GLENEALY PLANTATIONS SDN BHD

(3453-X)

Glenealy Plantations Sdn Bhd (GPSB): High Carbon Stock (HCS) Recovery Plan

Belaga, Sarawak,

Malaysia

May 2021

Fact Sheet

Project Objective	:	A recovery site plan to compensate for GPSB group-wide potential High Carbon Stock (HCS) liability in Malaysia and Indonesia.
Name of Recovery Site	:	Belaga Recovery Site.
Site Legality	:	Paong FMU, under the Forest Timber Licence (FTL) No. T/0404.
Recovery Site Location	:	Kapit Division, Sarawak, Malaysia.
Project Area	:	3,736.19 ha (GIS Extent).
Centroid Coordinates of Recovery Site	:	2.9908 ^{o}N, 114.0284 ^{o}E
HCS Liability to Compensate	:	1, 853 ha (GIS Extent).
HCS Liability Period	:	1st January 2016 (the establishment of the High Carbon Stock Approach (HCSA) organization) to September 2020 (initiation of HCS liability calculation).
Managed by	:	Glenealy Plantations Sdn Bhd (GPSB).
In association with	:	Samling Plywood (Lawas) Sdn. Bhd.
Number of Page	:	63 pages.

Table of Contents

List of Tables

List of Maps

List of Charts

List of Abbreviation

CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CPO	Crude Palm Oil
CR	Critically Endangered Species
dbh	Diameter at breast height
DEM	Digital Elevation Model
ENR	Enhanced Natural Regeneration
FMU	Forest Management Unit
FTL	Forest Timber Licence
GIS	Geographic Information System
GPSB	Glenealy Plantations Sdn Bhd
ha	Hectare
HCS/ HCSA	High Carbon Stock/ High Carbon Stock Approach
HCV	High Conservation Value
ITP	Industrial Tree Plantations
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
LC	Least Concerned Species
MDF	Mixed Dipterocarp Forest
MEC	Malaysian Environmental Consultants
NDPE	No Deforestation, No Peat, No Exploitation
NGO	Non-Governmental Organisation
NTFP	Non-Timber Forest Products
PT. ABP	PT. Abdi Borneo Plantation
PT. TBP	PT. Tunas Borneo Plantation
RTE	Rare, Threatened and Endangered
SOP	Standard Operating Procedure
TEOW	Terrestrial Ecoregions of the World
UNEP WCMC	UN Environment Programme - World Conservation Monitoring Centre
VU	Vulnerable Species
WDPA	World Database on Protected Areas
WWF	Worldwide Fund for Nature

1 Introduction

Glenealy Plantations Sdn Bhd (GPSB) is a subsidiary of the Samling Group, currently its activities are restricted to only the development and management of oil palm concessions in Malaysia and Indonesia. GPSB recently published its own No Deforestation, No Peat, No Exploitation (NDPE) policy on 10th April 2020. The NDPE policy is being implemented in all 6 of its oil palm concessions.

1.1 Background

The Samling Group's plantation activities have been highlighted by Mighty Earth[1], in their rapid reports and articles released between February 2019 to August 2020. The general issues raised against the Samling Group are:

1. Deforestation for timber plantation operations,
2. Clearing of primary forest, and
3. Deforestation for oil palm development.

The message that Mighty Earth seeks to transmit, is that the Samling Group participates in deforestation. This is irrespective of whether it is managing a number of Industrial Tree Plantations (ITPs) with concessions granted in the 1990s, which logically requires regular harvesting and replanting. Included into the deforestation claim is its oil palm concessions under GPSB. The cross-product allegations raised by Mighty Earth have impacted GPSB's supply chain. Currently, GPSB's sales of crude palm oil (CPO) are being boycotted by several of its buyers. Retrospective blaming has been the key focus of campaigns against oil palm development and GPSB recognizes this as being effective, especially the economic impacts. In attempting to manage stakeholder expectations, GPSB has demonstrated its obligation to sustainability by undertaking the following:

i. Formulating and adopting a NDPE Policy,
ii. Enforcing a Planting Moratorium,
iii. Committed to undertaking HCS-HCV assessment for future new plantings,
iv. Undertaking an Independent HCS Loss Assessment,
v. Establishing a HCS Recovery Site (Loss compensation), and
vi. Initiating Stakeholder Engagement.

The first action carried out by GPSB is the commissioning of an independent High Carbon Stock (HCS) area loss calculation to determine its HCS liability within its oil palm concessions. This assessment was completed in January 2021. The timeframe of this HCS loss liability is from January 2016 to September 2020. The result of the independent High Carbon Stock area loss calculation is declared as 1,853 ha with the following details:

1. Lana Estate, Sarawak, Malaysia : None
2. Jelalong Estate, Sarawak, Malaysia : 302.98 ha
3. Belaga Estate, Sarawak, Malaysia : 31.06 ha
4. Sabah Timora Complex Estate, Sabah, Malaysia : None
5. PT. Abdi Borneo Plantation (ABP), North Kalimantan, Indonesia : 102.55 ha
6. PT. Tunas Borneo Plantation (TBP), North Kalimantan, Indonesia : 1,416.12 ha

[1] Might Earth: A US-based global campaign organization that works to protect the environment. Funded by the European Federation for Transport and Environment, the Centre for International Policy, Aidenvironment, and National Wildlife Federation under grants from the Norwegian Agency for Development Cooperation.

The HCS liability report has been distributed to stakeholders in the supply chain to demonstrate GPSB's commitment to transparency and engagement with stakeholders.

As the next step, GPSB has identified an area to initiate its HCS liability compensation. The site will be managed for conservation and rehabilitation and will be larger than the required compensation offset. This document serves as a recovery proposal to compensate for HCS area loss in its oil palm plantations in both Sarawak, Malaysia and North Kalimantan, Indonesia. This is GPSB's firm commitment to its NDPE policy.

2 The Belaga HCS Recovery Site

The site identified as GPSB's HCS Recovery Site is located in Belaga, Kapit, Sarawak, Malaysia. The total extent of the site is 3,736 ha, approximately twice the HCS liability hectarage. GPSB is committed to bearing the cost of management, and the establishment of a framework to ensure long-term conservation of the site. The Belaga Site is a suitable HCS Recovery Site because of the following attributes: -

1. Legal Security as it is embedded within a forest reserve logging concession
2. Recovery Area Offset Exceeding Loss Area,
3. Additionality,
    - Biodiversity conservation,
    - Carbon stock sequestration,
    - Rehabilitation, and
    - Developing and managing Non-Timber Forest Products (NTFP) extraction and collection and increasing local community economic resources.
4. Financial commitment from the company,
5. Enhancement of conservation values,
    - A site that contributes towards Sarawak's conservation efforts.
6. Commitment to long-term management, and
7. Inclusion of Social Components,
    - Participating of local community in activities such as establishing nursery and supplying seedlings for rehabilitation, and other socio-economic activities.
8. Opportunity to provide a commercially funded, long-lasting conservation impact on the Sarawak landscape.

3 Belaga HCS Recovery Site Description

3.1 General Site Description

The Belaga recovery site is located in the northern section of the Kapit Division in Sarawak, Malaysia (see Map 3.1 and Map 3.2). It covers a total extent of 3,736 ha and lies within a production forest reserve. The centroid of the recovery site is 2.9908 ^{o}N, 114.0284 ^{o}E. Current desk and satellite image analyses show that the area surrounding the recovery site consists of heterogenous land use. Road networks in the area dissect the forest landscape but also provides accessibility. The area is dominated by oil palm presence, interspersed with degraded forest. The site is connected to GPSB's Belaga oil palm concession sharing a common boundary, enabling direct management of the site.

Map 3.3 shows the surrounding concessions and land use adjacent to the Belaga recovery site. Although, the site may look like it is overlapping into other concessions, this is due to macro-scale mapping errors.

The recovery site has red-yellow podsols (refer to Map 3.4). The red-yellow podsol groups present in the site are 1) thin formations with steep slopes (approximate 3,548.92 ha) and 2) deep formation with gentle slopes (approximately 187.27 ha), refer to Table 3.1. The recovery site is located within the Rajang River basin between Koyan (west), Batang Belaga (north), and Penyuan (south) rivers. The Batang Belaga is a tributary of the Sungai Rajang a major river in Sarawak, refer to Map 3.7. The topography of the site is undulating with steep slopes up to 61° (refer to Map 3.5). Table 3.2 shows the slope classes hectarage spread in the Belaga Site. Further inland, the terrain becomes rugged with steep hills in the southern section. The elevation model of the site ranges from 210 m to 904 m above sea level (see Map 3.6). Elevation classes and the hectarage in the Belaga Site are shown in Table 3.3.

The region has a tropical climate, with average annual rainfall between 3,300 mm and 4,600 mm. The northeast monsoon season occurs between November to March, which carries stronger winds and heavier rain, while the milder southwest monsoon season is usually between June to October[2]. The daily mean temperature ranges from 23°C to 32°C, and the humidity is generally high, roughly about 80 – 90%.

Table 3.1: Type of soils and the extent present in the Belaga Site

Soil Code	Type of Soil	Area (ha)
4	Red-yellow podsols -thin formation, steep	3,548.92
5	Red-yellow podsols, deep formation, gentle slopes	187.27
Total		**3,736.19**

Source: Malaysian Environmental Consultants (MEC) unpublished data.

Table 3.2: Slope classes and the hectarage spread in the Belaga Site.

No	Slope (Degree)	Area (ha)
1	0 - 5	151.97
2	5.01 - 10	484.98
3	10.01 - 15	780.13
4	15.01 - 20	951.45
5	20.01 - 25	681.97
6	More than 25.01	685.69
Total		**3,736.19**

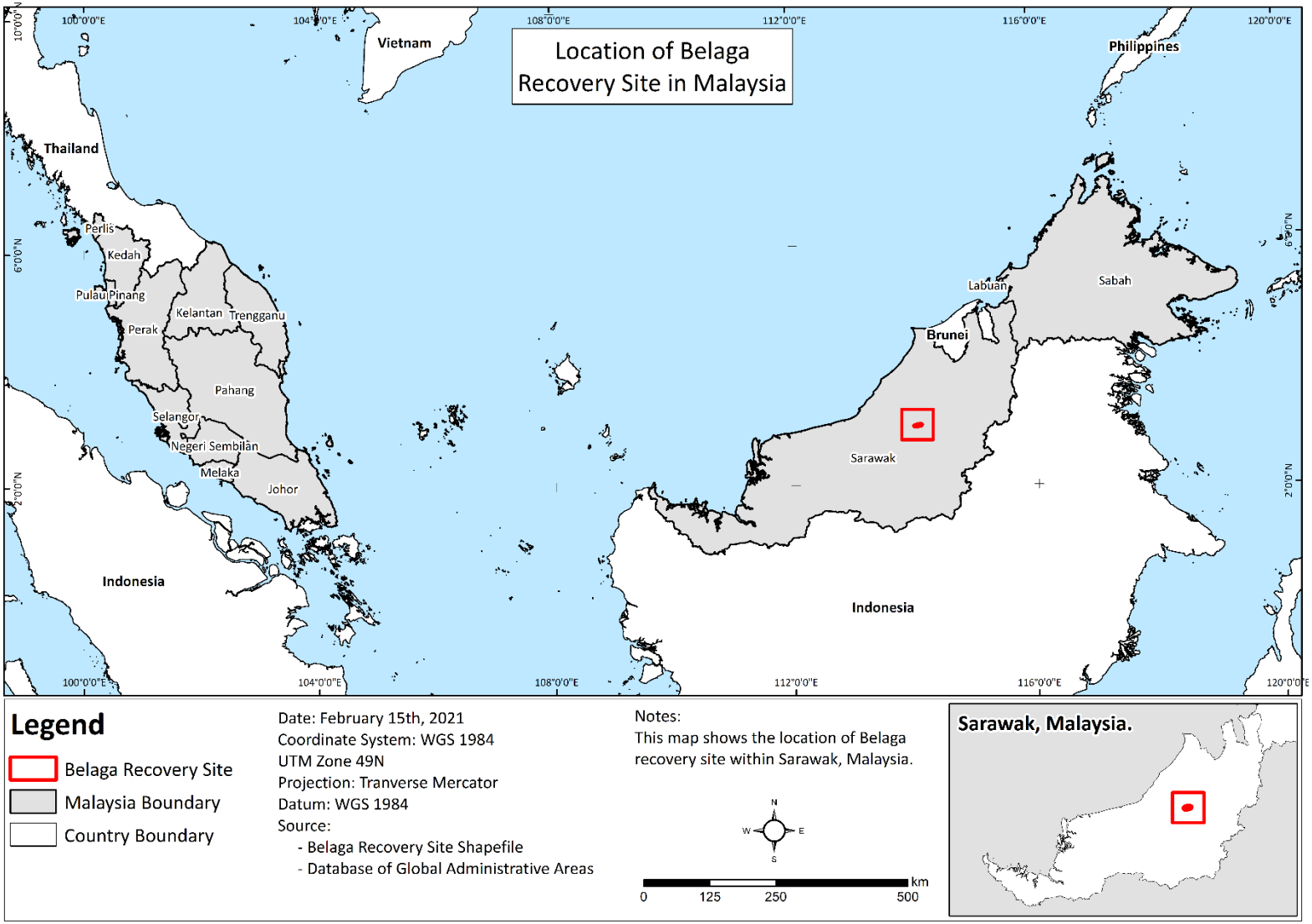
Source: Alos Palsar.

Table 3.3: Elevation classes and the hectarage in the Belaga Site.

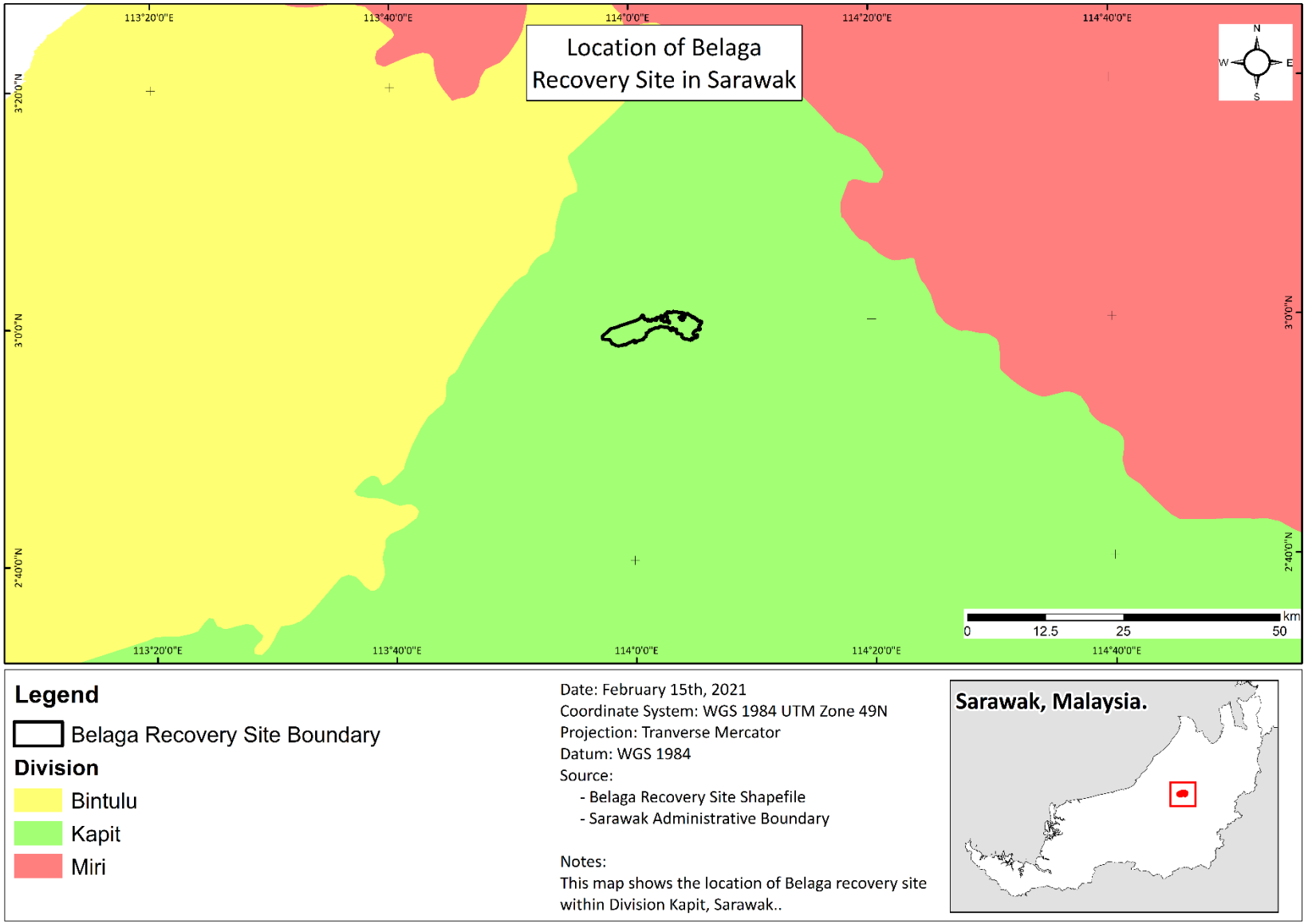
No	Elevation (m)	Area (ha)
1	200.01 - 300	903.34
2	300.01 - 400	980.00
3	400.01 - 500	854.17
4	500.01 - 600	572.02
5	600.01 - 700	283.30
6	700.01 - 800	108.25
7	800.01 - 900	34.98
8	900.01 - 1,000	0.13
Total		**3,736.19**

Source: Alos Palsar.

