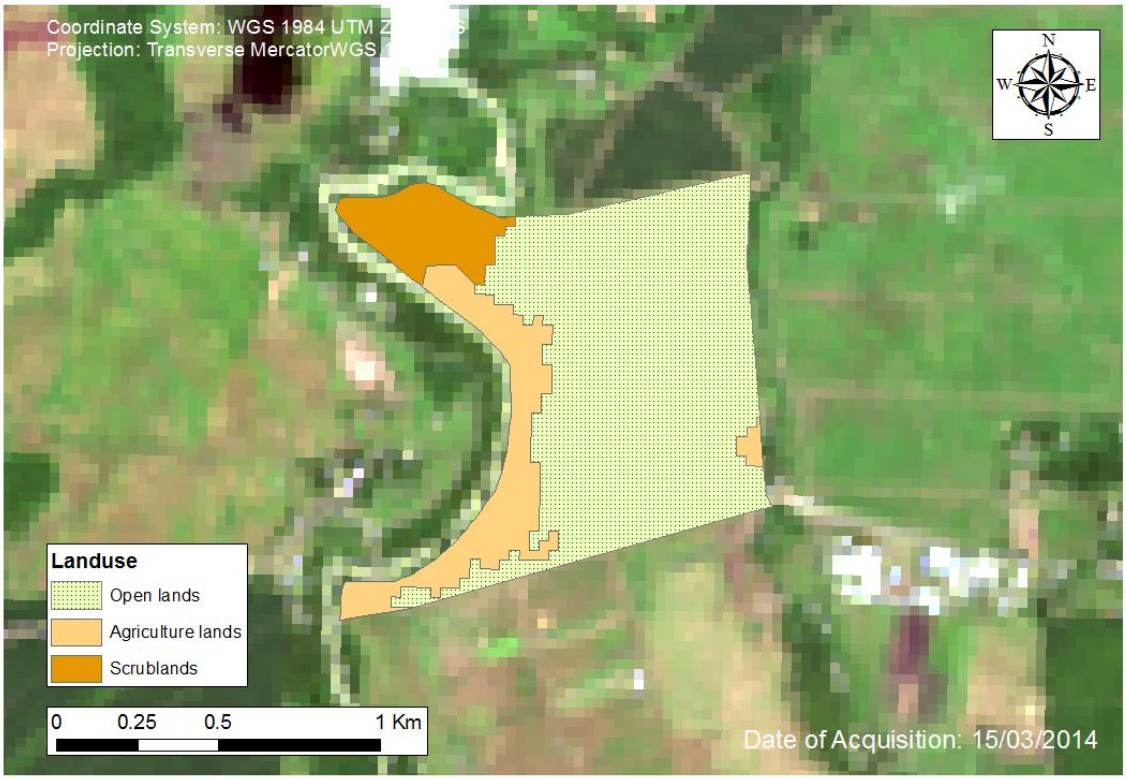

Figure 71 Land Cover Map of Solrice 1 for 15/03/14

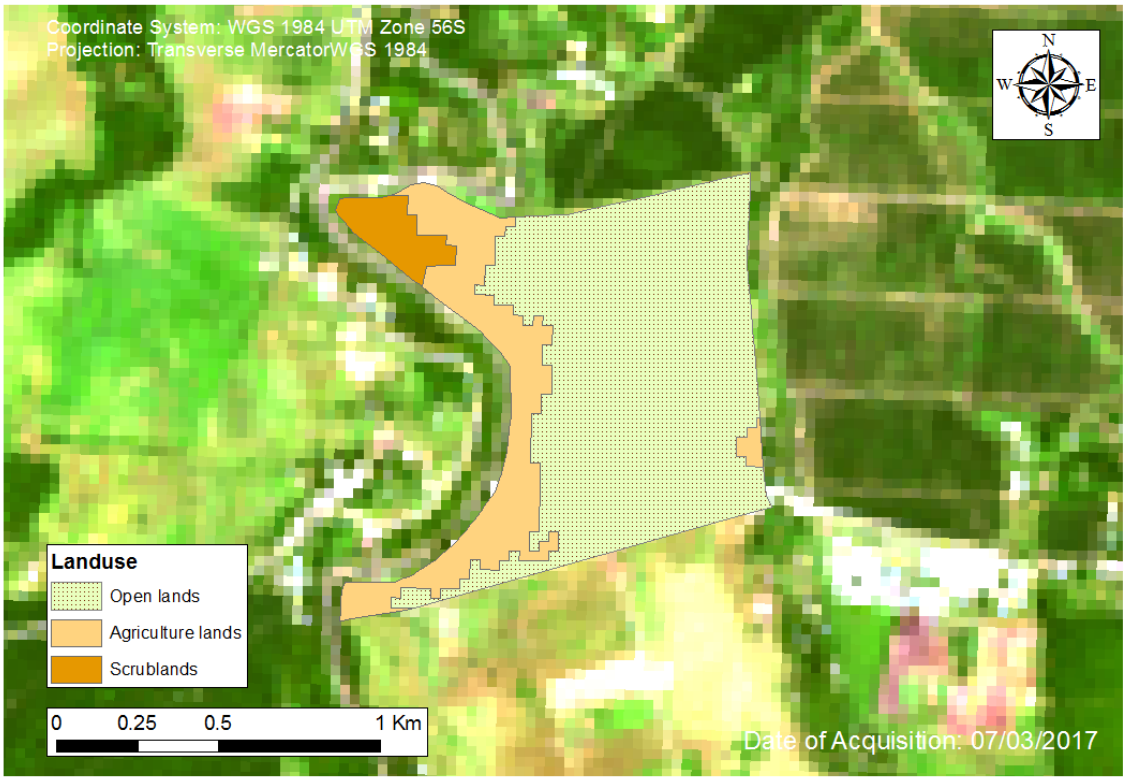

Figure 72 Land Cover Map of Solrice 1 for 07/03/17

6.8 Tree Cover Loss 2000-15

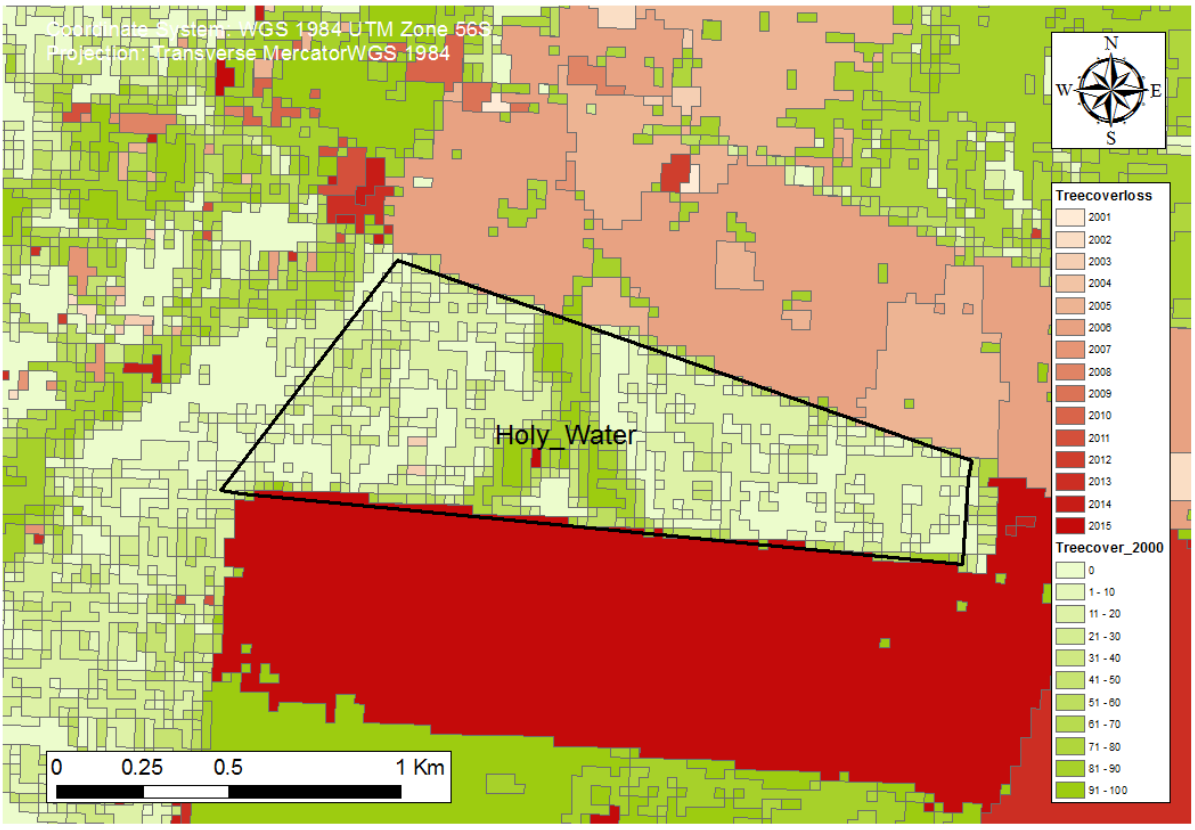

Figure 73 Map of Tree Cover Loss 2000-2015 for Holy Water

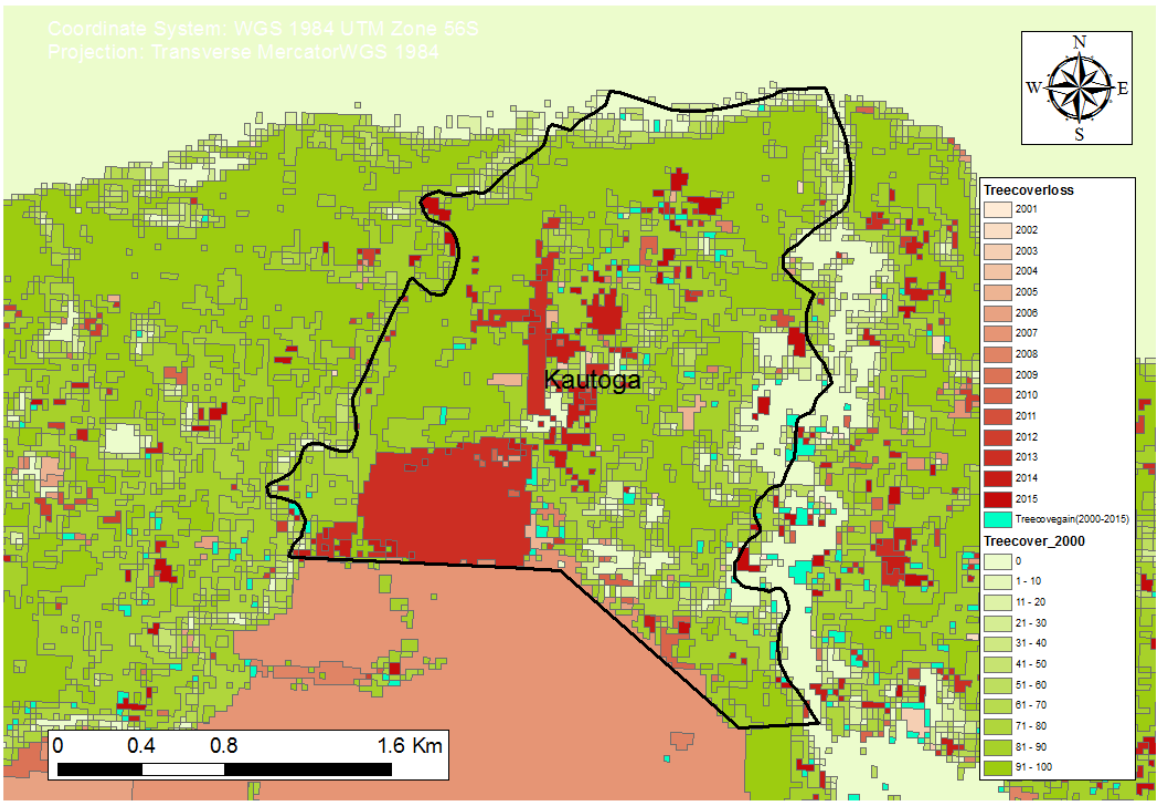

Figure 74 Map of Tree Cover Loss 2000-2015 for Kautoga

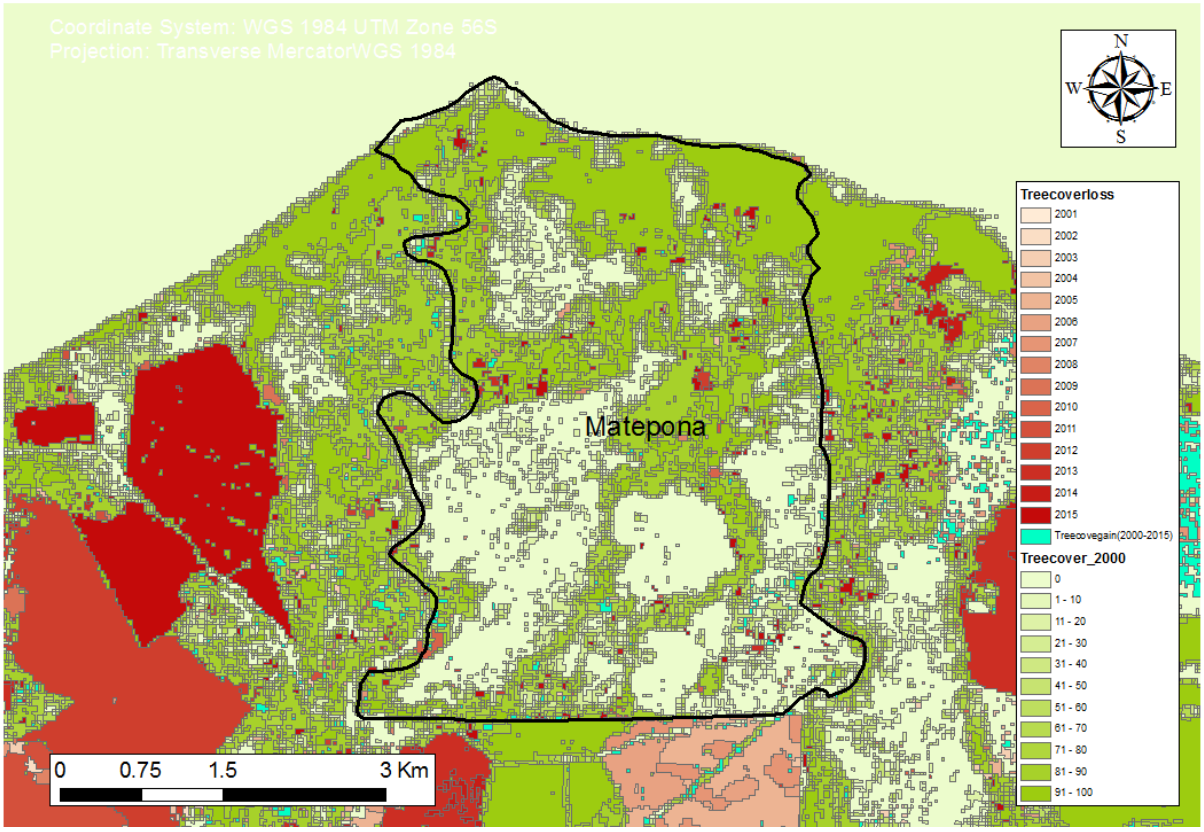

Figure 75 Map of Tree Cover Loss 2000-2015 for Matepona

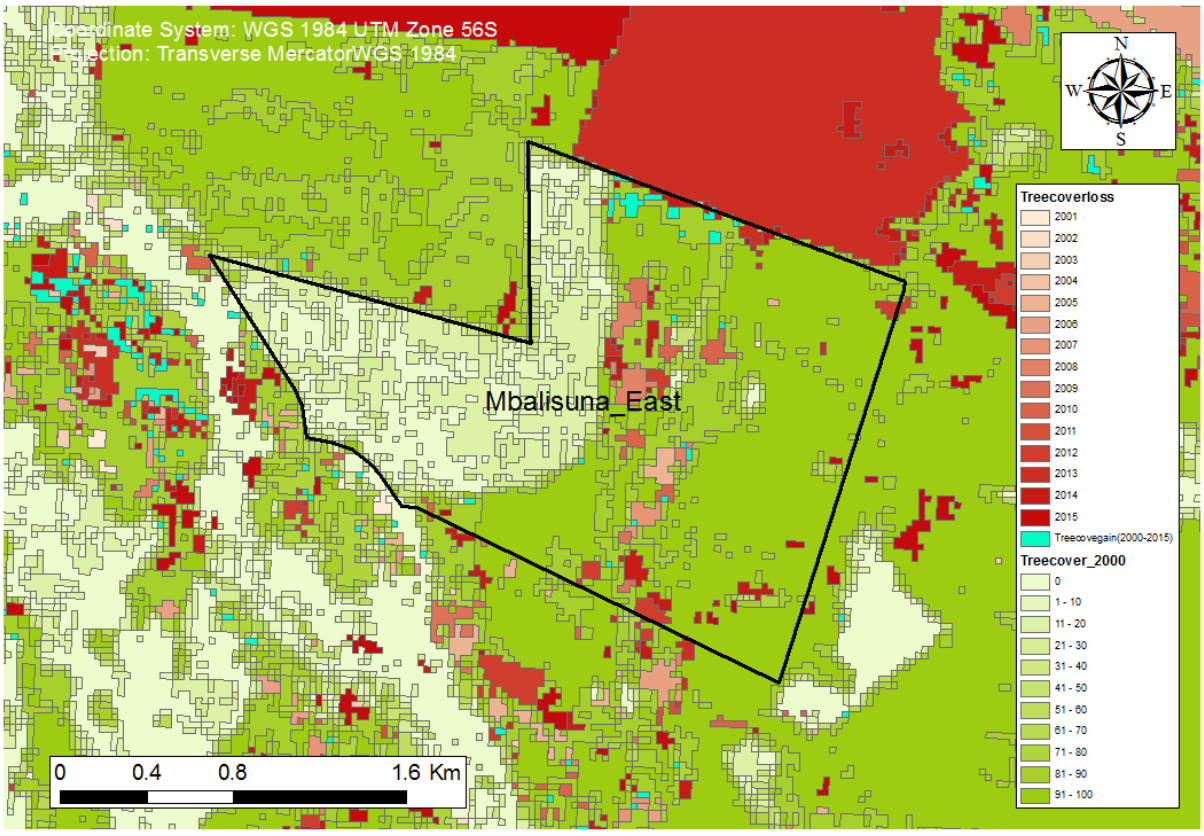

Figure 76 Map of Tree Cover Loss 2000-2015 for Mbalisuna East

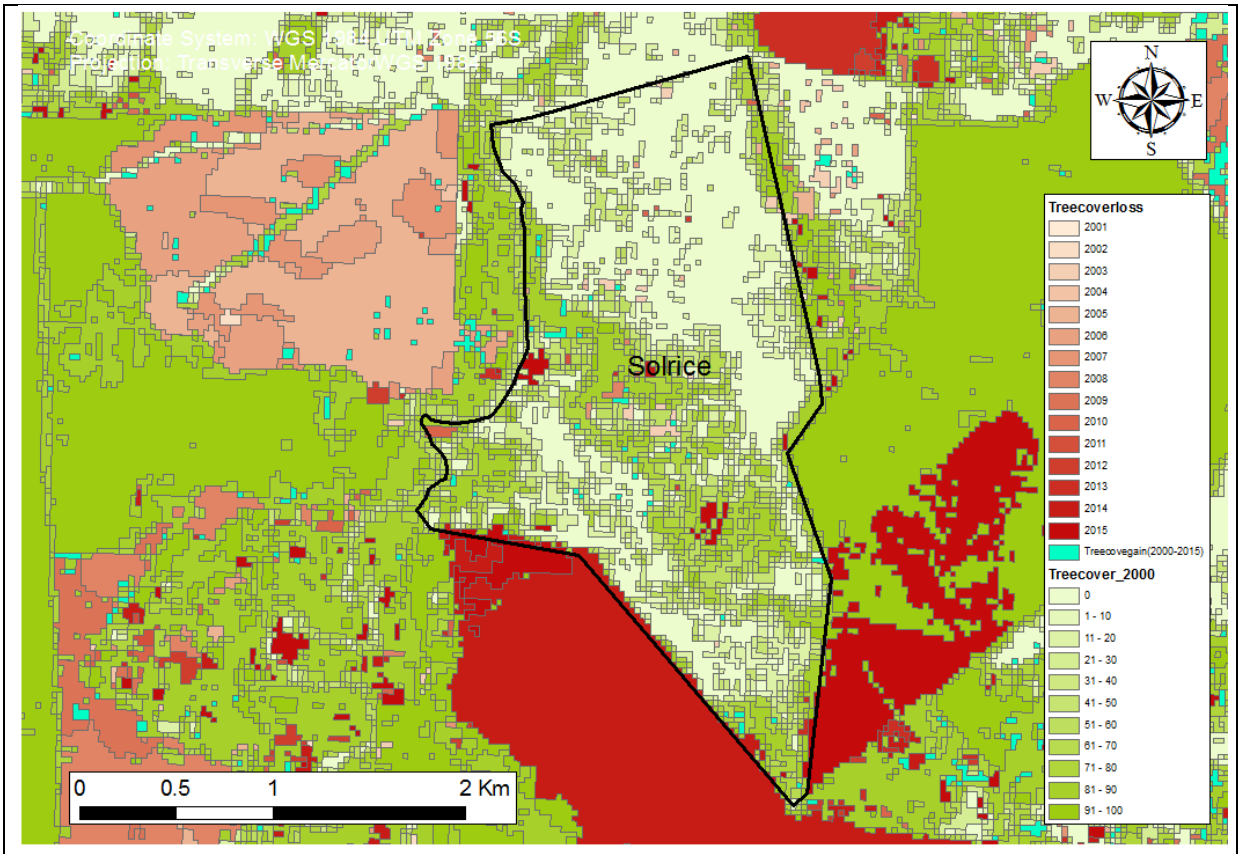

Figure 77 Map of Tree Cover Loss 2000-2015 for Solrice 2

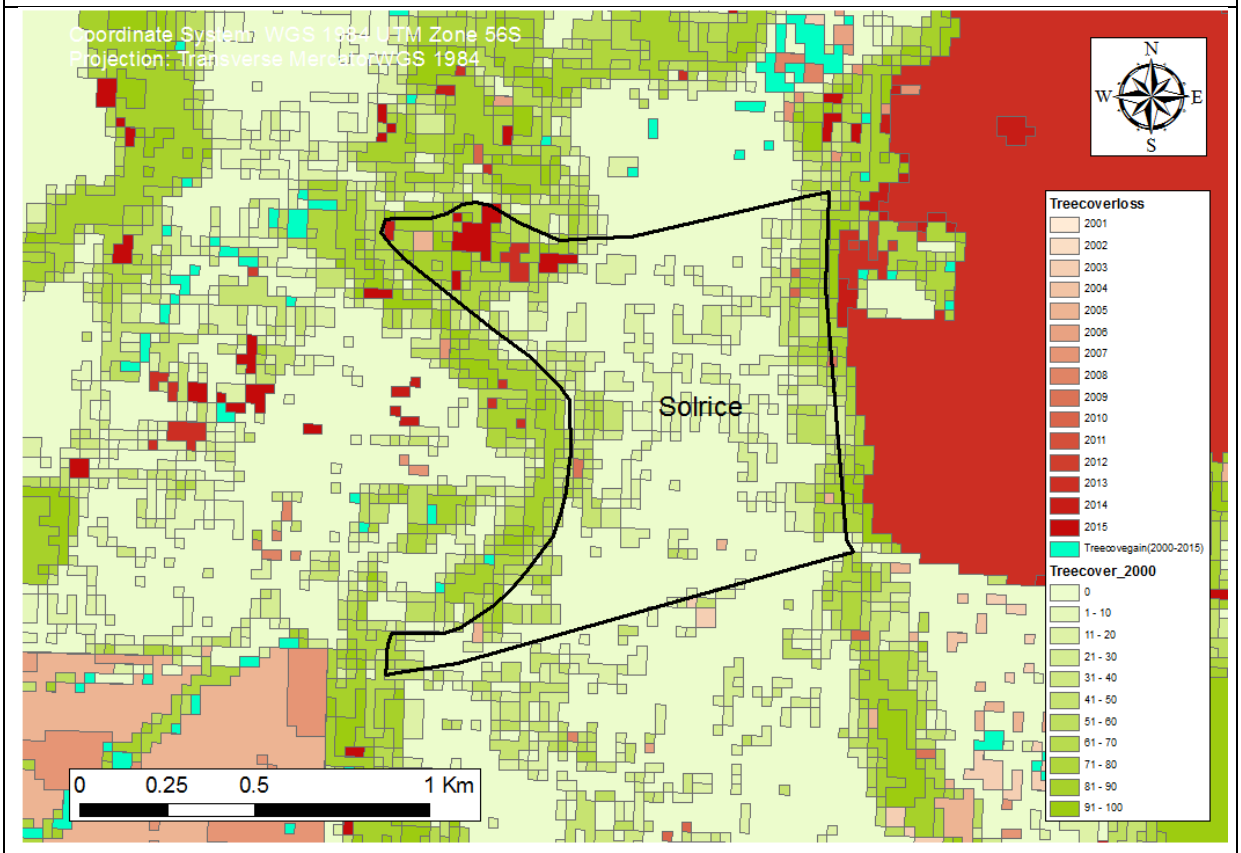

Figure 78 Map of Tree Cover Loss 2000-2015 for Solrice 1