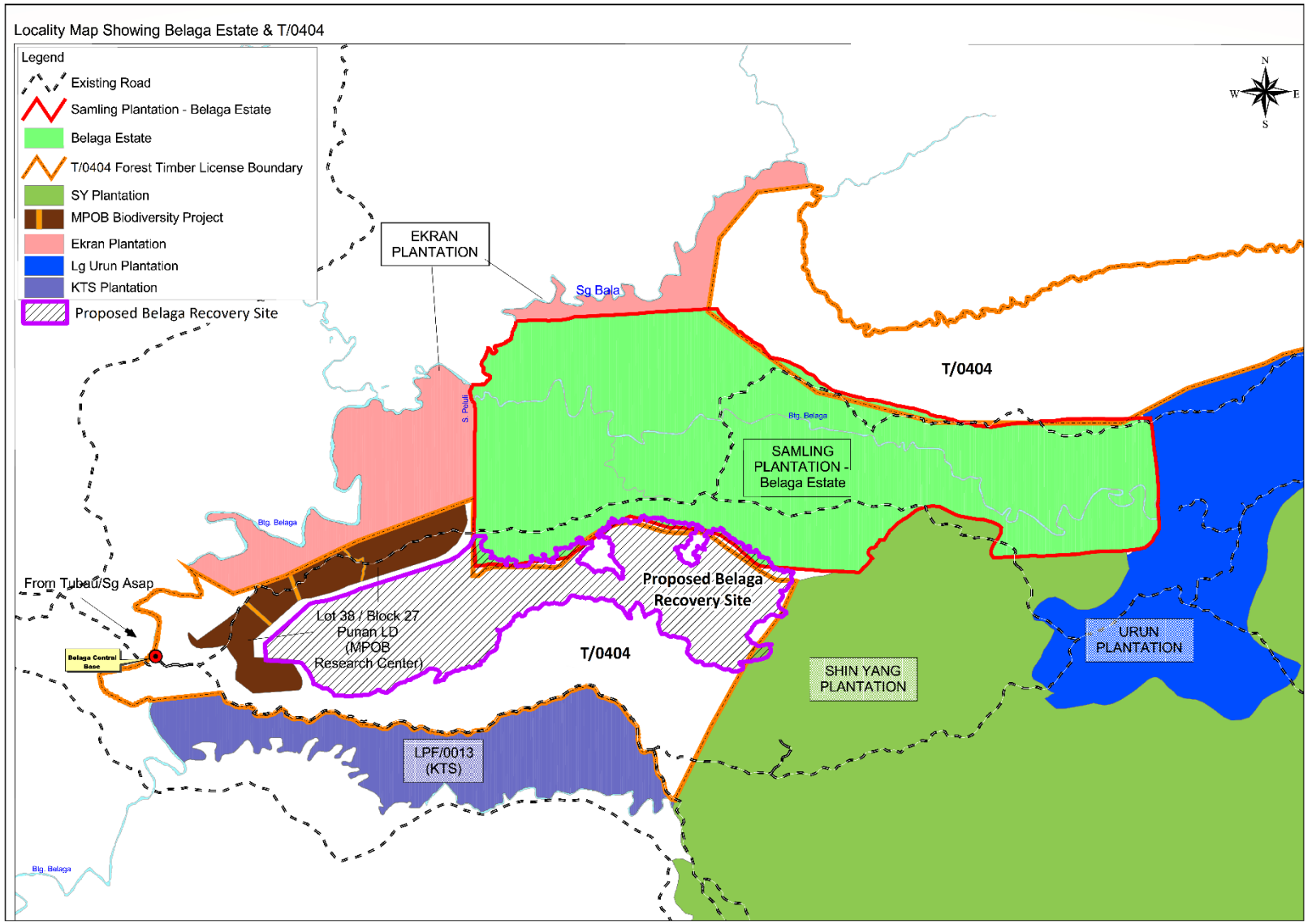
[2] https://www.sarawak.gov.my/web/home/article_view/159/176/



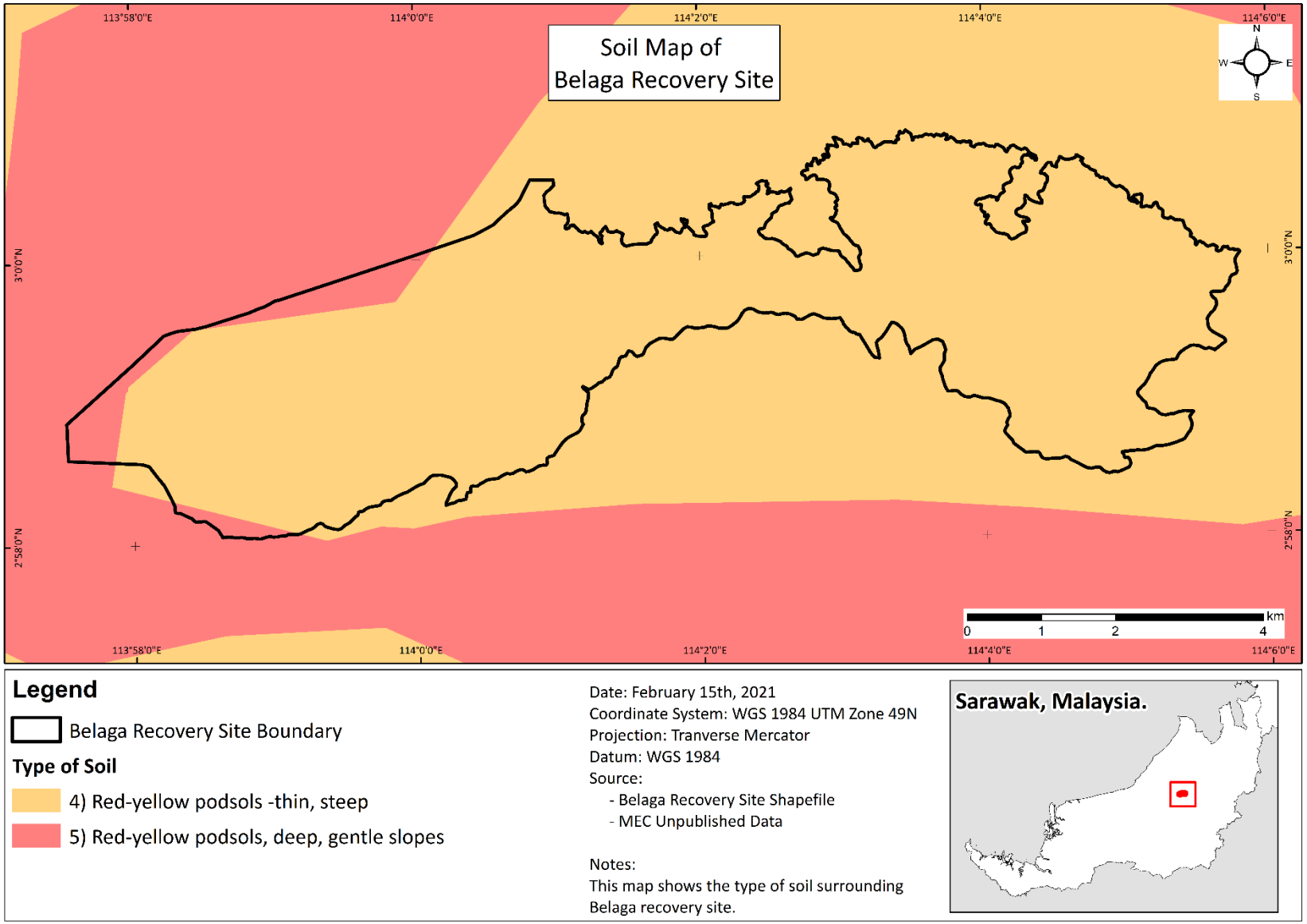
Map 3.1: Location of Belaga Recovery Site in Sarawak, Malaysia



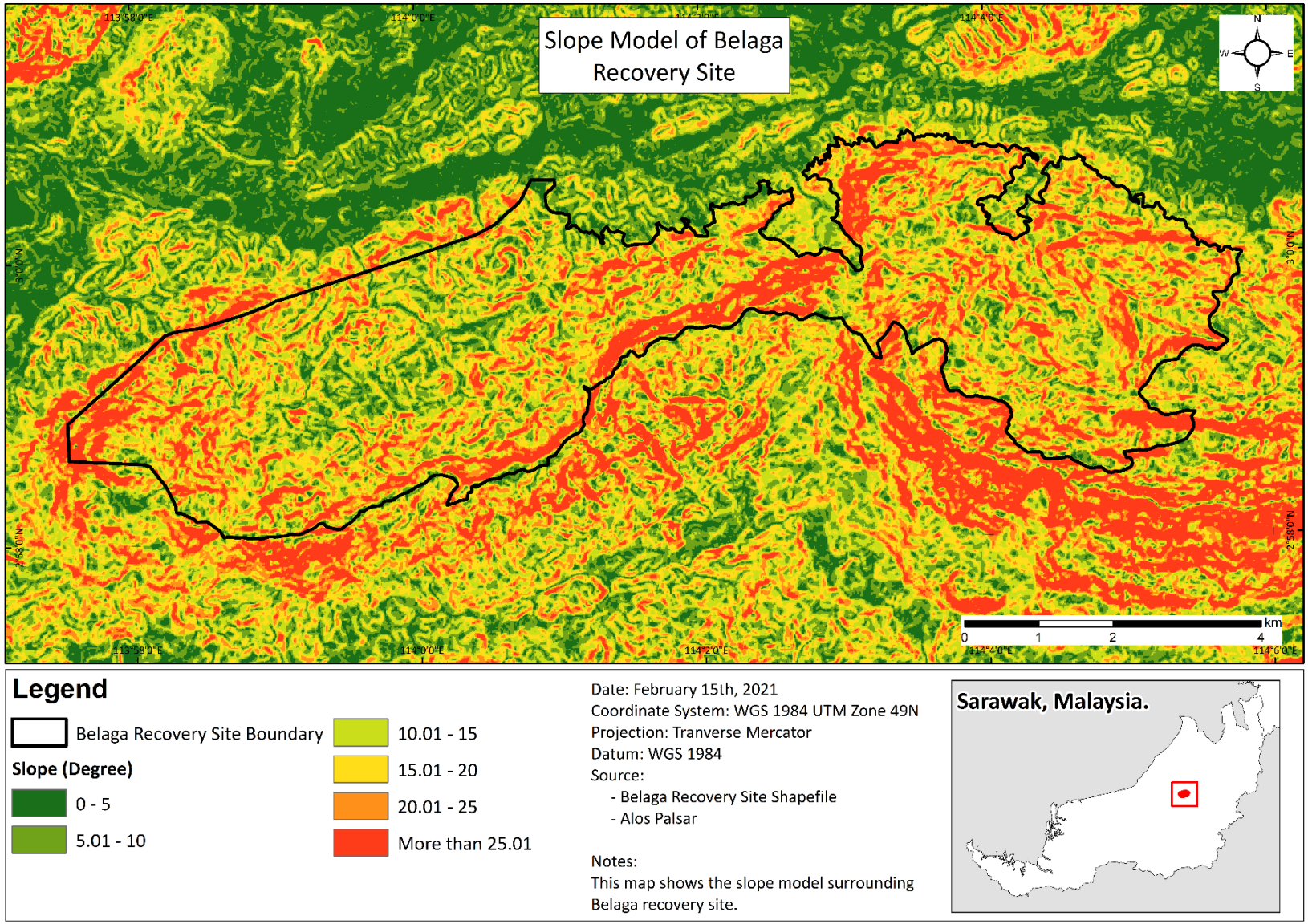
Map 3.2: Administrative map of Sarawak, Malaysia



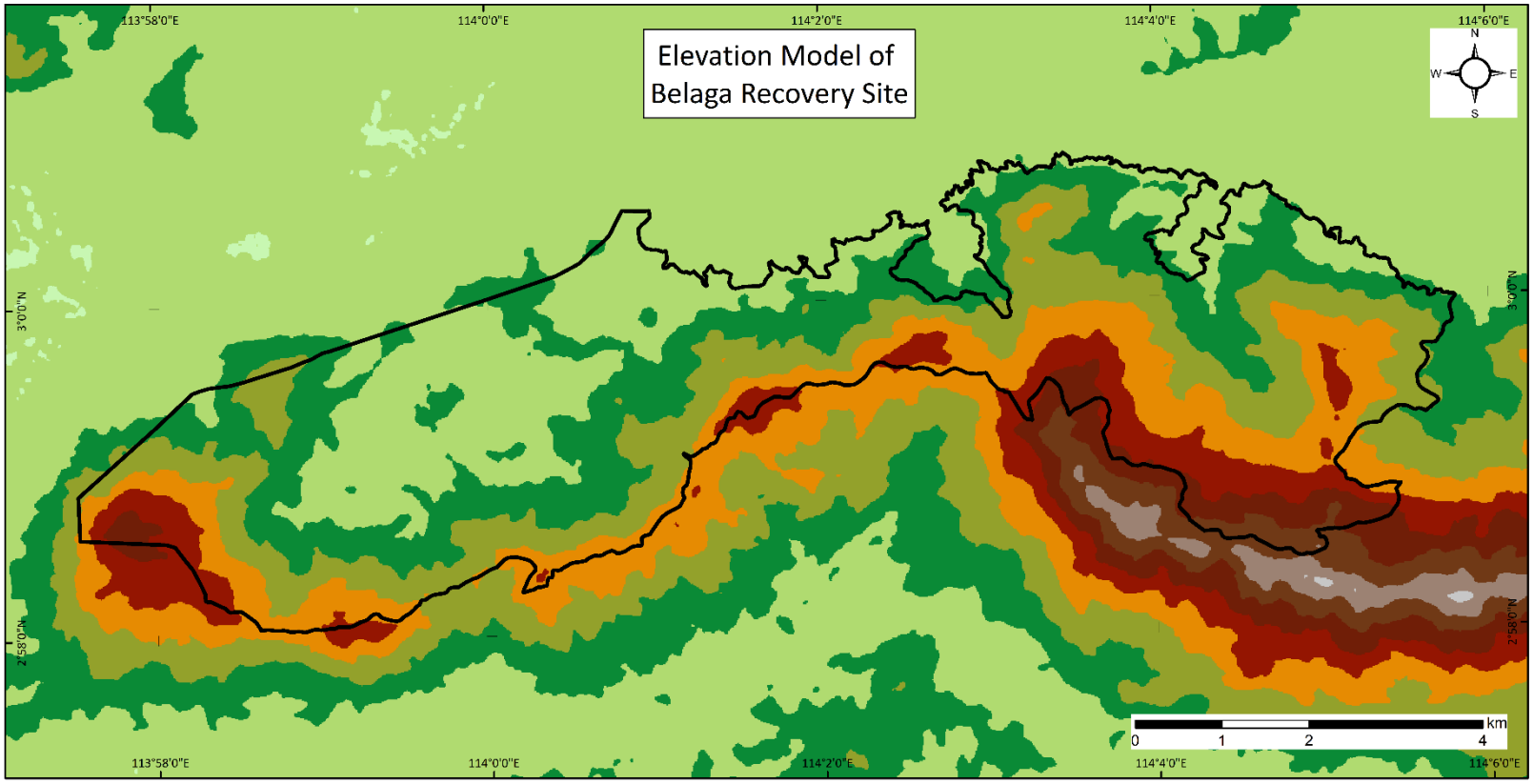
Map 3.3: Surrounding concession and land use adjacent to the Belaga recovery site.



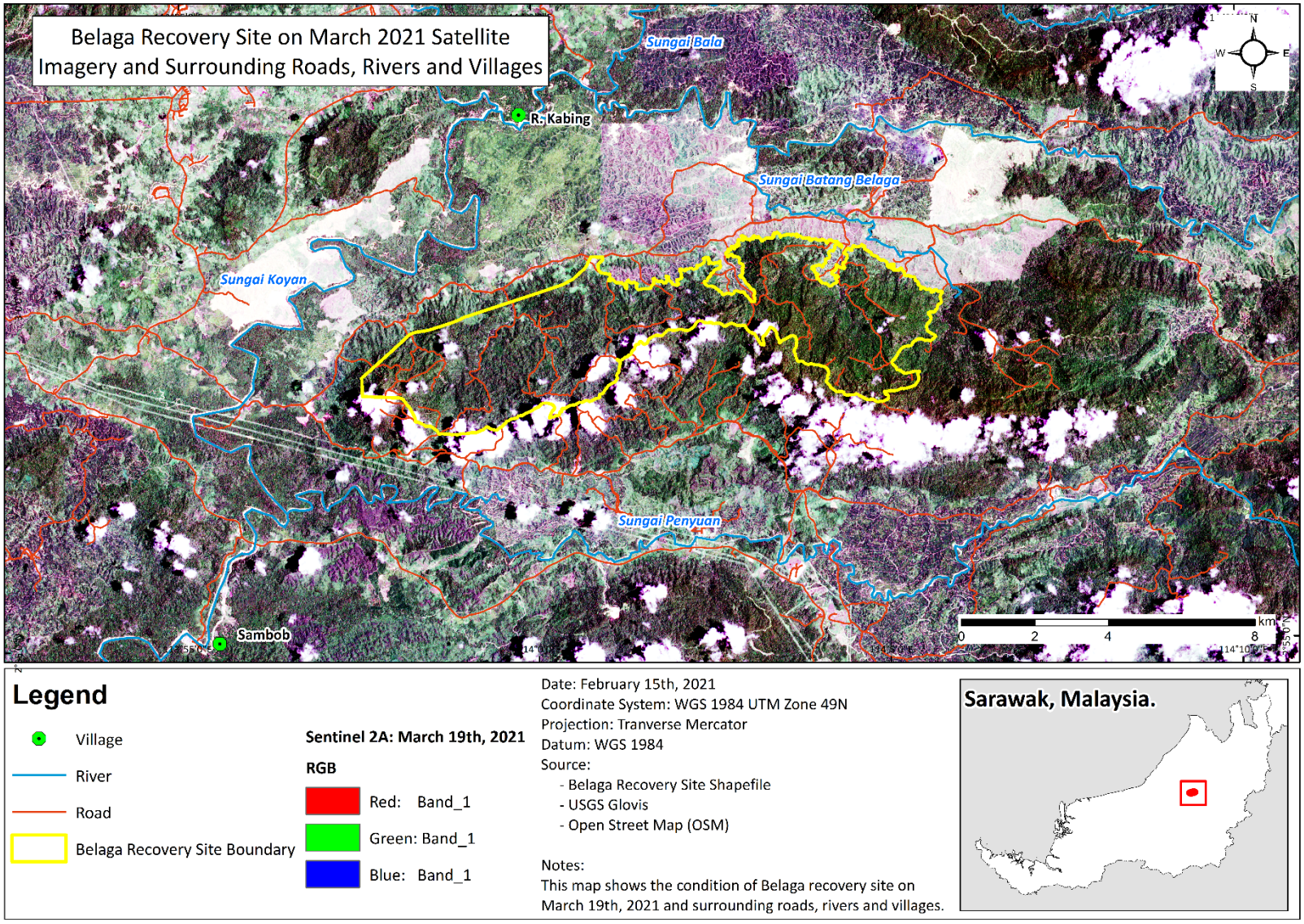
Map 3.4: Soil types in Belaga Recovery Site



Map 3.5: Slope model in Belaga Recovery Site



Map 3.6: General elevation of Belaga Recovery Site



Map 3.7: Road Network, River and Villages within and surrounding Belaga Recovery Site.

3.2 Regional Ecology, Protected Areas and Historical Land Use

Borneo Island is an interesting biogeographical zone of plants and animals. The variation has been described by various explorers in the past, and various 'boundary' lines such as the Wallace's Line and Weber's Line have been proposed to differentiate the flora and fauna to the east and west of this zone.

Despite the differences in fauna and flora composition, the general forest form and physical structure found in Sarawak are still similar to those found in other parts of Malaysia and Indonesia. For the purpose of assessing biodiversity, it is more useful to treat Sarawak as part of Borneo Island rather than to differentiate based on political regions.

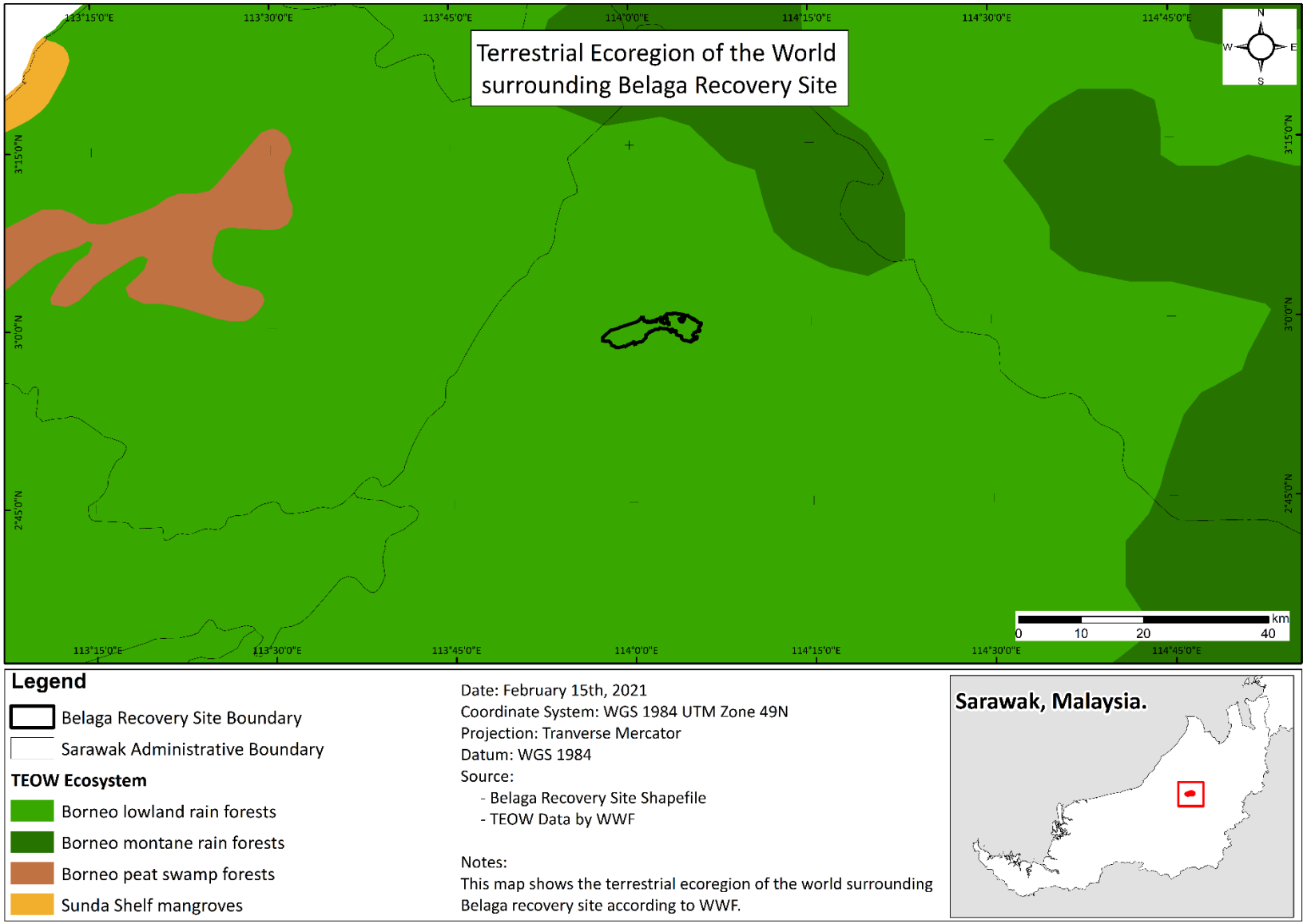
Sarawak is the largest state of Malaysia (124,450 square km), with an area almost equal to that of Peninsular Malaysia (132,265 square km). It is located in the northwest of Borneo Island and borders Sabah in the northeast, Kalimantan in the south, and the South China Sea in the north. Reference to external conservation global databases produced the following information:

- WWF's Terrestrial Ecoregions of the World (TEOW), see Map 3.8, the landscape ecosystem within Sarawak surrounding the recovery site is **Borneo lowland rain forest**.
- World Database of Key Biodiversity Areas (KBAs) map, Map 3.9, there are 20 KBAs located in Sarawak. However, there are no KBAs located adjacent to the project site. The closest KBA is approximately 27 km from the concession, these being **Dulit Range and Usun Apau National Parks**.
- World Database on Protected Areas (WDPA) and Sarawak Forestry Department (see Map 3.10) there are no totally protected forest reserves, national parks, wildlife reserves, wildlife sanctuaries and protected forest areas near to the project site. The closest protected areas are approximately 27 – 52 km away from the project site, they are the Dulit Range, Usun Apau, Sungai Meluang, and Binyo-Penyilam National Parks.

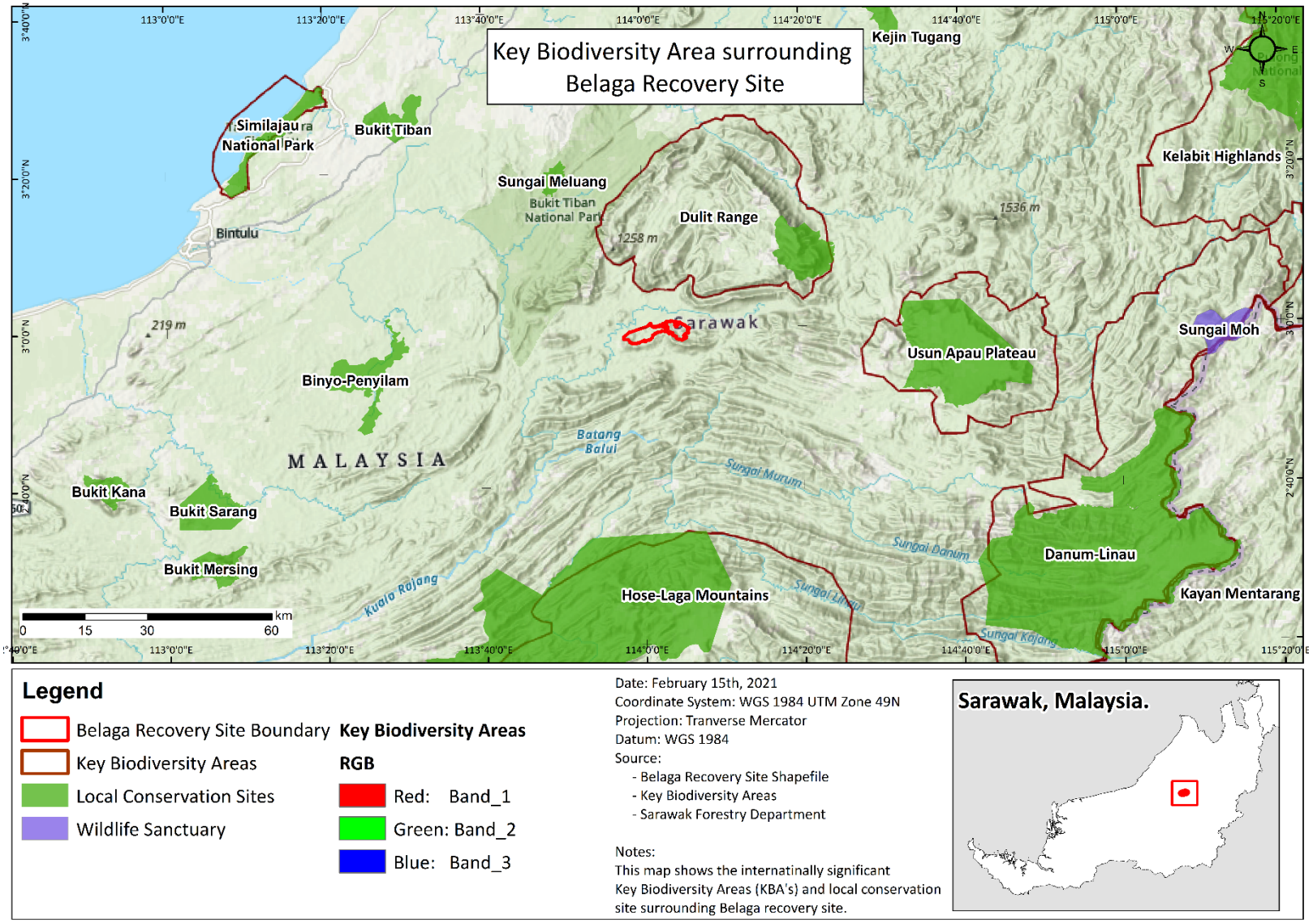
Map 3.11 provides an ecological model for Sarawak based on the unpublished MEC data on forest vegetation classification. This model gives an idea of the original ecosystems at a time before significant and permanent human change to vegetation cover – probably 200 years before the present time. The types of ecosystems identified within the site are Lowland Dipterocarp Forest (with elevations less than 500 m above sea level (asl)) and Upland Dipterocarp Forest (with elevations between 500 m asl to 1000 m asl).

Table 3.4: Ecological types and extent in the Belaga Recovery Site

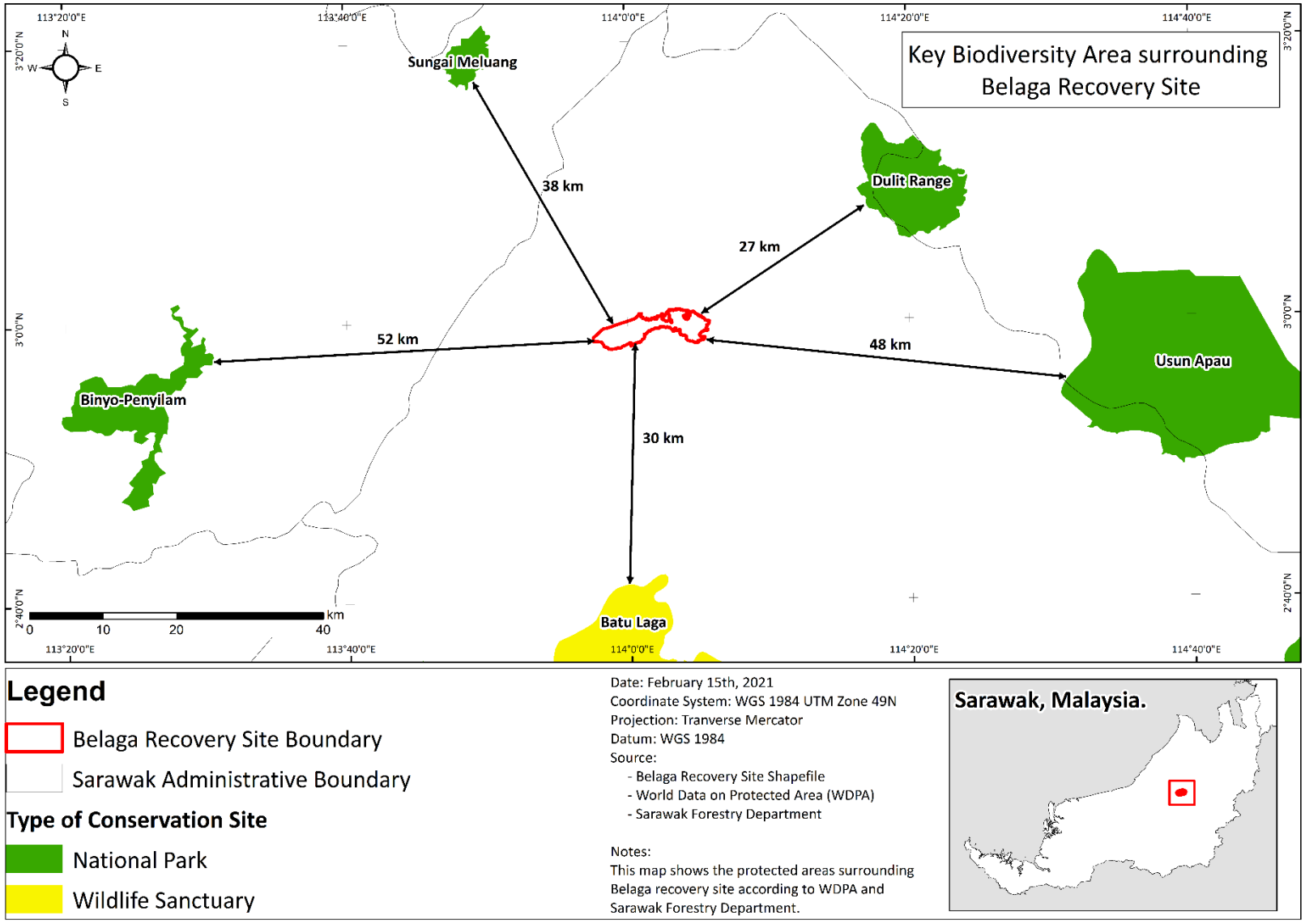
No	Ecological Class	Area (ha)
1	Upland Dipterocarp Forest with elevation between 500m to 1000m asl	998.68
2	Lowland Dipterocarp Forest with elevation less than 500m asl	2,737.51
Total		**3,736.19**



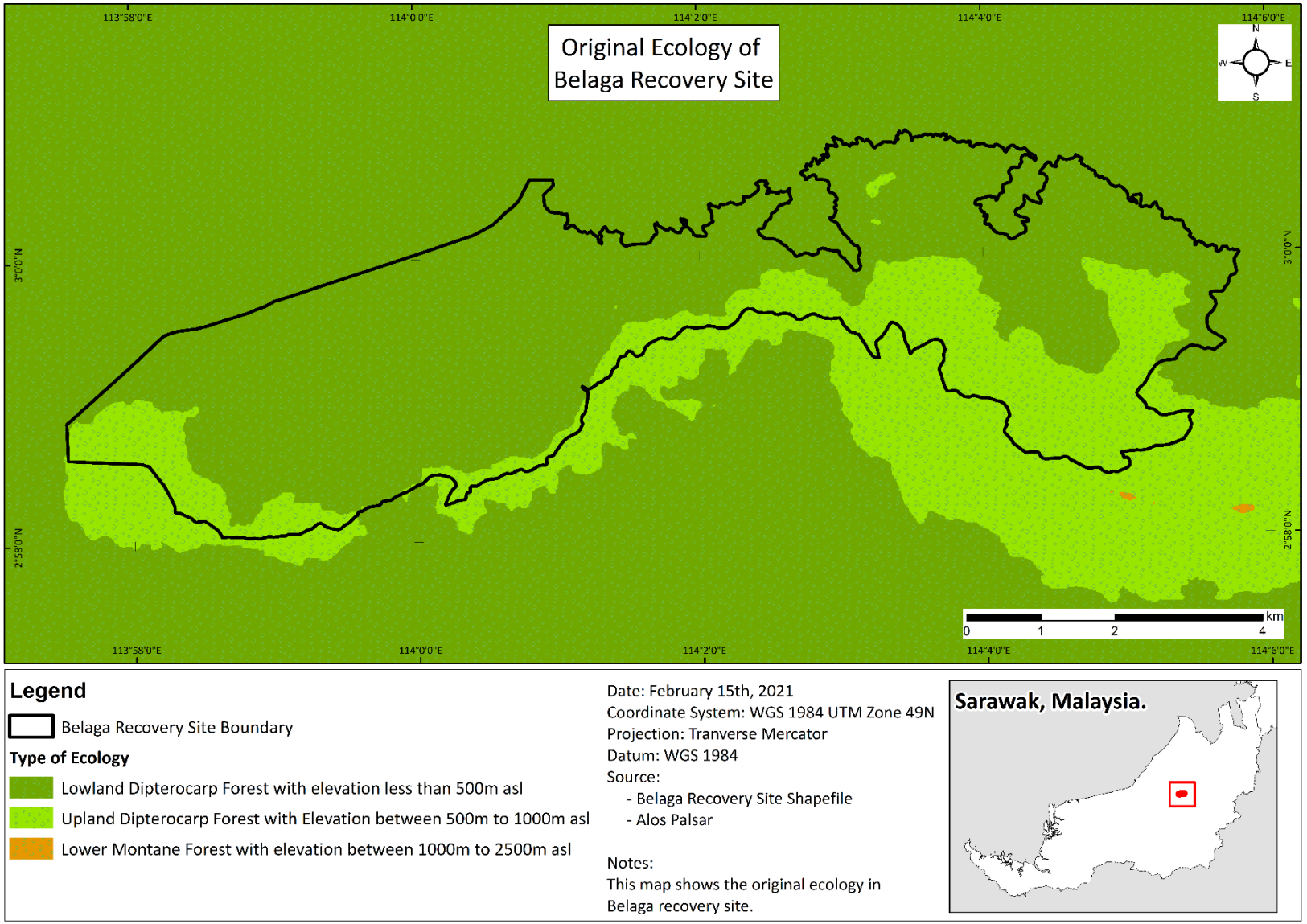
Map 3.8: WWF's Terrestrial Ecoregions of the World (TEOW) and Belaga Recovery Site



Map 3.9: Key Biodiversity Areas surrounding Belaga Recovery Site



Map 3.10: World Data on Protected Areas (WDPA) by UNEP WCMC and Sarawak Forestry Department surrounding Belaga Recovery Site



Map 3.11: Original ecosystems model for Sarawak overlain with Belaga Recovery Site

3.3 Ecological and Botanical Resources of the Recovery Site

Potential vegetation types found in the recovery site

The recovery site has mainly Lowland Dipterocarp Forest (elevation less than 500 m asl) with small patches of Upland Dipterocarp Forest (elevation between 500 m to 1000 m asl) found just on the southern boundary of the site. Refer to Map 3.11.

Lowland Dipterocarp Forest in Sarawak comprises of Extreme Lowland Dipterocarp Forest found below 75 m above sea level (asl), and Lowland Dipterocarp Forest found between 75 m and 500 m asl. Upland Dipterocarp Forest can be considered as almost 'equivalent' to the Hill Dipterocarp Forest of Peninsular Malaysia which ranges from about 350 m to 750 m asl. In Sarawak, the type of forest below 1000 m asl is known as Mixed Dipterocarp Forest (MDF).

MDF is considered the natural (climax) vegetation of the lowland areas of Sarawak found over sandy mineral soils. In its undisturbed state, the MDF has stand heights reaching over 35 m to 45 m; stand densities of trees (with dbh above 10 cm) of over 400 trees per ha and stand basal areas up to about 50 m^2/ha. The dominant families of emergent and main canopy trees would be Dipterocarpaceae, Anacardiaceae, Leguminosae, Malvaceae, Burseraceae, and dominant genera include Shorea, Dipterocarpus, Dryobalanops, Hopea, Koompassia, Durio, and Canarium. Understorey trees are from the families of Lauraceae, Rhizophoraceae, Meliaceae, Lecythidaceae, Annonaceae, Myristicaceae, and Myrtaceae. The ground flora would be dominated by Palmae, Pandanaceae, Rubiaceae, Zingiberaceae, Araceae, and Melastomataceae. Most of these natural forests have been disturbed through clearing for cultivation by the local communities over a long period (probably over 50 years) and more recently, severely disturbed by intensive and extensive logging.

Areas in the Shifting Cultivation Cycle

The sites disturbed by local community shifting cultivation appear as a mosaic of relatively small patches (usually less than 2-5 ha) with vegetation at varying stages of regeneration. These are in the different *recovery* phases of the shifting cultivation cycle (clearing, planting for a few years, and left to regenerate to restore some fertility- any period up to 10 years or more, before it is cleared and planted again). The patches can have different heights of vegetation, the texture of plant canopy but usually fairly even size of crowns of the canopy.

Fallowing patches of shifting cultivation areas can have remnant shrubs of *Solanum*, chilis, and bananas and fruit trees like *Artocarpus, Litsea,* and *Nephelium* (rambutan). In addition to pioneer species such as *Melastoma, Ficus,* wild ferns (*Dicranopteris, Nephrolepis*), grasses, sedges (*Scleria purpurascens),* and various climbers (*Calamus, Tetracera, Uncaria,* and *Rubus*). In severely degraded patches, especially where the soils are poor (often sandy), *Imperata* (lalang) may have established, and direct planting of trees will not be successful.

Logged Over Forests

The ex-logging areas, on the other hand, appear as areas dissected by a network of logging roads; roads of different widths (which corresponds to main log extraction roads, and narrower feeder roads and skid trails and sometimes even tractors trails). The vegetation cover does not appear as patches as with shifting cultivation area, but closer examination can reveal fairly large crowns or canopies *closely* interspersed with smaller canopies. Some of the logged areas that have regenerated well (and over a longer time) may show more trees with larger crowns than smaller crowns, and also the narrowing of the roads due to the growth of vegetation along the roadsides. The growth of vegetation can also hide the narrower skid and tractor trails.

In more recently logged over forest, there are pioneer woody species such as *Macaranga, Callicarpa, Ficus, Alstonia, Archidendron, Pternandra* and bamboos. Non-tree species and herbaceous species can include rattans and other palms, bamboos, bananas, gingers, *Pandanus*, ferns, grasses, and sedges and Marantaceae. In less disturbed areas or areas that have been left to regenerate for a longer period, seedlings and saplings of some Dipterocarp and primary forest species such as Anacardiaceae, Leguminosae, Malvaceae and Burseraceae may be found if 'parent trees' can be found nearby.

3.4 Preliminary Analysis of Belaga Site Historical Land Cover

The historical land cover change of the site is presented in Table 3.8. A chrono-sequence of satellite imagery spanning over 30 years indicates that the site has been subjected to logging since 1990 until 2018. The spread of logging is observed to be extensive except in steep areas which recorded no impact. The area has been systematically logged, over the period of 30 years with pockets of high impact dissected by a high density of logging roads. It is predicted that due to the constant impacts of logging, the situation is such that various zones of phased regeneration have been created. The satellite images also show areas of high intensity impact where the succession has been arrested and deflected to low stature vegetation. The point of undertaking this analysis is to accurately demarcate impact zones which would then be subjected to different management regimes. The frequency of logging impacts was mapped for the site over the 30-year period and a summary is presented in Table 3.5.

Table 3.5: Frequency of Impacts in the Belaga Site over 30 years and extent

Frequency	Area (ha)	Percentage (%)
0	1,280.52	34
1	1,096.79	29
2	740.51	20
3	277.26	7
4	142.90	4
5	86.53	2
6	51.97	1
7	36.51	1
8	23.20	1
Total	**3,736.19**	**100**

The analysis indicates that approximately 1,281 ha is intact and has not been impacted by logging. This serves as a core conservation area. In addition to this, 1,097 ha or 29% of the site has been impacted at least once. Approximately 618 ha has been impacted by more than 3 logging episodes. The site is seen to be very suitable for multiple conservation activities as it has a 34% core intact and a range of sites where rehabilitation, carbon sequestration, and corridor connectivity can be undertaken. The frequency of impacts has been translated into the severity of impacts and has been broadly divided into 4 classes, beginning with low impacts, and ranging to high impacts. See Table 3.6.