7.0 FPIC process

7.1 Identification legal, customary or user rights

All proposed new developments have undergone extensive participation with the legal customary land owners. All of the land under consideration is privately owned, there are no government granted concessions in Solomon Islands and as such the identification of genuine land owners is a requirement to ensure the security of the long term investment. All of the new development have resulted from voluntary and unsolicited expressions of interest by the traditional landowners. The long standing presence of NBPOL in this landscape and the employment of local citizens familiar with the land owners of the areas including those being proposed by them for development has facilitated the identification of the rightful land owners.

7.2 Documentary evidence of FPIC process

The fulfilment of FPIC requirements have been further ascertained and reinforced through the carrying out of the SEIA, HCV and HCS all of which incorporate best practices such as participatory mapping as part of their methodology. All the original expressions of interest, meeting attendance records of awareness meetings, and land use planning maps signed off by clan leaders are available for verification by the CB.

8.0 Summary of Management Plans

8.1 Team responsible for developing management plans

The management plans are developed by GPP Management based upon the recommendations of the assessments done and summarized within this document. The following detail the roles and responsibility of each Management team.

General Manager GPP- Authorizes the Management plan. Ensures budgetary requirements are met as necessary to implement the management plan. Structures lease agreements to make protection requirements a condition of HCVMA lands leased to GPP. Supports Management team as necessary to resolve any issues met during the implementation of the Management Plan.

Field Manager GPP- Implements the operational components of the Management Plan. Ensures all Field Department employees and Contractors are inducted to the requirements of the Management Plan. Monitors and enforces requirements of the Management Plan.

Sustainability Manager GPP- Trains all Field Management Staff on the requirements of the Management Plan. Provides initial and regular awareness to all land owning communities as required. Audits the implementation of the Management Plan by the Field Department.

8.2 Elements to be included in management plans

8.2.1 Social Impact Management Plan

The following social impact management plan is derived from the SEIA report recommendations and is relevant to impacts and mitigation measures identified in that reports These recommendations will be incorporated into the a GPP Social Management Plan whose coordination is responsibility of the Sustainability Department.

Table 34 Social Impact Management Plan

Parameter to be monitored	***Proposed Enhancement / Mitigation Measures***	***Location***	***Measurement***	***Frequency***	***Responsibility***	***Estimated Time-frame for completion of task***
An increase in skill levels among workers and local residents.	New employees will be trained to perform their tasks and trained in basic health and safety. Local contractors will also acquire new skills and expertise. Skills development will occur throughout the development and operation phases.	All	SOP/Records of Trainings	Ongoing	Managers	11/17
An increase in income levels for employees and local residents.	In addition to 300 additional employees, local residents will benefit from an increase in royalties, lease payments, dividends (subject to profitability) and increased sales of local produce and other local business opportunities as a result of continued economic growth. Income levels will continue to increase over time.	All	Increased Business Opportunities operating.	Ongoing	Local Community and Employees	11/17
Improvements to health levels as a result of improved housing, solar power and hygiene.	Families with higher income levels are expected to invest in housing improvements. This may improve hygiene and sanitation and reduce the incidence of malaria. These benefits will increase over time.	All	Reduction in Malaria cases and other diseases	Quarterly	Clinic Staff	11/17
Reductions in labour as people invest in permanent housing and vehicles.	Investment in improved housing and vehicles may reduce the labour required for housing repairs, the collection of water, and walking to and from bus stops, providing additional time for economic activities or leisure. These benefits will increase over time.	All	Survey on the impact of Oil Palm	Annually	Sustainability	11/17

Parameter to be monitored	*Proposed Enhancement / Mitigation Measures*	*Location*	*Measurement*	*Frequency*	*Responsibility*	*Estimated Time-frame for completion of task*
Perceived adverse health impacts as a result of a decline in the quality of ground water downstream from estate oil palm.	This is a concern to some local residents. While local people are unlikely to change practices (e.g. boil water), the fear of contamination may cause some frustration or anxiety. Concern will increase over time unless addressed.	All	SOP Water Testing where applicable	Quarterly Parameter and Monthly Water Sample Result	Sustainability	11/17
A decline in subsistence food production in the longer term.	Although oil palm will be planted on land that is currently unused, population growth may lead to a shortage of land suitable for gardens in the future.	All	Community Land Use Map plan	Annually	Sustainability/ community	11/17
A decline in health levels in the longer term as a result of an increase in diabetes and other lifestyle diseases caused by poor dietary choices and limited exercise.	Health levels will decline if people replace garden produce with processed foods (rice and noodles), consume more salt and sugar in processed foods and drinks (e.g. soft drinks, biscuits), and exercise less. The risk of a potential decline in health levels will increase over time.	All	Awareness on Non Communicable Diseases	Quarterly	Medical Staff	11/17
Domestic violence and other law and order problems as a result of increased alcohol abuse.	Higher income levels are expected to contribute to increased alcohol abuse, particularly among young males and on weekends. This in turn leads to domestic violence, assault and other social problems.	All	DV Awareness and Grievance Procedure	Once	Sustainability Manager/ Managers	11/17
Poor attendance at schools due to overcrowding and lack of parental supervision.	The expected population growth will increase the number of students in the schools. Unless the government funds an increase in classrooms and teachers the classes may become crowded, potentially causing some tension between the children of local residents and workers, which may lead to low attendance by students whose parents come from other provinces. Poor attendance is likely to increase as the population increases.	All	SIG/GPG Awareness on the importance of Education	Annually	SIG/GPG/Parents	11/17
An increase in pedestrian accidents as a result of	Increased traffic will occur as a result of the road upgrade occurring, local residents purchasing vehicles,	All	Traffic Awareness programs	Once	RSIP Traffic/ Managers/Em	11/17

Parameter to be monitored	*Proposed Enhancement / Mitigation Measures*	*Location*	*Measurement*	*Frequency*	*Responsibility*	*Estimated Time-frame for completion of task*
increased traffic volumes.	and increased activity from GPPOL as production increases. The increase in traffic is likely to result in traffic and pedestrian accidents, and the risk of accidents will increase over time as the volume of traffic increases.				ployees	
Social tension, leading to violence, between different ethnic groups in the work compounds.	Stage 1 will require a 20% increase in the workforce. Although there is scope for social tension, GPPOL actively integrates people from different provinces and has a system for dealing with any disputes that arise between people with different ethnic backgrounds.	All	Grievance and Social Procedure	Once	GPPOL Social Committee	11/17
Social tension, leading to property damage and/or violence, between compound residents and local residents.	The risk of social tension is considered to be low as local tribes and clans have been empowered by the establishment of GPPOL and are supportive of the development approach. Further in-migration, resulting from workforce recruitment, is required for the expansion and will stimulate economic development.	All	Grievance Procedure and Mechanism	Once	GPPOL Social Committee/Community Leaders	11/17
Social tension, leading to disputes and an erosion of tribal, clan and family relationships, due to dissatisfaction with the management of landowner benefits.	Tension may occur if the allocation and use of funds by either GPRDA or GPRDC is not transparent or seen as fair. This could lead to disputes between landowning tribes, clans and families, and potentially lead to property damage and violence. The risk is highest when the FFB price, and therefore royalty and dividend payments, are low.	All	Grievance Procedure and Mechanism	Once	Community Leaders	11/17 onwards
Social unrest, disputes and a general decline in security, due to increased economic inequality between those residents benefiting from oil palm, and those that do not.	Oil palm is the major contributor to economic development in the Study Area. Jealousy may occur between landowner groups who are benefiting from oil palm, and those that are not. The economic disparity is likely to be greatest when oil palm prices are high, or conversely, when the price or production levels of other commodities (e.g. copra, cocoa) are low.	All	Grievance Procedure Mechanism	Once	Communities Leaders	11/17 onwards

8.2.2 Habitat Management Plan

The following habitat management plan is derived from the HCV and HCS report recommendations and are relevant to all areas and values identified in those reports. These recommendations will be incorporated into a GPP Habitat Management Plan whose coordination is responsibility of the Sustainability Department. Management plans will be site specific in respect to recommendations for maintaining HCVs.