Table 3.6: Severity of Impacts in the Belaga Site over 30 years and extent

Type of Impact	Area (ha)	Percentage (%)
No Impact	1,280.52	34%
Low Impact	1,837.30	49%
Medium Impact	506.69	14%
High Impact	111.68	3%
Total	**3,736.19**	**100%**

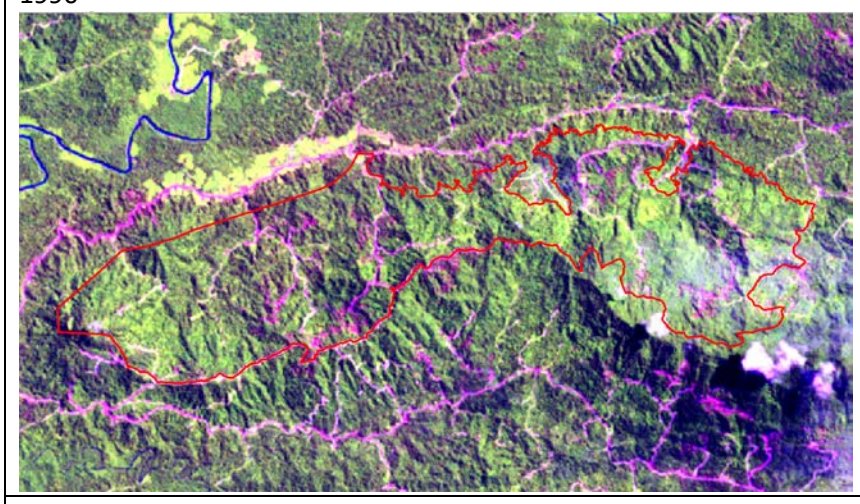
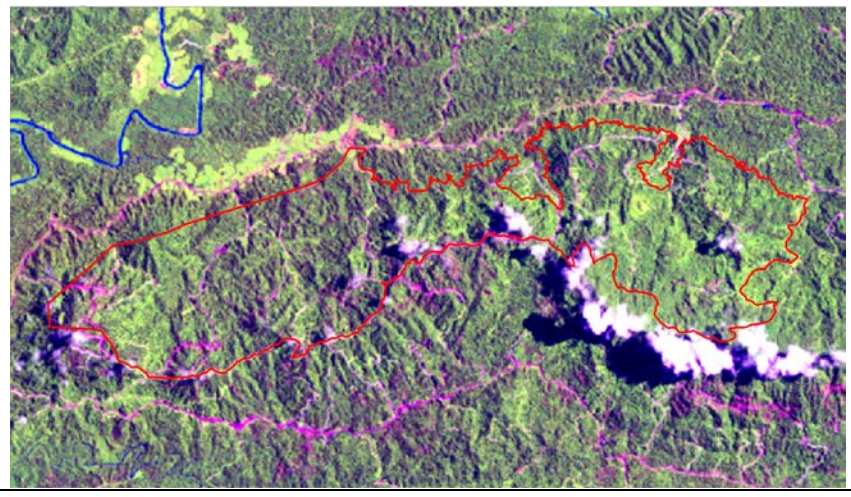
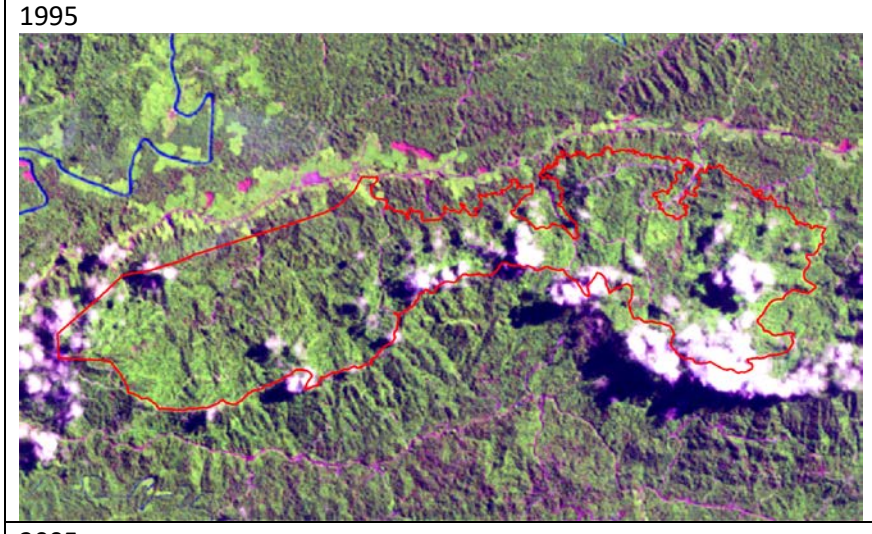
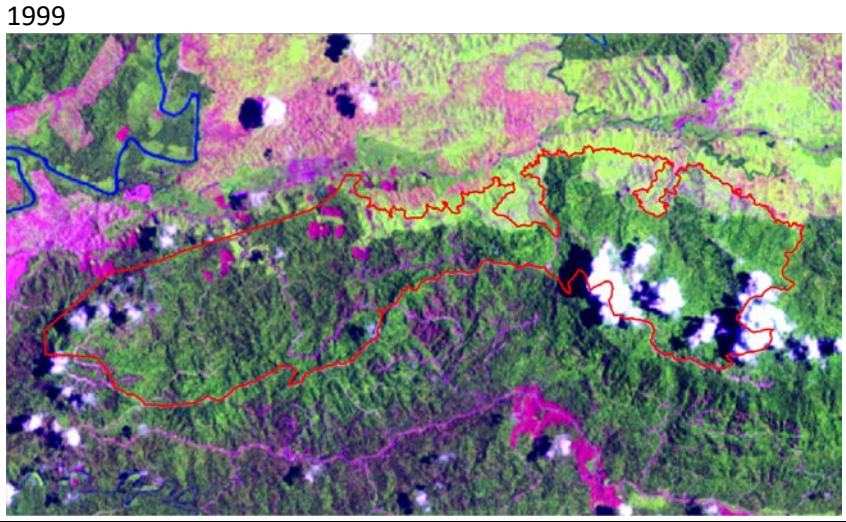
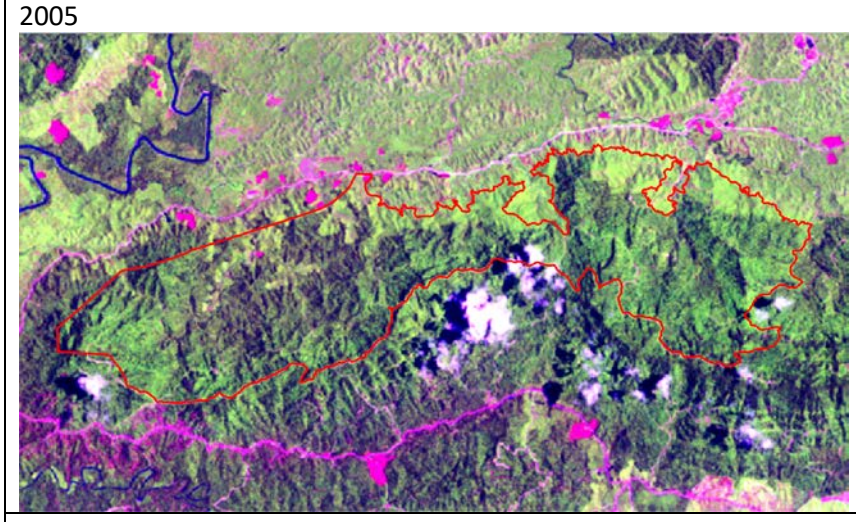
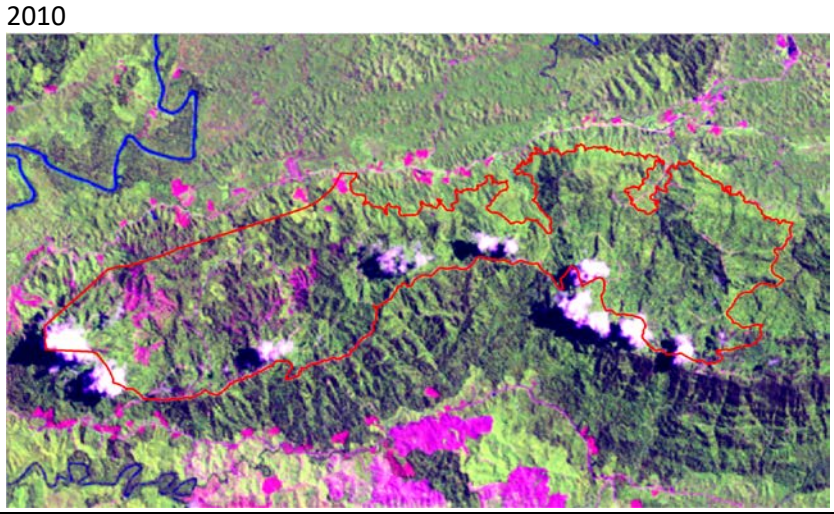
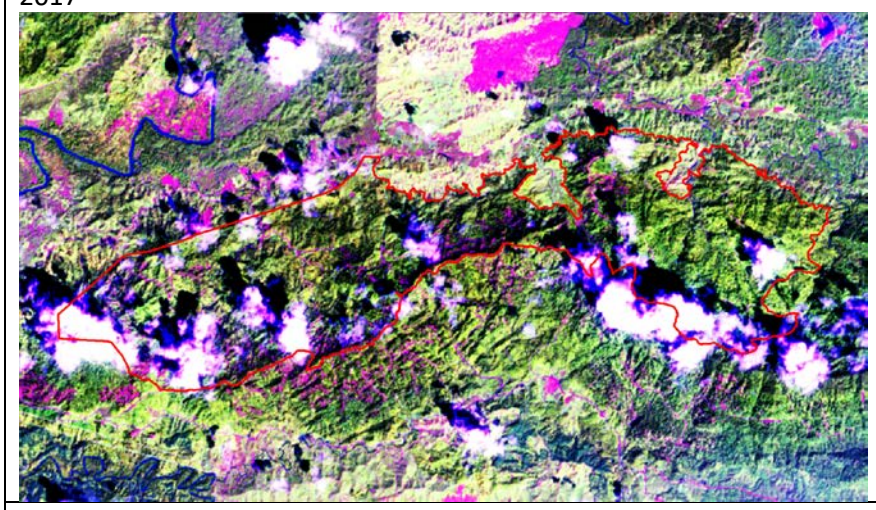
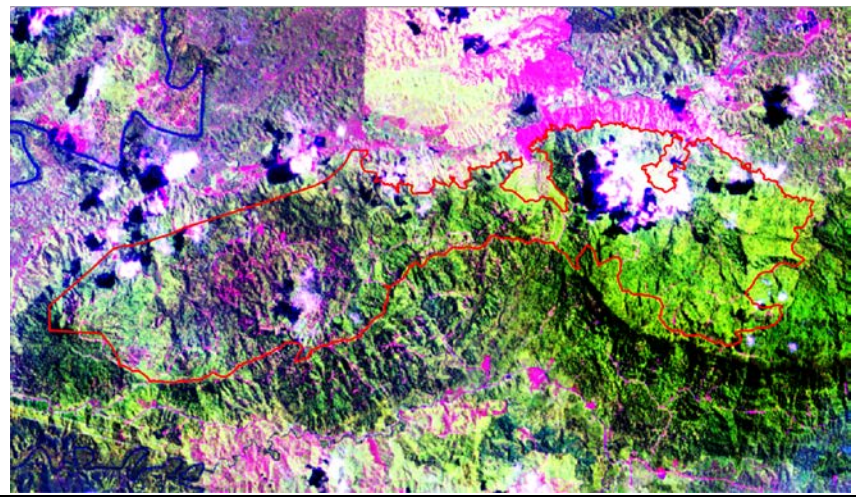
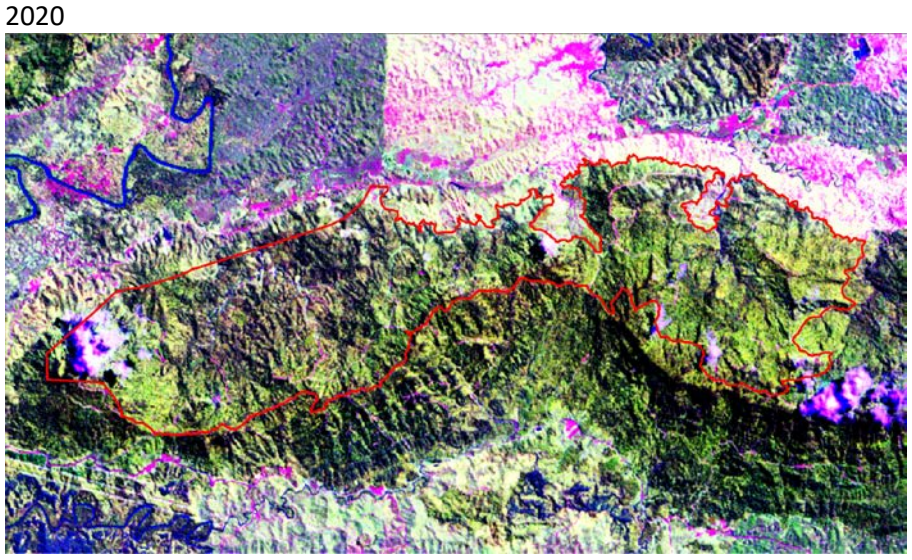
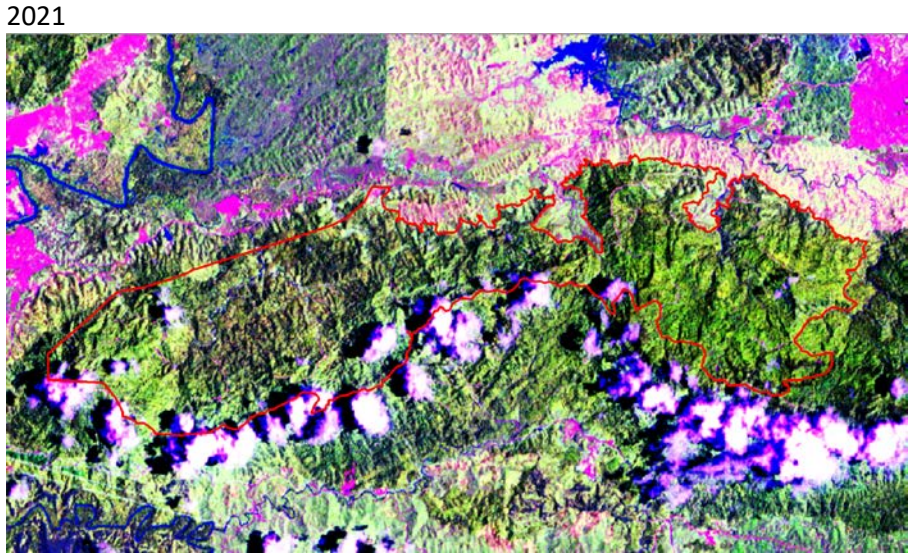
The spatial distribution of impacts in the recovery site is presented in Map 3.12. The eastern section of the recovery site has the lowest logging impact, whereas the central and western sections show the highest impacts. This is directly correlated to the terrain in the Belaga site. Moving from impact analysis, an attempt has been made to zone the impacts as an initial management action. The analysis has produced the necessity for 4 management zones (see Map 3.13). The zonation is based on a combination of accessibility, the concentration of impacts, terrain, and local community activity. The management zones specifics are summarized in Table 3.7. The details of zone management will be identified in the proposed management planning exercise to be undertaken over a period of 12 months, beginning September 2021. This will be a consultative exercise. In the meantime, interim management actions have been identified and implemented.

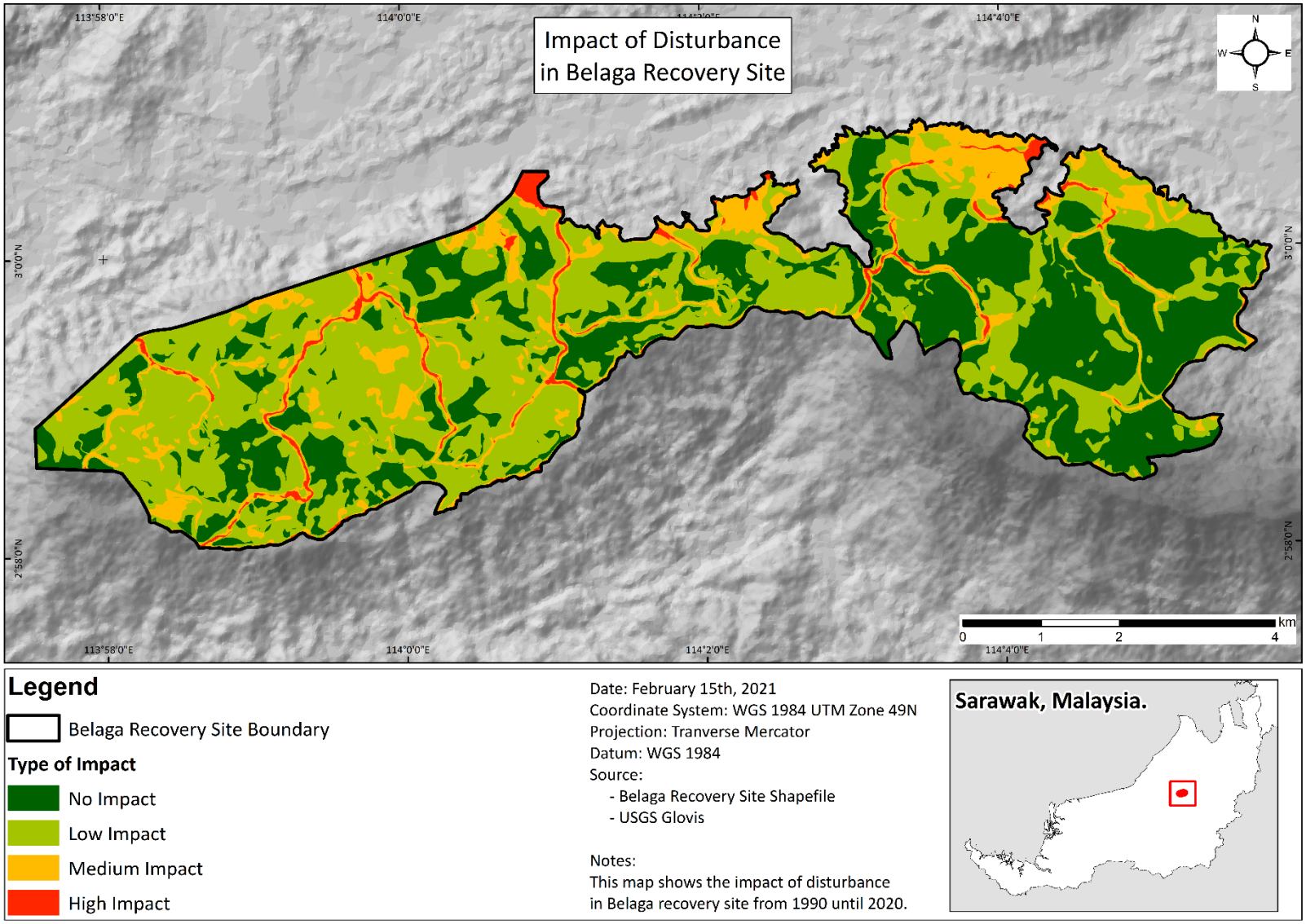
Table 3.7: Management zone and the impact hectarage

Management Zone	No Impact	Low Impact	Medium Impact	High Impact	Total of column (ha)
1	386.28	1,086.21	229.56	62.00	1,764.05
2	146.98	273.47	86.82	16.38	523.65
3	82.11	213.64	146.05	22.39	464.19
4	665.14	263.98	44.26	10.91	984.30
Total of rows (ha)	**1,280.52**	**1,837.30**	**506.69**	**111.68**	**3,736.19**
Percentage (%)	34	49	14	3	100

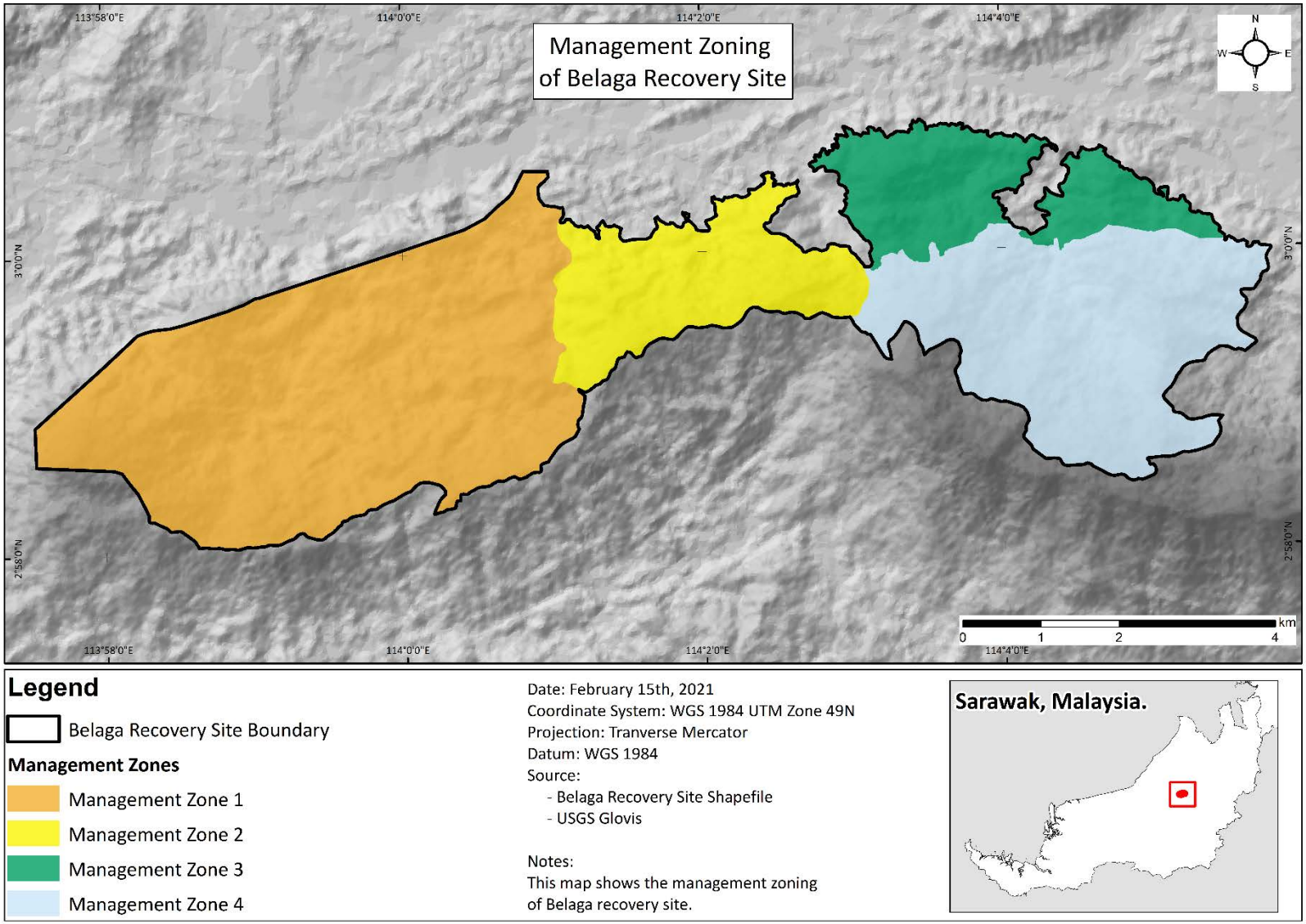
This preliminary analysis is an indicator that the site selected by GPSB fits the criteria required for the HCS liability. The site as indicated above, requires management, and has the potential to become one of significance in the Kapit Division. The establishment of its legality will see it contributing to conservation set asides and the long-term significance of this site, is that it will be a multiple use site, demonstrating rehabilitation, biodiversity conservation and local community participation. Funding of the site's management would be from a commercial entity, and this could become a future model for the conservation of sites in Sarawak.