Table 35 Habitat Management Plan

Parameter to be monitored	***Proposed Enhancement / Mitigation Measures***	***Location***	***Measurement***	***Frequency***	***Responsibility***	***Estimated Time-frame for start and completion of task***
Management	Development of a standard operating procedure (SOP) that clearly details the method required for the protection and monitoring HCVMA areas identified	*All*	SOP	*Annually*	*Sustainability Manager*	*12/17-02-/18*
	Develop habitat management plans to manage and maintain all HCVs within leased areas	*All*	Habitat Management Plan	*Annually*	*Sustainability Manager*	*01/18- onwards*
	Ensure all contractors are trained in rules of clearing, stopping at areas of demarcation and felling any vegetation into the plantation areas not into the protected areas.	*All*	Training records	*TBD*	*Sustainability Manager*	*03/18*
	Finalise formal management agreements with all communities. This should include a map of the areas to be develop for oil palm, HCV areas and the areas to be set aside for gardens. This should take into account areas external to the assessment area that may be available for gardens.	*All*	Lease agreement	*Once*	*General Manager*	*02/18*
Conversion of forest areas to agriculture. Extraction of logs to meet	Paying a lease on the conservation areas. Stop paying lease if evidence of subsequent clearing is observed.	*ALL*	Lease fee payments referencing HCV survey results (see below)	*Quarterly*	*General Manager*	*02/18*

Parameter to be monitored	***Proposed Enhancement / Mitigation Measures***	***Location***	***Measurement***	***Frequency***	***Responsibility***	***Estimated Time-frame for start and completion of task***
demand for customary purposes.	Having a conservation area manager that socialises the purpose of conservation and gets conservation area projects running.	*ALL*	*Sustainability Manager position funded*	*Ongoing*	*General Manager*	*Done*
	Surveys of all HCVs to check for incursions of gardening or logging	*All*	*HCV Survey Forms*	*Quarterly*	*Field Manager*	*04/18 onwards*
	Agreement on forest boundaries with tribes and demarcation of all HCV areas, including boundaries adjacent to future palms and within existing forest.	*All*	Signed agreement with map. Referenced clause in lease agreement	*Once*	*General Manager*	*03/18 onwards*
	Agreement on use of forest areas by tribe / clans (e.g. no clearing for agriculture, limited firewood extraction, but no tree felling allowed)	*All*	Signed agreement with map. Referenced clause in lease agreement	*Once*	*General Manager*	*12/17-02/18*
	Communication and awareness on the importance of maintaining HCVs	*All*	*Attendance records*	*Quarterly*	*Sustainability Manager*	*03/18 onwards*
Harvesting of Pterocarpus indicus	Specific ban on harvesting of this species.	All	Awareness records	*Annually*	*Sustainability*	*03/18 onwards*
	Inventory/map of existing trees and include in regular survey	All	HCV Survey Forms	*Biannually*	*Sustainability*	*03/18 onwards*
	Planting additional trees	All	Inspection records	*Quarterly*	*Field*	*03/18 onwards*
Conversion of forest areas to agriculture. Extraction of logs to meet demand for customary purposes.	Agreement on forest boundaries and forest area use with clans and demarcation of forest areas.	All	Signed agreement including maps	*Once*	*General Manager*	*12/17-02/18*
	Use of Monitoring Results to adapt management recommendations in the future	*All*	*Habitat Management Plan revised annually*	*Annually*	*Sustainability Manager*	*11/18*

Parameter to be monitored	*Proposed Enhancement / Mitigation Measures*	*Location*	*Measurement*	*Frequency*	*Responsibility*	*Estimated Time-frame for start and completion of task*
	Ensure that demarcation is done prior to contractors start clearing the area. Demarcation can be assisted with paint, flagging tape, etc	All	Field inspection	Once	Field Manager	Before clearing estimated 2/18
	Maintain and establish riparian buffers – this involves : Planting appropriate vegetation to stabilise the riparian areas. Ensuring vegetation cover is maintained	All	HCV Inspection Forms	Quarterly	Sustainability Manager	After planting estimated 03/18 onwards
	Maintain watershed protection	All	Water quality testing where applicable	Quarterly	Sustainability	TBD
	Agreeing with the community on allowable use of vegetation in riparian areas	All	Attendance records	Annually	Sustainability Manager	10/17 ongoing
Continued agricultural expansion putting increased pressure on forest areas. Burning to assist agricultural development within the riparian buffer strip People constructing huts and living (permanently or temporary) and making gardens on riparian area. Lack of understanding	Completion of mapping of all areas where resources are extracted by the community. This should be confirmed in small villages where the HCV assessors were not able to visit.	All	Habitat Management Plan	Annually	Sustainability Manager	1/18
	Agreement on “no clearing” (e.g. for gardens) within forest areas within the lease.	All	Conservation areas included in lease	Once	General Manager	*12/17-02/18*
	Agreed enforcement protocol of holding back rental payments or removal from the lease area for transgressions found in inspections.	All	Conservation areas included in lease	Once	General Manager	*12/17-02/18*

Parameter to be monitored	*Proposed Enhancement / Mitigation Measures*	*Location*	*Measurement*	*Frequency*	*Responsibility*	*Estimated Time-frame for start and completion of task*
about HCV with the community						
	Ensuring adequate areas are available for the community to garden (outside the lease area).	All	Community use areas mapped out	Once	General Manager	8/17 Done
Accidental clearing of cemeteries and other cultural sites (e.g. tambu sites, WW2 historical sites) by GPPOL staff.	Completion of mapping of all areas which constitute HCV 6. This should be confirmed in small villages where the HCV assessors were not able to visit	All	Checks to make sure enclaved areas are still clearly delineated.	Once	Sustainability Manager	8/17 Done Community Use Areas
	Demarcation in the field prior to land clearing and planting.	All	Signage	Once Quarterly	Field Manager	Before clearing estimated 2/18
	Demarcation on operational map	All	Maps	Once	Sustainability Manager	Before clearing estimated 2/18
	Documentation of cultural and historical values	All	Habitat Management Plan	Once	Sustainability Manager	Before clearing estimated 2/18
	Follow up with NGOs, Government bodies about the HCV concept and the company's development plan.	All	Keep records of all meetings and communications about HCV.	Once	Sustainability Manager	TBD
River changing course and destroying riparian area.	Buffer zones increased beyond RSPO standards where appropriate. Documented in HCV maps.	All	Maps	Once	Sustainability Manager	Done
	Demarcation prior to clearing	All	Field	Field Inspection		Before clearing estimated 2/18

8.2.3 Soil Management Plan

The following soil management plan is derived from the soil suitability report recommendations and is relevant to all areas identified in that reports. These recommendations will be incorporated into the Plantation Management whose coordination is responsibility of the Field Department.

Table 36 Soil Management Plan

Parameter to be monitored	***Proposed Enhancement / Mitigation Measures***	***Location***	***Measurement***	***Frequency***	***Responsibility***	***Estimated Time-frame for completion of task***
Marginal soils identified in soil suitability study	Compare productivity on similarly classified soils in existing plantations	*All*	GIS Map OMP Data	*Once*	*Field Manager*	*January 2019*
Soil management	Apply soil amendments as deemed necessary based on the above recommendation	*TBD*	Field inspection	*Ongoing*	*Field Manager*	*June 2019*

8.2.4 GHG Management Plan

The following soil management plan is derived from the GHG report recommendations and is relevant to all areas identified in that reports. These recommendations will be incorporated into the Plantation Management whose coordination is responsibility of the Field Department.