Table 3.8: Chrono sequence of 30 years land use change from 1990 to 2020 (present)

1990 	1991 
1995 	1999 
2005 	2010 
2017 	2018 
2020 	2021 



Map 3.12: Mapping of impacts from 30 years of logging activities in the Belaga recovery site.



Map 3.13: Management zones generated from the 30-year impacts mapping.

4 Recovery Plan Components

One of the main objectives of this recovery plan is to state the specifics that are required to ensure that the recovery site will be legally recognised and endure the challenges of managing it. Ten basic components have been identified. But the success of management is not restricted to the component listed below. These components and how they are approached will determine the success of site management. The components are as follows:

1. Legal Consideration ,
2. Offset Exceeding loss,
3. Additionality,
4. Financial Support,
5. Enhancement of Conservation Values,
6. Commitment to long-term management,
7. Consultative Approach,
8. Inclusion of Social Elements,
9. Scientific based approach, and
10. Management Planning. – inclusive of capable team.

4.1 Legal Considerations

The identified Belaga recovery site was initially part of the former Forest Timber Licence No. T/3282 licenced to Samling Plywood (Bintulu) Sdn. Bhd., and is now amalgamated into Paong FMU (Forest Management Unit). The site is legally licenced under a Forest Timber Licence (FTL) to Samling Plywood (Lawas) Sdn Bhd – a Samling Group subsidiary, with the Licence no. T/0404 (see Map 3.3). Although the licence conditions do not allow the site to be legally transferred to GPSB, it can however be negotiated that the GPSB can directly manage the site for conservation. This is to be done with a legally recognized memorandum of understanding between the licencee and GPSB. It would become a bipartite exercise, the parties being GPSB and Samling Plywood (Lawas) Sdn. Bhd. The negotiations for this are underway where the details of partnership and management are being worked out. The FTL was issued on 15th May 1993. The licence will, tentatively, expire on 14th May 2033, in the next 12 years. Both GPSB and Samling Plywood (Lawas) Sdn. Bhd. are working to secure the site legally for a longer period to serve the objectives of this recovery plan. A proposed strategy is for Samling Plywood (Lawas) Sdn. Bhd. to successfully achieve Natural Forest Certification by year 2022. Upon obtaining this certificate, the government (Forest Department Sarawak) will automatically grant Samling Plywood (Lawas) Sdn. Bhd. a 60-year licence period for the entire Paong FMU, the recovery site included. This will then ensure that the Belaga Recovery Site's conservation status will be extended to 60 years.

4.2 Offset Exceeding loss

Results from the independent retrospective HCS loss assessment indicate that 1,853 ha of HCS area loss has been identified in GPSB's oil palm concessions. The HCS loss liability period is from 1st January 2016 (the establishment of the High Carbon Stock Approach (HCSA) organization) to September 2020 (initiation of HCS liability calculation).

As such, GPSB is committed to compensating its HCS liability in an actively managed offset area that exceeds its losses. The identified Belaga Recovery Site is 1,883 ha more than the said HCS liability hectarage, as it has an extent of 3,736 ha. GPSB is committed to this area because an extension from 1,853 ha will make the conservation contribution substantial and recognize the fact that in the Belaga locality, no protected areas exist. The exercise to conserve needs to be significant.

4.3 Additionality – Multiple Conservation Potential and Conservation Model

From earlier analysis, it has been determined that the site was subjected to several cycles of logging, and timber extraction activities, beginning as early as 1990, progressing all the way until 2018. The historical land cover and impacts analysis in Section 3.4 records the frequency and intensity of disturbance that had occurred in the site. It is evident that the Belaga site has a disturbed ecosystem with a distribution of intact patches existing in the eastern section. The additionality factor here is that the Belaga recovery site could provide GPSB with multiple conservation opportunities, which will become significant.

Apart from its conservation and rehabilitation potential, the Belaga recovery site has the potential to become the first successful commercially driven conservation site in Sarawak. It will be an exercise involving multi-stakeholder input and in partnership with Samling Plywood (Lawas) Sdn. Bhd.

This is also part of GPSB's initiative to shift our gear into sustainable agriculture as a core business practice. Our commitment has been evident through our NDPE Policy and its Implementation Plan, the NDPE Commitment Self-Declaration, and Independent HCS loss Assessment, as well as, committing to establishing and managing a recovery site, adding on to Sarawak's conservation efforts. This exercise would create a small but significant internationally recognised conservation site. In summary, the additionality that the site would contribute is listed below.

1. Multi-conservation efforts: -
    - Biodiversity conservation,
    - Carbon Stock Sequestration, and
    - Developing and managing NTFP extraction and collection and increasing local community economic resources.
2. Rehabilitation of lowland dipterocarp forest, a similar ecosystem to the loss area, and within the same landscape, Borneo Island.
3. Inclusion of social components and participation of local communities.
4. The opportunity to provide a long-lasting conservation impact on the Sarawak landscape.

4.4 Financial Support and Resources

GPSB, as the party responsible for HCS loss, is totally committed to financially supporting the establishment and long-term management of the Belaga recovery site. The details of the financial support and the resources that GPSB would need to successfully manage the site will be determined during the site management planning exercise.

4.5 Enhancement of Conservation Values

The establishment and management of the Belaga site is not only restricted to HCS loss liability offsetting. Once established, GSPB envisions that the management of this site will support 4 overarching conservation objectives. These potential objectives being:

1. Biodiversity Conservation,
2. Carbon Stock Sequestration,
3. Rehabilitation, and
4. Benefiting NTFPs and local community's economic resources.

These conservation objectives should be consulted and mutually agreed upon with both the local community and external stakeholders. Of primary importance would be collaboration with Samling Plywood (Lawas) Sdn. Bhd. GPSB will work towards achieving these goals and review the success of the recovery plan against these objectives.

4.6 Commitment to long-term management

GPSB is negotiating through the licencee to ensure that the site will be managed and remain intact initially until 2033 (current validity of the licence). However, Samling Plywood (Lawas) Sdn. Bhd is heading towards certifying this concession by 2022. This would then extend the security of the area with a 60-year licence period. This is GPSB's long term goal. It is principally a 60-year commitment and in the interim, based on its commitment with Samling Plywood (Lawas) Sdn. Bhd., it could become a State-recognised conservation site with sustained management and financial inputs. In terms of management, the initial period for planning would be 5-years with annual operation plans. The planning cycle is, thus, 5 years. This could potentially go on for the next 60 years. The company would ensure that the following are undertaken.

- Review of management plans every 5 years,
- Annual operation plans,
- Funding cycle renewed every 5 years,
- Monitoring plans supporting adaptive management, and
- Local community participation and enhancing sustainable NTFP collection.

4.7 Consultative Approach

The core of this project is transparency. It will be ensured that all relevant stakeholders will be involved in the establishment and management of this site. Co-management of specific areas within the site will be considered. The proposed direction in ensuring site establishment and sustained management will need to take into consideration the following:

- **Transparency** will be upheld through local community involvement and stakeholder engagement. Both parties will be kept updated and have opportunities to provide feedback for improvement.
- **Active Communication,** where two-way communication is promoted. Stakeholders will be reached and kept informed. Feedback will be recorded, and conflicting stakeholder interest will be charted.
- **Inclusive and in participation of local communities,** where local communities' needs, and involvement will be prioritized.
- **Stakeholder consensus,** where the management plan of this recovery will require stakeholder endorsement. Assuming stakeholder endorsement is received, active conservation management could begin.
- **Conflicts** that are related to economic gains and biodiversity loss – hunting, wildlife trading, and uncontrolled NTFP collection.

The management planning exercise which will ensure that it is done through a consultative approach, which will then provide the right frame for effective management.

4.8 Inclusion of Social Elements

The presence and use of this area by local communities is acknowledged, and in the management planning exercise, the following will be analysed:

- The dependency of the surrounding local communities on the site.
- Utilisation of the site for economic activities.
- The existent of traditional areas within the site.
- Traditional knowledge.
- Encroachment and illegal occupation.
- Native customary rights over the land.
- Involvement and support of the local communities in conserving the area and the establishment of nurseries and seedling supply.

Identification and management of the social components are seen as crucial. Understanding the local communities' needs and their perception of the conservation site is identified as being very important. Thus, the focus on understanding community needs, profiling them, and getting them involved in both the management planning and ultimately assisting in managing the site is seen as a priority.

4.9 Scientific based approach

This will not be a blind attempt to just secure the area and leave it in benign neglect. GPSB plans to take a scientific approach where it will begin with data collection to obtain the right information to undertake management of the site. The data required will include the following.

- Detailed ecosystem mapping,
- Inventorise flora and fauna species occurrence,
- Ascertain the condition of impacted and unimpacted ecosystems,
- Stream mapping and desktop hydrology,
- Detailed soil types,
- Inventorise sites for rehabilitation,
- State of natural succession and regeneration,
- NTFP inventory,
- Identify and inventorise existing conflicts, and
- Local community profiling.

The data is required to allow the planners to make informed decisions regarding management options which are practical and implementable. An adaptive management approach will be investigated.

5 Interim Management and Monitoring Activities

The Belaga site requires an interim management period while the management plan is being formulated. The management plan exercise will take 12 months to complete beginning, in September 2021. With the information generated from the preliminary desktop site analysis and the pre-scoping site survey, and interim actions have been initiated. The actions are systematically listed in Table 5.1, which is a summary of recommended specific activities to be implemented. The proposed duration for implementing the interim management and monitoring activities is 12 months from the initiation of this recovery plan.

Table 5.1: Interim Management Actions

No.	Interim Management Actions	Specific Activities	Expected Outcome of Activities	Monitoring Actions
1.	Stakeholder Identification	• Identification of key stakeholders who are involved in Belaga recovery site. • Engagement with stakeholders for consultations.	• Registry of identified stakeholders, relevant to the recovery site. • Records of stakeholder engagement.	• Monitoring of stakeholders' involvement needs and expectations.
2.	Engagement with Samling Plywood (Lawas) Sdn. Bhd.	• Follow up meetings with Samling Plywood (Lawas) Sdn. Bhd counterpart regarding the use of the FTL site for conservation. • Formation of a bipartite exercise between GPSB and Samling Plywood (Lawas) Sdn. Bhd. through a legally recognized memorandum of understanding between the licencee and GSPB. • Establishment of GPSB as the site manager through the Samling Group. • Contribute towards the conservation efforts of the FTL natural forest certification. • Informing and engaging with the local government - state authority, district council, and local academic institutions, through the licencee where applicable.	• Negotiations on the details of partnership and formalize the MOU. • Continuous consultation with Samling Plywood (Lawas) Sdn. Bhd for active site management. • Records of engagement (formal letters), minutes of meetings. • Summarised management chapter for the recovery site for inclusion into the licensee's Forest Management Plan.	• Internal monitoring of progress of acceptance of site management initiatives by GPSB. • Strategic communications with Samling Plywood (Lawas) Sdn. Bhd regarding progress.

No.	Interim Management Actions	Specific Activities	Expected Outcome of Activities	Monitoring Actions
		• Formulate Belaga Recovery Site management chapter for the licencee's Forest Management Plan for certification purposes.		
3.	Building an Onsite Management Team	• Establish an onsite management team. The team composition should consist of the following: i. Middle-level project manager to manage the team on-site and consult with the licencee ii. Onsite Conservation Personnel (with basic botany, wildlife, forestry, and ecology background), iii. Social officer, iv. Forest Rangers (Conservation Rangers), v. Local community representative or a company personnel who is from the local community, and speaks the local language and dialect, vi. Senior manager to make higher-level decisions (from HQ). • Determine the duration of appointment and scope of work for this management team. • Formalise the recovery site management team structure in an organization chart.	• The organisation structure of management team (Org Chart). • Individual scope of work for team members. • Duration of appointment for the management team.	• Monitoring of work progress and team performance.
4.	Boundary Demarcation	• Determine the boundary markers spacing and estimated locations with GPS coordinates through a desktop exercise. • Initiate accessibility and ground conditions assessments. These factors will determine the boundary demarcation. • Begin on the ground boundary demarcation. • Record accurate boundary marker. For management and monitoring planning and record keeping.	• Map of the tentative location of boundary markers with coordinates. • Progress report of boundary markers and signboard installation on the ground. This should include: - Location of actual boundary markers, - Location of signboards installed,	• Regular monitoring of inspection and maintenance of boundary markers. • Monitoring for illegal activities and encroachment.

No.	Interim Management Actions	Specific Activities	Expected Outcome of Activities	Monitoring Actions
		• Installation of signboards at key locations along the boundary. • Initiate inspection and maintenance of boundary markers (regular monitoring).	- Sample of ground photographs, and - Progress of installation. • Records of illegal encroachment should be maintained.	
5.	Site Biology Assessment	• Pre-scoping field survey and desktop study of the Belaga recovery site. • Preliminary identification of botanical and wildlife species data from field surveys. • Inventory of Rare, Threatened, and Endangered (RTE), invasive and endemic occurrences identified on-site or sighted by locals. • Initiating camera trapping and recording of mobile species identified on camera traps. • Threats Assessment - Identification and recording of both potential and current threats to develop an appropriate threats management and mitigation action plan.	• A brief report of pre-scoping and desktop study. • Field inventory of botanical and zoological species. • Results of camera trapping, photograph inventory of species identified (if available). • Records of potential and current threats for the management plan.	• Monitoring of RTE species occurrences. • Monitoring of hunting activities.
6.	Social Study	• Data collection on surrounding villages/towns, demography, living conditions and customary rights. • Check if these local communities are using the site: - - Identify the resources utilized by the local community from the site (including NTFP). - Identify and engage with encroachers. • Identifying local representatives (including community leaders, NGOs). • Studying the feasibility of training the local community to establish nursery and supply seedlings.	• Social study report. • Inclusion of relevant local representatives and community leaders in the stakeholder's list.	• Monitoring of local communities needs and expectations. • Monitoring of NTFP and other utilisation of the site by locals.

No.	Interim Management Actions	Specific Activities	Expected Outcome of Activities	Monitoring Actions
7.	Desktop Hydrology Assessment	• Data collection on the biophysical factors such as rainfall, topography, and hydrology. • Mapping of rivers and streams, and water catchments. • Developing an accurate slope and elevation model of the site. • Identify water flow. • Soil survey. • Mapping of steep slopes, water sources, and fragile soils on the ground.	• Report on steep slopes, water regime, soil, water catchment. • Map of drainage map. • Map of steep slopes. • Soil map, including fragile soils. • Terrain model.	• Monitor progress of mapping and data collection.
8.	Land Cover Mapping	• Drone mapping. • Preliminary landcover mapping from the drone image. • On-site field verification.	• Mosaic drone image for the entire site (see section 5.1.2). • Preliminary landcover map. • Vegetation mapping.	• *Initiated, t*o monitor progress.
9.	Carbon Stock Assessment	• Determination of preliminary carbon stock assessment of the recovery site. • Carbon stock mapping according to the impact zones.	• Report of preliminary carbon stock assessment of the recovery site. • Map of carbon stock.	• Monitoring progress of assessment.
10.	Impact Analysis of the Recovery Site	• Chrono-sequence of logging. • Frequency of impacts mapping. • Zonation of impact severity within the recovery site. • Preliminary management zonation.	• Map of Chrono-sequence. • Map of Impacts. • Map of Impacts Zonation and Management. (Refer to section 3.4)	• Completed.
11.	Collation of data and resource to support long-term management of the Recovery Site.	• Gather relevant information on the resource that needs to be conserved (site inventory). • Conduct discussion that should shape policies, plans, and actions. • Identify procedures and actions that management will apply (SOPs). • Investigate rehabilitation methods. • Develop an iterative cycle for self-improvement.	• Collation of data. • Policies, Plans and Procedures, • SOPs. • Adaptive Management Plan.	• Monitoring progress of data gathering.

5.1 Interim Actions

5.1.1 Pre-scoping Field Survey

In fulfilling its commitment towards securing and managing the Belaga recovery site, GPSB has initiated a series of interim actions. Some of these actions are drawn from Table 5.1. The logical flow of actions would be to understand the site, from both the social and biophysical context. GPSB has formed an interim team to undertake a pre-scoping of the site and the findings are summarized below. The preliminary findings indicate the following:

1. The western section of the Belaga recovery site has been highly impacted by past logging and has the potential for rehabilitation and assisted forest recovery. See Map 5.3.
2. Some roads are impassable; however, patches of degraded forest are accessible by foot.
3. There are 2 possible points of entry into the western section of the site. These roads were previously used by loggers for timber extraction.
4. A potential threat identified to the site would be illegal hunting and the over-collection of forest resources by local communities. This is due mainly to the road access created by logging companies.
5. The eastern section of the site is steep, with rugged terrain and higher elevation. This section of the site has a lesser logging impact as compared to the west. The site is dominated by hill dipterocarp forest with pockets of forest regenerating from logging. See Map 5.3.
6. In the northern section, encroachment into the site was detected in the form of cash crop planting by the local community. The focus of the interim management would be on identifying the presence of local community activities within the site. See Map 5.3.