Table 37 GHG Management Plan

Parameter to be monitored	***Proposed Enhancement / Mitigation Measures***	***Location***	***Measurement***	***Frequency***	***Responsibility***	***Estimated Time-frame for completion of task***
Mitigate net GHG emissions associated with oil palm cultivation	Implementation of the High Carbon Stock Approach prior to development. No conversion of vegetation with carbon stock > 75 tC/ha.	*All*	GIS Map	*Once*	*Sustainability Manager* *Field Manager*	*Completed*
Enhancement of Carbon Stocks	All HCV/HCS areas to be leased to company to be managed as conservation areas allow for carbon sequestration.	*All Except Matepona*	GIS Map Field inspection	*Quarterly*	*Sustainability Manager* *Field Manager*	*January 2019 onwards*
	Awareness to be carried out on the importance of maintaining HCV/HCS areas identified. Fund raising, ie/ through HCSA, for funding into the conservation of these areas	*Matepona*	GIS Map Field inspection	*Annual*	*Sustainability Manager* *Field Manager*	*January 2019 onwards*
	Monthly monitoring of all conservation areas within areas leased to NBPOL. Enforcement of incursions (ie/gardening) through consultation with communities, removal of crops and if that is not effective enforcement through stop payments of lease payments over conservation areas.	*All Except Matepona*	Field Inspections	*Monthly*	*Sustainability Manager* *Field Manager*	*January 2019 onwards*

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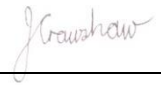
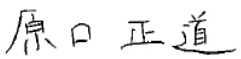
10. Internal responsibility

10.1 Formal signing off (with date) by assessors and grower.

The following assessors formally accept our interpretation of their findings and management recommendation as summarised in this report:

Assessment	Name of Lead Assessor	Signature
High Conservation Value Assessment	Jules Crawshaw	
Social Environmental Impact Assessment	Mike Finlayson	
Soil Suitability Study	Shane Tutua	
Land Use Change Analysis	Masamichi Haraguchi	
Carbon Stock Assessment	Michael Hansby	
Greenhouse Gas Analysis	Michael Hansby	

10.2 Statement of acceptance of responsibility for assessments and formal signing off of management plans.

This document is the public summary of the integrated SEIA, HCV & HCS management for new developments on the Guadalcanal Plains at Guadalcanal Plains Palm Oil Limited and has been approved by management.

Craig Gibsone: General Manager **Date: 10/11/2017**

Signature: 

Mohamed Azahar Bin Saat: Operations Manager **Date: 10/11/2017**

Signature: 

Regina Pokana: Sustainability Manager **Date: 10/11/2017**

Signature: 

10.3 Organisational information and contact persons.

Contact Persons:

For RSPO Matters:

Sander van den Ende: Sustainability Group Manager, New Britain Palm Oil Limited
Email: svdende@nbpol.com.sg

Regina Pokana: Sustainability Manager, Guadalcanal Plains Palm Oil Limited
Email: rpokana@gppol.com.sb

For Operational, Legal and Financial Matters:

Craig Gibsone: General Manager, Guadalcanal Plains Palm Oil Limited
Email: cgibsone@gppol.com.sb

Annex 1 Dates of FPIC engagements

Table 38 Dates of FPIC engagements

Study	Dates	Notes
SEIA	September-November 2016	Field work and report writing
Current landowners	12 September 2016	Impacts of existing oil palm Current issues/opportunities for improvement Potential impacts and impact management
Metapona landowners	21 October & 15 November 2016	Description of land considered for development Description of nearby communities and livelihoods Attitudes towards oil palm development
Kautoga landowners	18 October & 10 November 2016	Description of land considered for development Description of nearby communities and livelihoods Attitudes towards oil palm development
Mbalisuna East landowners	19 October & 11 November 2016	Description of land considered for development Description of nearby communities and livelihoods Attitudes towards oil palm development
Holy Water landowners	18 October & 12 November 2016	Description of land considered for development Description of nearby communities and livelihoods Attitudes towards oil palm development
Solrice 1 landowners	20 October & 16 November 2016	Description of land considered for

		development Description of nearby communities and livelihoods Attitudes towards oil palm development
Solrice 2 landowners	20 October 2016	Description of land considered for development Description of nearby communities and livelihoods
Current outgrowers	8 September 2016	Area of oil palm, management arrangements Impacts of oil palm development Current issues/opportunities for improvement
Tetere Police	12 September 2016	Current and proposed personnel/resources Impact of oil palm operations Relationship with GPSS Potential impacts and impact management
Nguvia Community High School	12 September 2016	School attendance Support from GPPOL Impact of oil palm operations Potential impacts and impact management
DFAT	9 September 2016	Bridge construction Attitude towards oil palm expansion
GPPOWA	12 September 2016	Union membership and benefits Impacts of oil palm Potential impacts and impact management
GPSS	12 & 13 September 2016	History and overview of company Impacts of GPSS on law & order situation Relationship with Tetere Police

		Potential impacts and impact management
Health Manager, GPPOL	10 & 12 September & 10 November 2016	Health services provided Impacts of oil palm operations Potential impacts and impact management
Sustainability Manager, GPPOL	6-13 September & 9-17 November 2016	Definition and description of the Study Area Stakeholder engagement Impact of oil palm operations Potential impacts and impact management
Estate Manager, GPPOL	6, 12 & 13 September 2016	Landowner consultation Land negotiation and development process Potential impacts and impact management
General Manager, GPPOL	6-13 September & 9-17 November 2016	Stakeholder consultation Land negotiation and development process Impact of oil palm operations Benefit management
HCV	Sep-16	Compilation of secondary and available primary data, including preliminary stakeholder consultation during a short, initial visit to the license areas
	Oct-16	Rating the assessment as Tier 1 or Tier 2 and reporting this assessment to the HCVRN
	Oct-16	Team formation and briefing on project scope
	Oct-16	Planning for fieldwork and agreement on field methods for primary data collection
	Not Undertaken – but use made of	HCV Pre-assessment (scoping

	extensive HCS	study) based on available data
	14 - 27 October 2016	Fieldwork and primary data collection, including direct stakeholder consultation
	November – December, 2016	Data analysis and interpretation
	November – December, 2016	Preparation of a Draft Report, including HCVMA maps and management and monitoring recommendations
	Dec-16	Public consultation to report interim HCV findings and refine threat assessment
	Jan-17	Amend the draft report based on the Public Consultation
	Jan-17	Report finalization based on peer review and public consultation
	Jan-17	Sign-off by the peer reviewer
	Jan-17	Public Summary Report written based on the final HCV report.
	Sep-16	Compilation of secondary and available primary data, including preliminary stakeholder consultation during a short, initial visit to the license areas
HCS	June 16	Initial image classification / interpretation
	June-July-16	Field assessment
	June-July-16	Field assessment data analysis
	Aug-Sept-16	Refinement of Land cover mapping
	Sept-16	Draft report production
	June-17	Input from GPPOL regarding Community Land Use Planning
	Oct-17	Final run through the 'patch analysis decision tree' to incorporate enclave areas from the

		GPPOL community land use planning.
	Dec-17	Report completed
Soil Suitability Study		
LUCA	July-August 2017	GIS Modelling and verification
GHG	August-Dec 2017	GIS and GHG Modelling