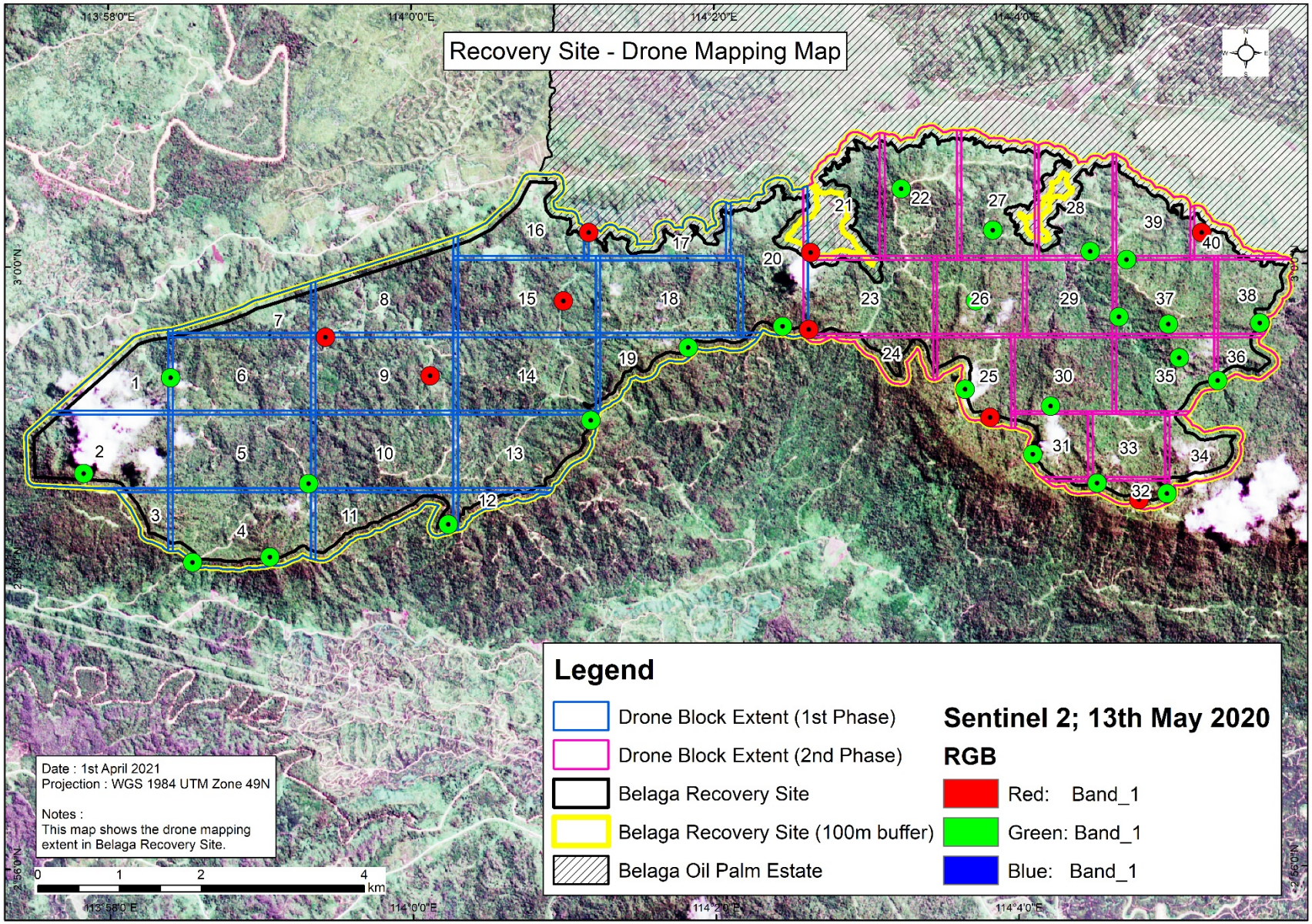
5.1.2 Drone Mapping of the Recovery Site

To further understand the resources in this site, a high-resolution drone mapping exercise has been initiated. It is planned that the entire site will be mapped at 10 cm resolution, enabling land cover, vegetation, carbon, and ecosystem mapping. The drone mapping exercise was initiated in February 2021, and the details of the drone image capture are summarized in Table 5.2. The recovery site was divided into 3 sections with an additional 100 m buffer to ensure that mapping would also include activities on the border of the recovery site. The spatial approach towards the drone mapping is presented in Map 5.1 and Map 5.2 .

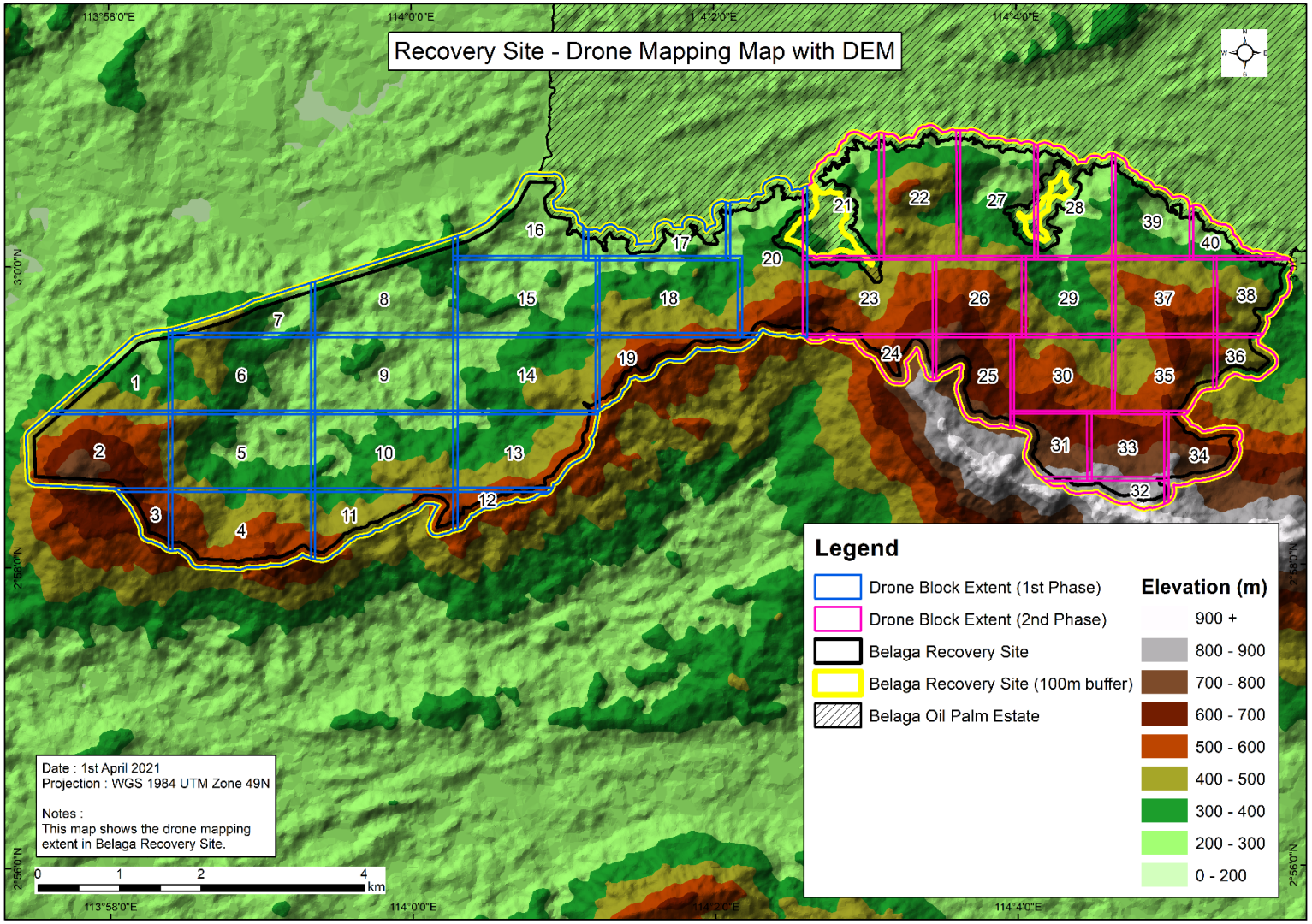
Table 5.2 Drone Mapping Area Extent in Belaga Recovery Site

Area Name	GIS Extent (ha)
Belaga Recovery Site (Phase 1)	2,217.31
Belaga Recovery Site (Phase 2)	1,518.88
Total Extent (ha)	**3,736.19**
Drone extent 100m buffer (ha)	534.37

The mapping was undertaken in pre-established grids to ensure adequate overlap in the drone images captured between grids cells. The drone grid overlap is 50 meters and adequate overlap was ensured within images in each grid.



Map 5.1: Phase 1 & 2 Block Extent for drone mapping

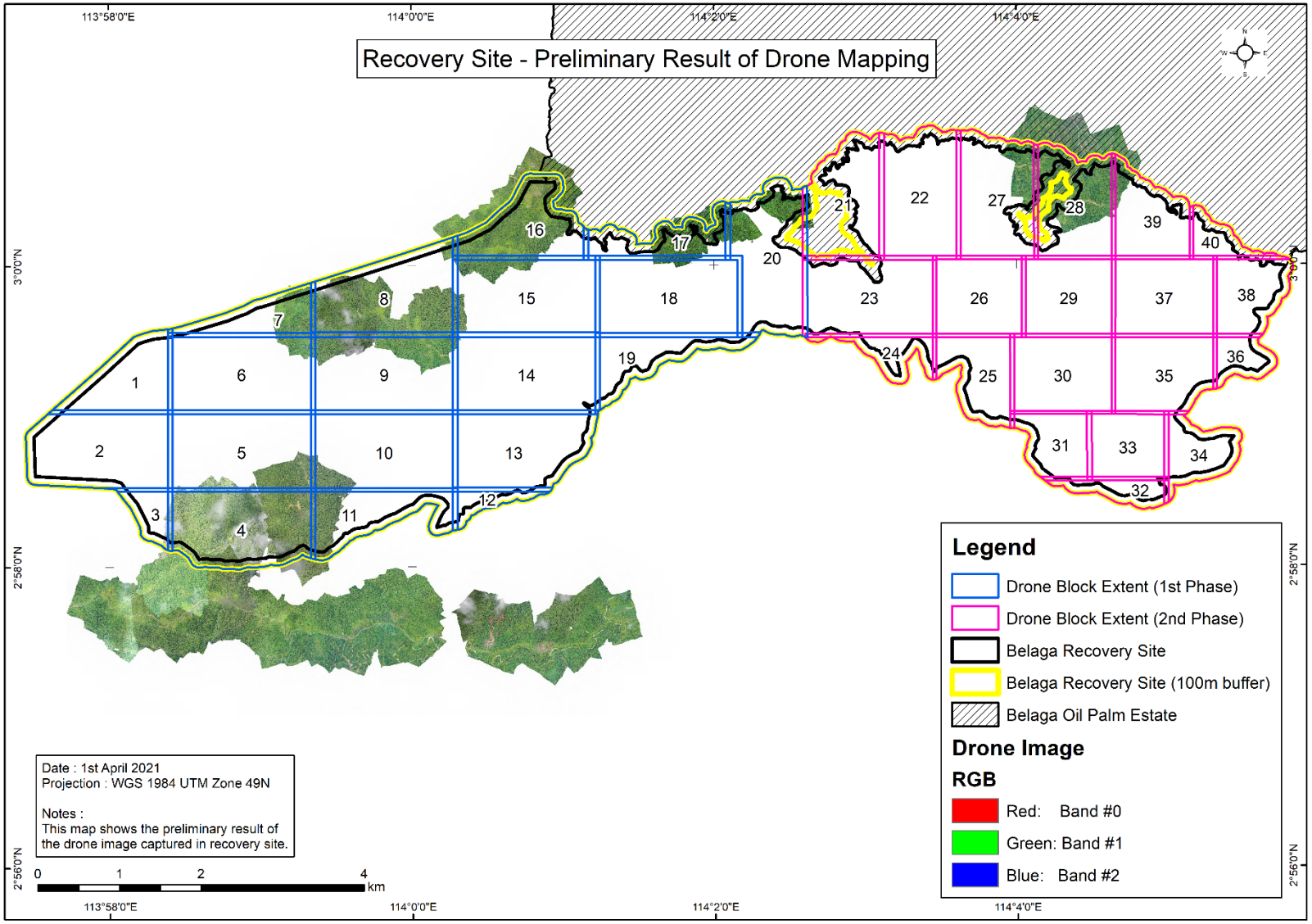


Map 5.2 : Phase 1 & 2 Block Extent for Digital Elevation Model (DEM)

The approach towards mapping the site was to initially evaluate and refine the drone mapping method. This preliminary exercise which comprised of 40 flight missions, covering 900 ha recorded the following challenges:

- Most roads were impassable. There are no accessible roads in these steep areas in the east.
- It was difficult to find an ideal take-off point for the drones.
- Walking through shrub and high grassland is difficult and time consuming.
- The forest is dense with a thick canopy cover.
- Some grids were difficult to fly over due to its steep terrain and high elevation.
- These images are shown in Section 5.2 .

In this preliminary exercise, the grids that were successfully mapped are 4, 5, 7, 8, 11, 16, 17, 20, 27, and 28. See Map 5.3. Presented in the following pages are samples of oblique images taken to get a better view of the site and understand the terrain challenges in drone mapping. The short distance variation in elevation prevented effective mosaicking of drone images, and the mapping methods are being revised to accommodate both elevation and steepness before accurate mapping is done.



Map 5.3: Phases of Preliminary Drone Mapping in the Belaga recovery site

Refer to photographs below: -

5.2 Pre-scoping Field Survey – Belaga Recovery Site Conditions

As part of the interim management action, an initial ground survey was undertaken in February 2021. The field survey focused on gaining access and to get an idea of the condition of the highly impacted areas within the site. A record of the images captured on site is presented below.

In the interim period, before the formulation of the 5-year management plan, actions have been initiated to gather data, have an idea of site conditions, high-resolution areal mapping of the site, and establishing a set of interim actions to demonstrate GPSB's commitment to establishing and managing the site over an extended period. This is a long-term commitment. GPSB through Samling Plywood (Lawas) Sdn. Bhd. has obtained initial permission to access the site to undertake the necessary assessments. These assessments would in turn provide information supporting the conservation efforts for the Belaga HCS Recovery site. In addition to this, it is also to demonstrate that GPSB has not made a static commitment regarding the Belaga HCS Recovery Site and is actively going through the interim management phase and moving on to actively undertaking onsite management once the planning exercise is complete.

5.3 Species Conservation and Addressing Rehabilitation

As part of interim actions, GPSB began investigating the potential occurrence of RTE and endemic species in the Belaga recovery site. Species listing has been generated from survey data obtained from other comparable sites in Sarawak. The intent is to create awareness amongst the management team and the local community on the potential presence of endangered flora and fauna in the site. This would require immediate interim management actions to be developed, to ensure that the process of conserving the site with its species is undertaken as soon as the situation allows. The summary of the species potentially present is provided in Appendix 9.1.

GPSB also recognizes the importance of establishing a rehabilitation programme for impacted ecosystems. To be proactive, an assessment of rehabilitation methodology has been undertaken so that initial trials can proceed while the management planning exercise is being undertaken. The results of these trials will support the final outcome of the management plan, where rehabilitation is concerned. A summary of the proposed approach for undertaking rehabilitation is presented in Appendix 9.2. Details are provided on the flow process with considerations that need to be taken into account. Suitable species for rehabilitation have also been listed.

6 Management Planning

In the process of establishing the HCS Recovery Site, GPSB has considered interim management which supports actions primarily to ensure that proposed activities in the site are supported and recognised by the Forest Department Sarawak (FDS). And to obtain enough information to proceed with directed management. The initial objective was to offer this site as a recovery option for the loss of HCS in their oil palm concessions in Malaysia and Indonesia. Although this is one of the primary objectives, preliminary studies have presented a whole host of other opportunities. In the previous section, actions have been initiated to proceed with the necessary negotiations with the FDS and Samling Plywood (Lawas) Sdn. Bhd. securing the area for long-term management, biophysical description, vegetation mapping, social inclusion, impacts analysis and zonation.

The process of managing this site has begun with preliminary actions working towards signing an enduring Memorandum of Understanding (MoU) with Samling Plywood (Lawas) Sdn. Bhd. This is the pathway supported and recognised by the FDS and is a prerequisite to proceeding with actual site management. The Belaga recovery site has the potential of becoming a site of conservation importance because of its location and the presence of ecosystems in various stages of recovery. Rehabilitation would then become an important exercise. The site has a spread of intact areas which will play a crucial role in providing the source of genetic material to spread effectively into the regenerating ecosystems.

6.1 Management Planning Approach – Project Cycle

Keeping the above in perspective, the planning for this site must promote multiple conservation management objectives. The site should serve as a model, not only for rehabilitation and ecosystem recovery but also provide livelihood opportunities for the local communities.

Elements of long-term strategic planning are required in formulating the management plan for this multiple use site. The focus is on conservation where HCS recovery is one component. This being the case, the plan, should encompass all potentials for the site and, therefore, a period of 12 months is allocated for developing the initial 5-year management plan. To take the guidance provided by the *Open Standards for the Practice of Conservation*, a 5-step process, project cycle will be adopted. Refer to Chart 6.1.

The 5-steps that need to be considered for the successful management and monitoring of the site are:

1. Assess,
2. Plan,
3. Implement,
4. Analyse & adapt, and
5. Share.

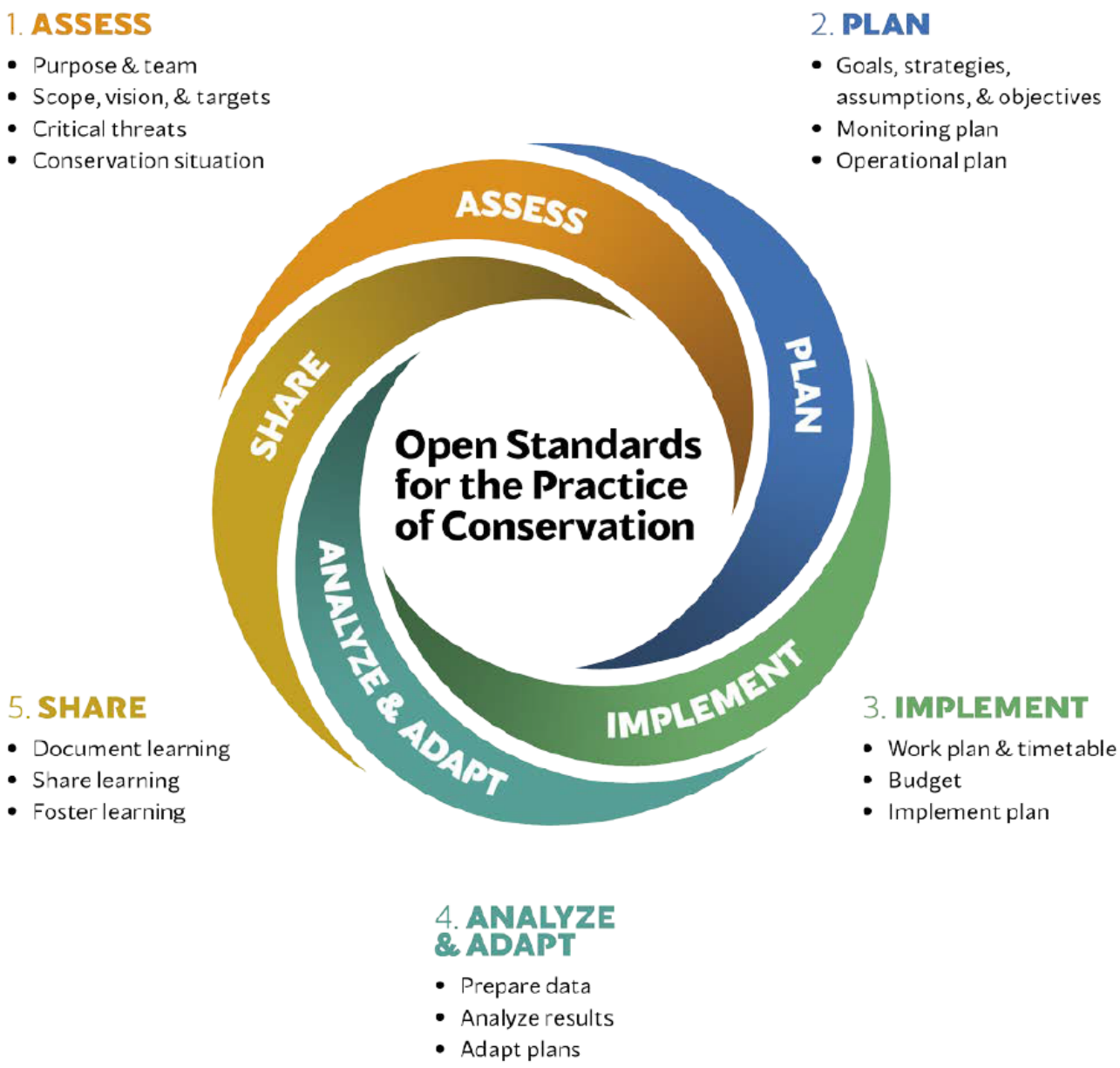


Chart 6.1: Open Standards for the Practice of Conservation Project Cycle

6.2 Management Planning Process

The management plan is the document that states the strategy and objectives that GPSB will implement over an initial 5-year period. The management objectives are determined through data acquisition and analysis, extended consultation with relevant stakeholders and implementation feasibility. The plan is to guide site managers on how to translate targeted actions on the ground to achieve conservation objectives. It would also identify the general scope of work that needs to be undertaken. GPSB is proposing to undertake the exercise that will create a practical and implementable management plan.