Annex 2 Maps of Individual Net Potential Development Areas

Table 39 Net potential management areas in Kautoga

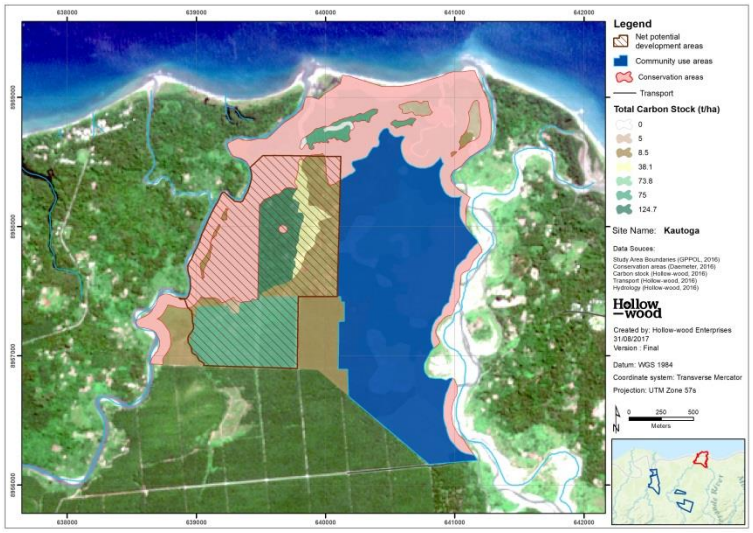


Table 40 Net potential management areas in Kautoga

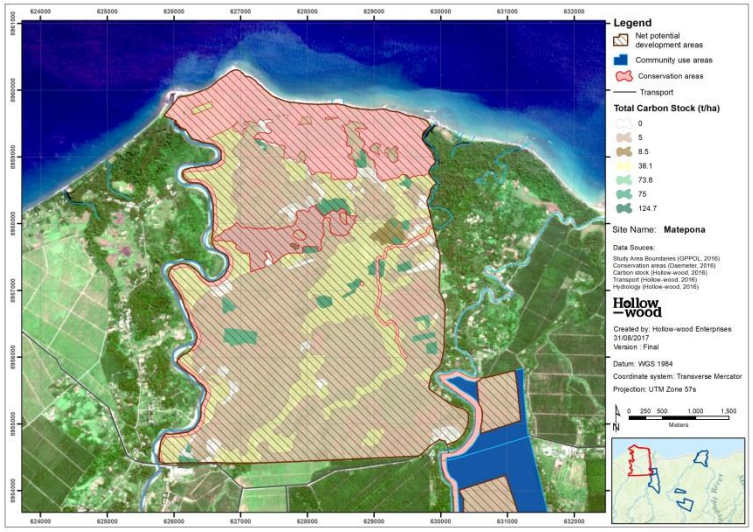


Table 41 Net potential management areas in Matepona

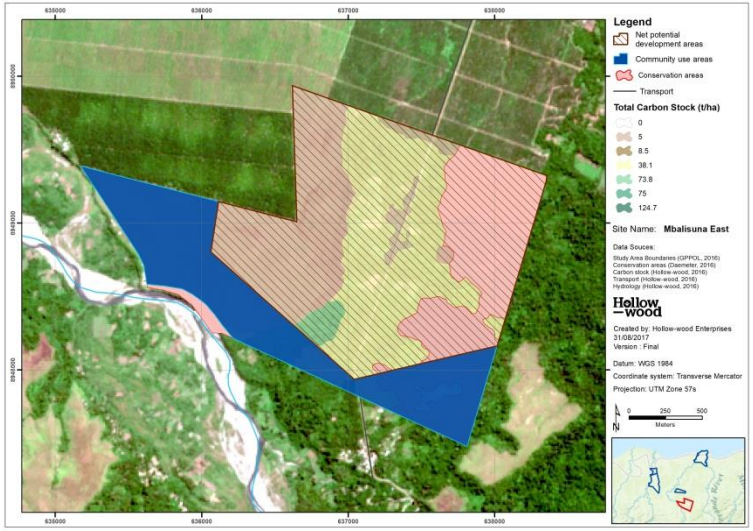


Table 42 Net potential management areas in Mbalisuna East

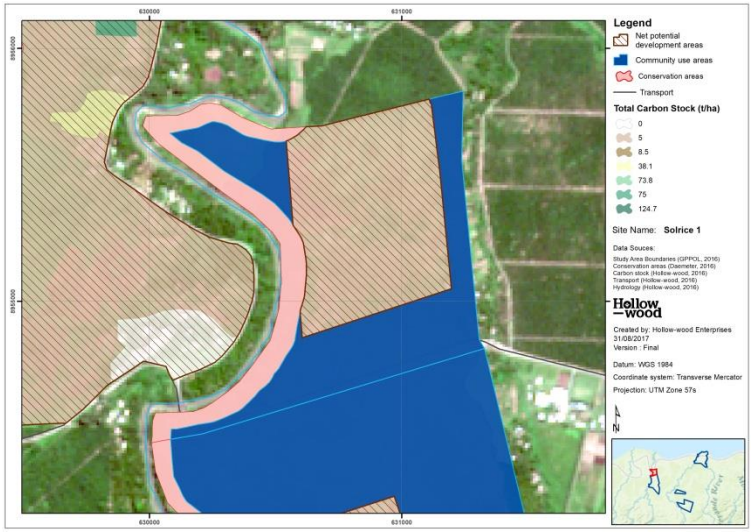


Table 43 Net potential management areas in Solrice 1.

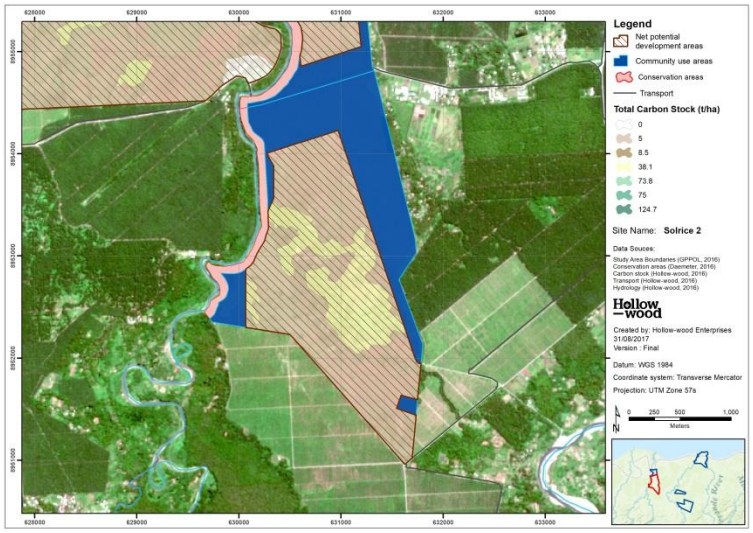


Table 44 Net potential management areas in Solrice 2