A 13-step management planning process to develop a conservation management plan is proposed and summarised in Chart 6.2. The 13-steps approach begins with data gathering and information and proceeds to identification of constrains opportunities and threats. The planning process will undertake a modified logical framework analysis to identify and support actions. A consultative approach is one of the core strategies that must be adhered to. There should be regular consultation with identified stakeholders at every step of the planning process. A final public consultation is also a key requirement. The final plan should be endorsed by key stakeholders and the NDPE Supply Chain. A stand-alone plan would proof ineffective if it is not supported by monitoring processes with the identification of key indicators. The 5-year management plan is to remain flexible in terms of revision as an adaptive management approach is advocated. Monitoring and evaluation will be the threat that determines whether the actions formulated are effective. An adaptive management cycle that will be considered is presented in Chart 6.3 . The very essence of this management planning exercise is to incorporate the principles of adaptive management. The Belaga site is to be managed and funded by a private entity, initially focusing on using the site for off-setting HCS loss in its oil palm concession. However, the case is such that potential conservation opportunities have emerged, making site management more complex. Thus, the plan is one that should be strategic, implementable, and adaptive.

The implementation of the plan must be monitored and evaluated periodically to ascertain effectiveness. If found to be lacking, then immediate adjustments to management actions must be made. This adjustment process is iterative and requires a monitoring and evaluation framework that constantly allows introspection of site management. The key word in developing and implementing management is flexibility. Rigid and static approaches are a thing of the past, and because this is a private endeavor, reaction times are, hopefully, shorter, and thus making the whole exercise effective.

It has to be reiterated throughout this document that the initial planning frame is to be 5 years. The formulation of this management plan should be done meticulously over a period of 12 months with various stages that would require consultation and review. The time frame for this management planning exercise is presented in Chart 6.4, where the required activities are listed against the proposed schedule which begins in August 2021 and ends in July 2022.

The proposed time frame of 12 months is seen to be sufficient to formulate and finalise an effective management plan. Assessment of the site would take approximately 6 months and would be on-going even after the planning exercise. The gathering of both human and financial resources also requires a few months of effort. This project irrespective of how well planned will fail if it is not funded adequately. In addition to this, the site management recognition must be accorded to GPSB. This should be formalized and recognized by local stakeholders. Without having the recognition, GPSB will be unable to proceed effectively in not only establishing the site but subsequent management.

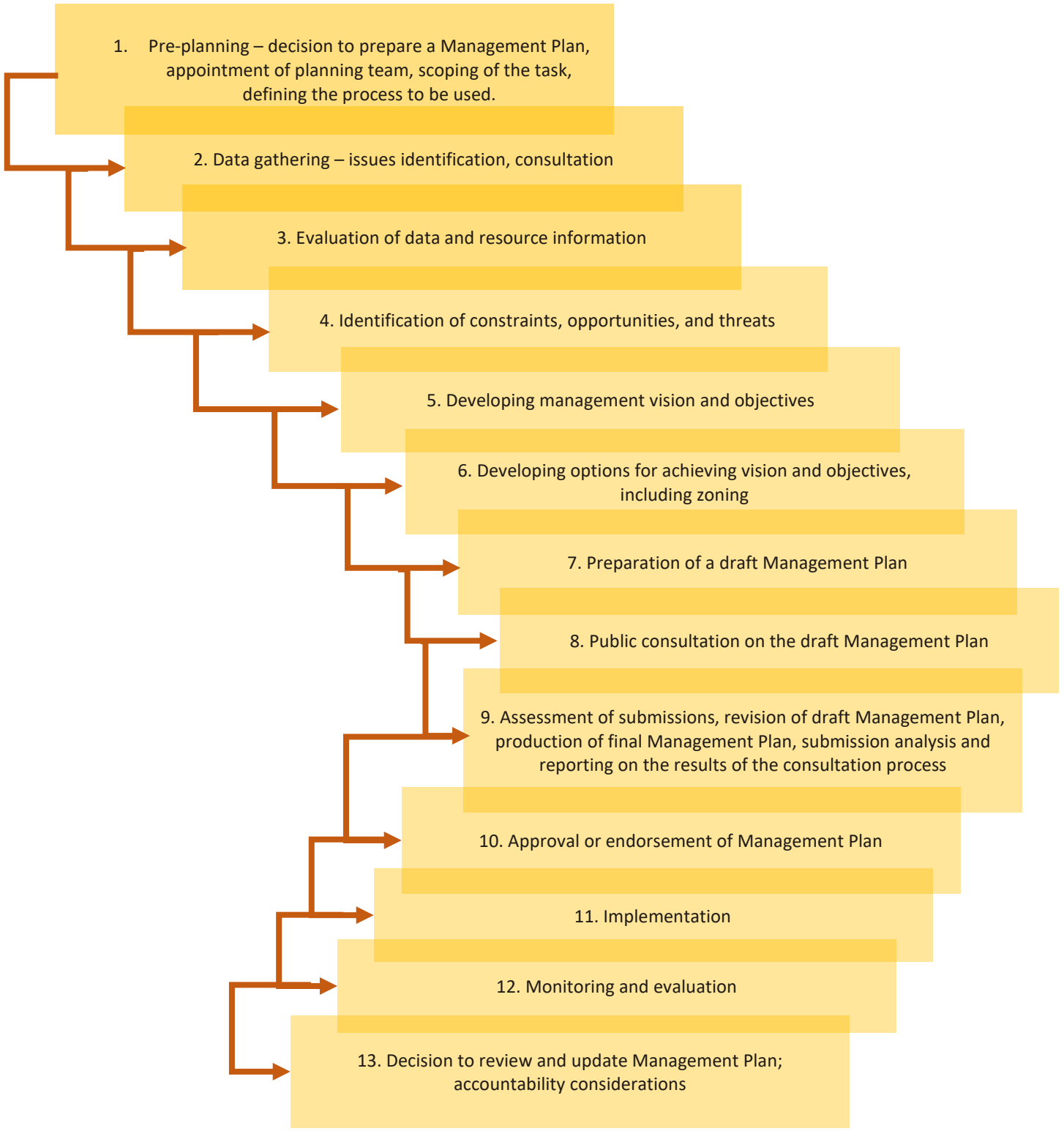


Chart 6.2 : Protected area management planning steps

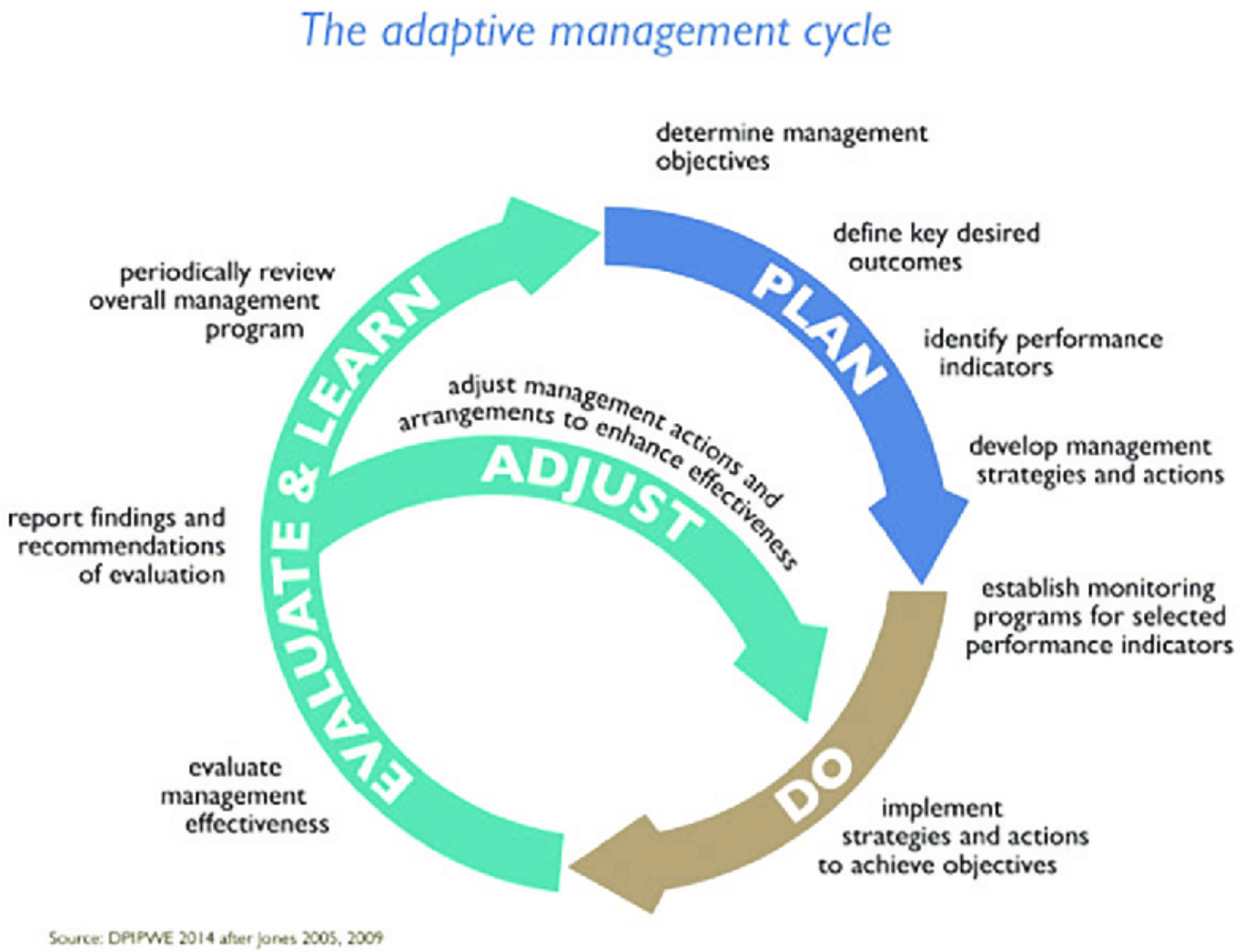
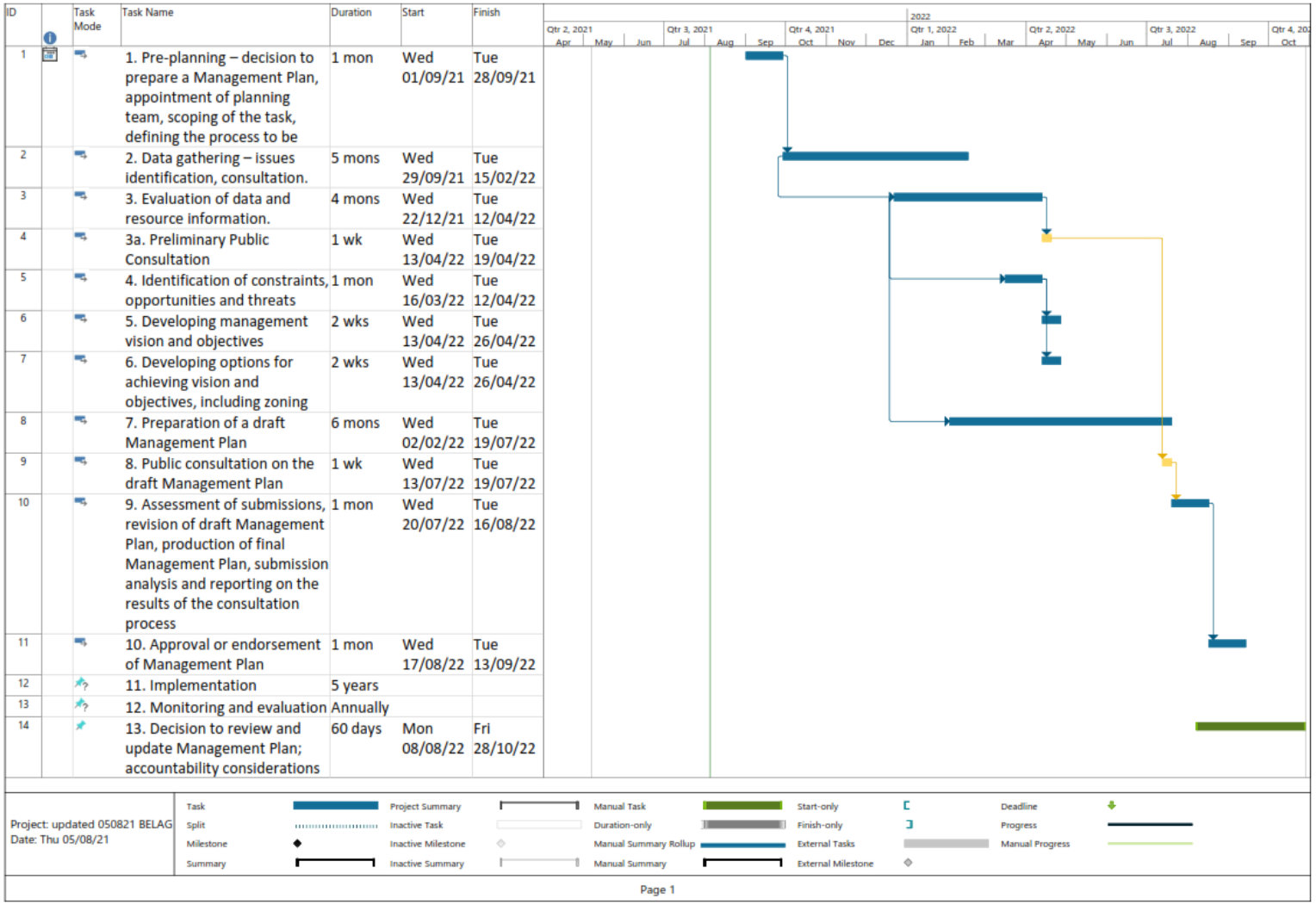


Chart 6.3: Adaptive management cycle (Source: The adaptive management cycle (DPIPWE 2014; Jones 2005, 2009).



ID	Task Mode	Task Name	Duration	Start	Finish
1		1. Pre-planning – decision to prepare a Management Plan, appointment of planning team, scoping of the task, defining the process to be	1 mon	Wed 01/09/21	Tue 28/09/21
2		2. Data gathering – issues identification, consultation.	5 mons	Wed 29/09/21	Tue 15/02/22
3		3. Evaluation of data and resource information.	4 mons	Wed 22/12/21	Tue 12/04/22
4		3a. Preliminary Public Consultation	1 wk	Wed 13/04/22	Tue 19/04/22
5		4. Identification of constraints, opportunities and threats	1 mon	Wed 16/03/22	Tue 12/04/22
6		5. Developing management vision and objectives	2 wks	Wed 13/04/22	Tue 26/04/22
7		6. Developing options for achieving vision and objectives, including zoning	2 wks	Wed 13/04/22	Tue 26/04/22
8		7. Preparation of a draft Management Plan	6 mons	Wed 02/02/22	Tue 19/07/22
9		8. Public consultation on the draft Management Plan	1 wk	Wed 13/07/22	Tue 19/07/22
10		9. Assessment of submissions, revision of draft Management Plan, production of final Management Plan, submission analysis and reporting on the results of the consultation process	1 mon	Wed 20/07/22	Tue 16/08/22
11		10. Approval or endorsement of Management Plan	1 mon	Wed 17/08/22	Tue 13/09/22
12		11. Implementation	5 years		
13		12. Monitoring and evaluation	Annually		
14		13. Decision to review and update Management Plan; accountability considerations	60 days	Mon 08/08/22	Fri 28/10/22

Chart 6.4: Proposed Gantt Chart for the Belaga Recovery Site Management Planning

7 End Note

GPSB's commitment in establishing and managing the Belaga recovery site is transmitted in the content of this recovery plan. The approach has been systematic with the identification and immediate initiation of interim actions, of which, the legality of site management is of utmost importance. Understanding the challenges, the company has begun preliminary analysis of the site in the form of drone mapping and pre-scoping ground surveys. A site team has also been assembled to implement the interim actions until the situation allows a permanent management team to be formed. Due recognition has also been given to the local community and it has been specifically stated in the recovery plan that engagement and understanding the needs of the local communities adjacent to the site is a prerequisite. This is not only for project implementation but sustaining it long-term.

This is an exercise to manage the resources that have been impacted by logging, and it is once again reiterated that although the original objective of managing the site is for carbon offsetting, it is evident that the site has more potential than this. With this in mind, site management is proposed to be extended to holistic conservation which not only includes managing the carbon stock but extends to promoting ecosystem recovery, habitat rehabilitation, and species conservation. The site has the potential to function as a linear corridor connecting surrounding forest fragments and thus magnifying its conservation role. It is envisioned that this site over the next 10 years, could potentially become a site of conservation significance in Sarawak.

It has been mentioned above that the site is legally a forest logging concession licenced to Samling Plywood (Lawas) Sdn. Bhd. The establishment of the Belaga Recovery Site is recognised by the FDS with the understanding that GPSB will sign a long-term MOU with the licencee, to directly manage the site demarcated within the concession area. This would than legally be the primary determinant of how it will be managed. GPSB will, through the MoU, become the principal manager of the site. Saying this however, it will still be a co-management undertaking with Samling Plywood (Lawas) Sdn. Bhd. GPSB will have direct management of the site once the MoU is signed.

The complexity of managing a conservation site within a logging concession has special requirements and warrants the formulation of a management plan that encourages sustainable multiple use of the site. Management in this case is not a short-term endeavor but one that is predicted to last over the next 60-years. But keeping in mind that the intensity of management will change over this period. The management planning exercise is emphasised and extended over a period of 12 months to ensure that sufficient consideration is given to the consultative approach, stakeholders, and the challenges presented by the site.

The broad term 'recovery' in this context connotates the attempt by GPSB to look into all aspects of ensuring site integrity coupled with ecosystem recovery. The recovery process for the immediate objective of carbon offsetting is easily achievable, but the challenge is, ecosystem management and species conservation. This recovery plan proposes a pathway to achieving long-term sustainability of the site and once again recording GPSB's commitment.

GPSB's proposed endeavor through commercial funding and direct management could translate into a model for other HCS liability recovery sites, where the focus should not only be fixated on carbon stock but expanded to involve ecosystems and species. Bearing the challenges, it is hoped that this recovery proposal will be translated into ensuring that the site identified, is successfully established and managed.

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9 Appendices

9.1 Conservation of RTE and Endemic Species Known in the Belaga Region

Conservation of Species – Flora

Table 9.1 below is a list of flora RTE and endemic species that are commonly known to be present in the Belaga region.

Table 9.1: List of Flora RTE and Endemic Species Known in the Region

No.	Family	Genus	Species	IUCN	CITES	Sarawak (Wildlife Protection Ordinance 1998)	END
1	Dipterocarpaceae	*Shorea*	*seminis*	CR	-	Schedule 2	-
2	Dipterocarpaceae	*Shorea*	*inaequilateralis*	CR	-	-	√
3	Thymelaeaceae	*Aquilaria*	*malaccensis*	CR	II	Schedule 2	
4	Dipterocarpaceae	*Parashorea*	*lucida*	CR			
5	Dipterocarpaceae	*Shorea*	*almon*	CR			
6	Dipterocarpaceae	*Shorea*	*peltata*	CR			
7	Dipterocarpaceae	*Shorea*	*seminis*	CR		Schedule 2	
8	Dipterocarpaceae	*Shorea*	*stenoptera*	EN		Schedule 2	*
9	Dipterocarpaceae	*Dryobalanops*	*rappa*	EN	-	-	√
10	Araliaceae	*Macropanax*	*concinnus*	VU	-	-	-
11	Malvaceae	*Durio*	*kutejensis*	VU			*
12	Dipterocarpaceae	*Shorea*	*macrophylla*	VU	-	Schedule 2	√
13	Anisophylleaceae	*Combretocarpus*	*rotundatus*	VU			
14	Dipterocarpaceae	*Dipterocarpus*	*gracilis*	VU			
15	Lauraceae	*Eusideroxylon*	*zwageri*	VU			
16	Anacardiaceae	*Mangifera*	*rufocostata*	VU			
17	Lauraceae	*Dehaasia*	*firma*	-	-	-	√
18	Ebenaceae	*Diospyros*	*ferox*	-	-	-	√
19	Moraceae	*Ficus*	*uncinata*	-	-	Schedule 2	√
20	Euphorbiaceae	*Macaranga*	*costulata*	-	-	-	√
21	Polygalaceae	*Xanthophyllum*	*neglectum*	-	-	-	√
22	Euphorbiaceae	*Macaranga*	*pearsonii*	LC			*
23	Malvaceae	*Pentace*	*laxiflora*	LC			*
24	Myrtaceae	*Syzygium*	*tawahense*	LC	-	-	√
25	Phyllanthaceae	*Baccaurea*	*angulata*				*
26	Elaeocarpaceae	*Elaeocarpus*	*cupreus*				*
27	Myristicaceae	*Gymnacranthera*	*ocellata*				*
28	Clusiaceae	*Mammea*	*acuminata*				*
29	Sapotaceae	*Palaquium*	*sericeum*				*
30	Melastomataceae	*Pternandra*	*cogniauxii*				*
31	Achariaceae	*Ryparosa*	*kostermansii*				*
32	Anacardiaceae	*Semecarpus*	*glaucus*				*
33	Dipterocarpaceae	*Shorea*	*beccariana*				*
34	Dipterocarpaceae	*Shorea*	*pinanga*			Schedule 2	*
35	Myrtaceae	*Syzygium*	*havilandii*				*
36	Dipterocarpaceae	*Vatica*	*micrantha*				*
37	Polygalaceae	*Xanthophyllum*	*resupinatum*				*

Conservation of Species – Fauna

Table 9.2 below is a list of fauna RTE and endemic species that are commonly known to be present in the Belaga region.

Table 9.2: List of Fauna RTE and Endemic Species Known in the Region

No	Group	Family	Scientific name	English name	Malay name	CITES	IUCN	Sarawak (Wildlife Protection Ordinance 1998)	End	Res/Mig
1	Mammal	Manidae	*Manis javanica*	Sunda Pangolin	Tenggiling	I	CR	P		BR
2	Mammal	Hylobatidae	*Hylobates funereus*	North Borneo Gibbon	Kelempiau	I	EN	TP	B	BR
3	Mammal	Cercopithecidae	*Nasalis larvatus*	Proboscis Monkey	Bekantan	I	EN	TP	B	BR
4	Dragonflies	Gomphidae	*Ictinogomphus acutus*	Tigertails			VU			BR
5	Mammal	Cercopithecidae	*Macaca nemestrina*	Pig-tail macaque	Beruk	II	VU	P		BR
6	Bird	Picidae	*Mulleripicus pulverulentus*	Great Slaty Woodpecker	Belatuk Kelabu		VU	P		BR
7	Bird	Accipitridae	*Nisaetus nanus*	Wallace's Hawk-Eagle	Helang Selat	II	VU	P		BR
8	Bird	Psittacidae	*Psittacula longicauda*	Long Tailed Parakeet	Betet ekor-panjang	II	VU	P		BR
9	Mammal	Cervidae	*Rusa unicolor*	Sambar deer	Payau/ Rusa		VU			BR
10	Reptile	Crocodylidae	*Tomistoma schlegelii*	False Gharial	Buaya Jujulong	I	VU	P		BR
11	Mammal	Suidae	*Sus barbatus*	Bearded pig	Babi hutan	VU	A2cd Ver 3.1			BR
12	Bird	Bucerotidae	*Anthracoceros malayanus*	Black Hornbill	Kekek	VU	A2cd+3cd+4cd ver 3.1	TP	G	BR
13	Reptile	Scincidae	*Dasia vittata*	Borneo Skink			LC		B	BR
14	Bird	Estrildidae	*Lonchura fuscans*	Dusky Munia	Bondol kalimantan		LC		B	BR
15	Bird	Timaliidae	*Mixornis bornensis*	Bold-striped Tit-babbler	Ciung-air coreng		LC		B	BR
16	Bird	Corvidae	*Platysmurus aterrimus*	Bornean black Magpie	Tangkar kambing		LC		B	BR

9.2 Rehabilitation Frame. – A Tentative Flow Chart

Flow Chart 9.1 shows tentative steps in developing a forest rehabilitation programme for the Belaga recovery site.

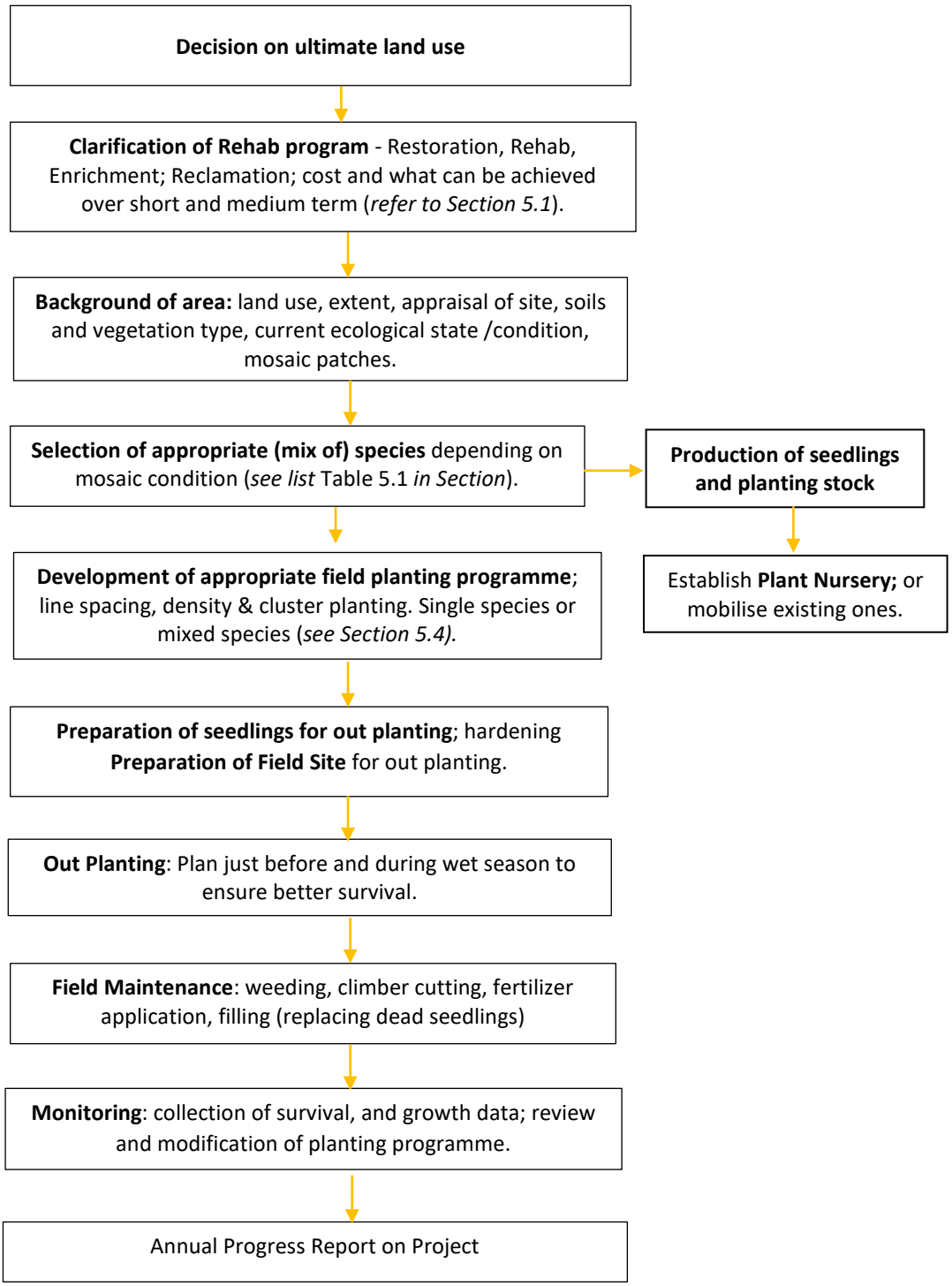

Chart 9.1 : Flow chart of steps to carry rehabilitation in Recovery Site.

9.2.1 Important Considerations when Rehabilitating Degraded Forests

When considering rehabilitating the disturbed areas, the nature and history of disturbance and state of natural recovery should be considered. In more open areas of the shifting cultivation cycle, plants that are tolerant of open conditions should be considered instead of primary forest species such as Dipterocarps, which are usually less tolerant of open conditions. When areas are well on the road to recovery, and the micro-climate on the forest floor is equitable, it would be pointless to plant early pioneer species that are light demanding and shade intolerant. In logged over areas, the choice of the exact location of planting is important as compacted soils on logging roads and log yards can seriously affect seedling survival and growth. Planting methods may also have to be modified for such areas. Tilling or digging planting holes, and the use of organic mulch and fertilizers may have to be considered to ensure that seedlings can survive and grow, all of which will incur additional cost.

> *Lamb (2003) describes options for rehabilitating degraded forests. He considers ecological restoration as difficult to achieve and considers rehabilitation as a more practical and achievable option, in which some of the original productivity and biodiversity may be recovered. He also listed three levels of rehabilitation – reclamation (to recover productivity but little of the biodiversity), rehabilitation (to recover productivity and the biodiversity) and restoration (where structure, productivity and biodiversity is targeted for recovery).*

There are numerous approaches to re-establishing forests from degraded areas. At the extreme end of **restoration** of forests, one attempts to restore as much of the natural features of the forest as possible to almost its original state (wrt structure and function, biodiversity of species, micro-climate, etc.). This is probably not achievable in the short term (less than 10 years), as a natural forest stand is species diverse, generally uneven-aged, multi-storied and self-regenerating. Whereas any restoration effort will initially result in a fairly even aged stand and not achieve the multi-storied affect until natural regeneration of seedlings has taken place. Further, it is exceedingly difficult, if not impossible, to re-establish the diverse species of shrubs, herbs, palms and to plant all the species in the different strata of the forest. Restoration is an expensive exercise and may not be feasible over large areas (*see the UPMKB/ Mitsubishi Project in Bintulu*) and takes a long time.

Rehabilitation is a less intensive approach, that often retains the existing state of the degraded forest and encouraging the regeneration of selected tree species either by **silvicultural treatment** (like removal of climbers and weed species) or by planting selected species, usually timber species, to promote the recovery of the natural forest stand. Silviculture is preferred by foresters as it is least expensive and exploits the natural ability of forests to recover. In areas where the stand still has sufficient large sized trees (at least over 30 trees- often commercial, timber species, with dbh above 30 cm), the area is usually left to recover by itself. In areas where the stand is poor (low number of big trees remaining in the area) **enrichment planting** using timber species is often used by foresters together with some form of treatment such as removal or thinning of non-commercial species, to promote the recovery of the timber value of stands. For long term objectives beyond timber values, a more intensive rehabilitation programme can be undertaken, involving the use of more diverse species (fruit bearing and useful for wildlife) and additional management inputs (such as weeding and addition of fertilisers). This is sometimes referred to as **enhanced natural regeneration (ENR)**but is still less expensive than restoration as it usually involves relatively less species and less intensive management efforts. While the resulting forest could be less diverse, the structure and function of

the forest could almost resemble that of the natural primary forest being multi-storied and having a fairly closed canopy and a moderated micro-climate within the forest.

Reclamation is often undertaken when the area is severely impacted such as when an area is mined for minerals or coal. The topsoil is usually lost or taken away and the natural horizontal structure of the soil is also destroyed. Reclamation can be in the form of 'benign neglect' where areas can be left as 'deserts' with bare soil and natural succession allowed to occur at its own pace which can be very, very slow if the area is left with nutrient deficient sandy soil – such as an ex-mining area. Often such areas are converted to other uses such as recreation areas with some input such as landscaping and tree planting. Intensive tree planting can also be pursued with many inputs – intensive planting of species such as *Acacias* and other legumes that can help build up nitrogen levels, soil organic matter and improve micro-climate conditions which could assist the growth of other species. (*See efforts by FRIM in Tapah/ Bidor area*). Thus, reclamation efforts can be low cost or high cost depending on the inputs into the degraded area.

9.2.2 List of tree species that are commonly used for restoration planting.

The following Table 9.3 provides a list of species that are commonly used for various rehabilitation projects in Malaysia and Indonesia. The table also shows the succession stage that the species 'prefer' and are commonly found in. The early succession stage species have a tolerance of open and exposed conditions, while late succession species prefer shade conditions when they are young. Fruit trees are also included as food plants for wildlife which can also help in bringing in additional species of trees.

Table 9.3: Tree species that are commonly used for rehab/ restoration planting.

No	Species	Common Name	Family	Succession
1	*Anthocephalus morindoefolius*	Kelampayan	Rubiaceae	Early
2	*Azadirachta excelsa*	Sentang	Meliaceae	Early
3	*Tristaniopsis whiteana*	Selunsor	Myrtaceae	Early
4	*Duabanga moluccana*	Sawi	Rhizophoraceae	Early
5	*Octomeles sumatrana*	Binuang	Tetramelaceae	Early
6	*Paraserianthes falcataria*	Kayu Machis	Leguminosae	Early
7	*Macaranga* spp	Binua	Euphorbiaceae	Early
8	*Cratoxylon arborescens*	Geronggang	Hypericaceae	Mid
9	*Dyera costulata*	Jelutong	Apocynaceae	Mid
10	*Durio zibethinus*	Durian	Malvaceae	Mid
11	*Ficus* spp	Ara	Moraceae	Mid
12	*Artocarpus* spp	Terap, Chempedak, Nangka	Moraceae	Mid
13	*Aquilaria beccariana*	Gaharu	Thymelaeaceae	Mid
14	*Gmelina* sp		Lamiaceae	Mid
15	*Peronema* sp	Sungkai	Lamiaceae	Mid
16	*Nephelium* spp	Rambutan	Sapindaceae	Mid
17	*Pometia* sp		Sapindaceae	Mid
18	*Lepisanthes*		Sapindaceae	Mid
19	*Shorea macrophylla*	Engkabang Jantung	Dipterocarpaceae	Late
20	*Shorea pinanga*	Engkabang Bintang	Dipterocarpaceae	Late
21	*Shorea beccariana*	Engkabang Lenggai	Dipterocarpaceae	Late
22	*Dryobalanops beccarii*	Kapur Bukit	Dipterocarpaceae	Late

No	Species	Common Name	Family	Succession
23	*Hopea*		Dipterocarpaceae	Late
24	*Intsia*		Leguminosae	Late
25	*Litsea*		Fagaceae	Late
26	*Lophopetalum multinervum*	Perupok	Celestraceae	Late
27	*Combretocarpus rotundatus*	Perepat	Anisophyllaceae	Late
28	*Garcinia* spp		Clusiaceae	Late
29	*Horsfieldia*		Myristicaceae	Late

The use of fruit trees can be beneficial to the local community as well as to wildlife species. Understorey species of shrubs and herbs should also be considered to improve the biological diversity of plant species as well as encourage the diversity of invertebrates and subsequently the diversity of vertebrates.

9.2.3 Additional Notes on Sections of Rehabilitation of Degraded Forest Stands.

Objectives of rehabilitation / restoration: overall objective and secondary/ supplementary objectives; re-establishing natural forest cover and biodiversity; increasing carbon sequestration. This is to compensate for clearing of potential HCS under the NDPE policy commitment.

Benefits of project: benefits of the rehab project – restoration of tree cover, reduction of soil erosion and soil loss; improving micro-climate and conservation of nutrients within the system; improving habitat and food resources for wildlife; leading to recovery of wildlife and biodiversity in general.

Approach to rehabilitation and restoration: short-term and immediate improvement via rehabilitation and leading to long-term restoration of forest natural to the area. Enrichment planting vs rehabilitation or restoration vs *enhanced* natural regeneration vs altered /diverted succession (other species- or plantations for timber or other products (rubber, durians, et c)

Preliminary Assessment of area/ location and degradation that has occurred: Get aerial photos or images of area. Determine extent of each category of disturbance; map of disturbance categories; tentatively 4 categories at the start –

- **cleared and open areas**,
- **early succession with pioneer species and shrubs** (stands below 10 m in height); canopy often fairly uniform wrt crown size and height (texture)
- **mid-late succession** with more trees (over 50 -100 trees/ ha?) with fairly closed canopy at ground level, and some opening above 20 m. view of canopy from above show small to moderate sized crowns of canopies and variable heights.
- **and late succession** with stand height over 30 m; with numerous trees with dbh over 30 cm; crowns of trees can be large and sometimes appear as emergents. Species mainly from primary forest such as Dipterocarps, Anacardiaceae, Leguminosae, Malvaceae and Burseraceae.

Field Assessment of sites of different categories; at least 4 to 6 sites/ sample plots to collect field data on existing types of vegetation and state of degradation; intensity of degradation (above categories – in term of no of stems remaining, sizes of stems remaining, species of plants found on site (dominant and ecological type (primary, mid succession or pioneer or just shrubs and climbers and herbs – grasses, sedges, ferns). Photos showing area and canopy opening at eye level and canopy opening from above (from drone images). Plot size can be 20m x 20m for the first 3 categories and 30m x 30m for the late succession category.
As an additional 'reference point', two 30m x 30m plots could be assessed in any nearby primary forest if they can be found.

Activities for initiating project:

- Planning: establishing partners in project.
- establishing targets for various phases – Gantt chart and various components or sections of project.
- Desktop assessment from available data and drone images.
- Generate preliminary maps of site based on disturbance categories.

Implementation:

- Field assessment; data compilation and analysis; generation of maps; and extents of different categories of degradation/ disturbance
- Developing Gantt chart of rehab programme; at least for 5 years and one for longer extent; need to set realistic targets, based on availability of planting materials, preparation of field sites for planting and manpower,
- Establishment of nursery and collection of planting materials; choice of species, appropriate for different categories of degraded state; estimation of requirements for each category of rehab or restoration areas; number of species; number of seedlings required; production rates (no per period, to tie up with field site preparation. Diversity of species for each site should be targeted.
- Determine density of planting and pattern of planting in each existing vegetation category.
- Estimation of staff required for office, nursery, and field work.
- Estimate cost of various items.

Nursery operations:

- Set-up of nursery: to be located in an area with gentle slope for sufficient drainage; basic facilities and equipment for plant production; ensure adequate supply of water.
- Areas / sections in the nursery: Sheds for storage of soil, fertilizers, chemicals, and equipment; beds for germination and vegetative propagation; usually covered; areas for keeping seedlings under shade and other areas with partial shade and other areas in the open. Areas for mixing soils and preparation of potting mix and planting of seedlings (can be quite extensive).
- Sufficient shade areas for storage of seedlings; open areas for hardening prior to out-planting,
- Areas for storing and preparing agrochemicals and pesticides and storage of related equipment.
- Seedlings to be planted out should be between 50 to 100 cm height; and planting should be at the end of the dry season/ beginning of the wet season to ensure seedling get sufficient rain for survival and growth.

Field operations: (Field planting procedures)

Planting usually take place at intervals along lines that are spaced out from a 3 or 4 m apart. The intervals between spots along the line can be 2 0r 3 m apart or more depending on how rapidly a vegetated cover needs to be established. In enrichment planting, the spacing between lines can be up to 10 m, while the distance between the planting spots along the line can be up to 3 to 5 m apart. A 3 m distance between planting points and a 10 m distance between lines should give a planting density of about 330 trees per ha (10,000/(3x10). At closer spacings, higher densities can be achieved. In rehabilitation programmes, the existing natural regeneration is usually considered, so the there is no need to plant like in a tree plantation setting of 3m by 3 m or 3m by 4 m spacing. At each planting point up to 3 or 4 seedlings can be planted. In tree plantations, the trees will be thinned out when they reach certain sizes, but in rehabilitation programmes, no thinning will be considered – it is assumed that the stands will thin out naturally. Important equipment and activities:

- Tractors and excavators; trailers for transporting materials and seedling to field for planting, equipment for clearing of vegetation- hoe, *parang*, auger, tapes (30, 50 and 5 m) and compasses,
- Usually, fertilisers and rock phosphate are applied when planting with no other follow-up treatments, except some regular weeding to remove climbers and weeds that shade the seedlings to ensure sufficient sun for proper growth.

Field Maintenance and monitoring

Field maintenance includes regular weeding (and climber cutting) and refilling or replacement of any dead seedlings. This requires regular field visits to monitor conditions of seedling and growth. In disturbed sites, weeds and climbers can be serious problems by out competing the seedlings for light and nutrients and also strangling the seedlings. Fertiliser application can also be considered depending on the soil condition. Weeding and monitoring should be done quarterly (every 3 months).

Monitoring, maintenance, and supplementary planting form a continuous feedback loop to ensure the success of the rehabilitation project.

- Initially, it will be mainly control of weeds and climbers that may strangle / choke seedlings and removal of any other plants that may excessively shade the seedlings and stunt growth. Subsequent maintenance could include fertilizer application and pruning or even culling of other seedlings in the cluster.
- Regular monitoring for mortality, survival, and growth of seedlings; initially note health and condition of seedlings; later to take measurements of heights and also diameters of stem. Each point should be numbered or identified so that maintenance activities can be recorded, and performance of seedlings noted.
- Filling or replacement of dead seedlings.
- Monitoring cost of project

Developing SOPs:

- For various activities, esp. in the nursery where safety is important as heavy and dangerous equipment and chemicals are used.
- Proper handling of materials (solids and chemicals) and their disposal is important to prevent environmental pollution and soil erosion.
- SOPs for handling seeds and wildlings are also important to reduce mortality and losses.
- Monitoring for pests and diseases is also important as with large numbers of similar species, spread of pests and diseases can occur very rapidly.
- Develop Gantt Chart for project.