

CONSERVATION OF THE SOUTHEAST PORTION OF NORTH SELANGOR PEAT SWAMP FOREST
PHASE 1 - BUKIT BELATA (EXT.) FOREST RESERVE PROJECT
Summary Progress Report March-September 2020

1. Introduction

The Global Environment Centre (GEC), a Malaysian non-profit organisation with expertise in peatland conservation, and Prosper Oil Palm (Prosper), a Malaysian oil palm company, signed an Agreement in March 2020 to support the conservation of the Southeast portion of the 81,000ha North Selangor Peat Swamp Forest (NSPSF), which is the largest contiguous peat swamp forest in Peninsular Malaysia. Phase 1 of the project (2020-2023) is focused on Bukit Belata (Ext.) Forest Reserve (BBEFR), which covers 3,140 ha (see Figure 1). It has been designed by Prosper as part of its Recovery Plan. The work is undertaken in the framework of the MOU between GEC and the Selangor State Government, which has facilitated joint forest conservation actions in NSPSF since 2010. GEC formally notified the Selangor State Forestry Department (SSFD) in April 2020 and subsequently secured necessary approvals for surveys, rehabilitation and joint actions. Even though the Agreement with Prosper was signed during the Malaysian Movement Control order (MCO) period, special permission was obtained from the authorities (Forestry Department and Police) to undertake initial work. As a result, many of the planned activities were successfully undertaken from March until September 2020, as described in the following sections.

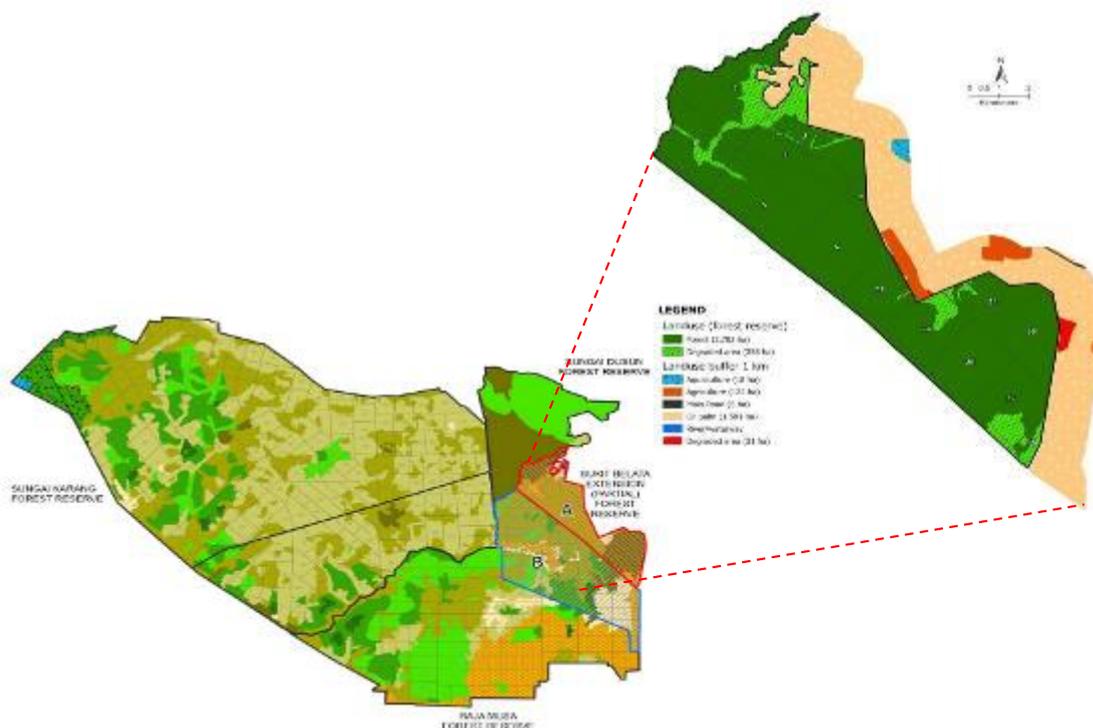


Figure 1. The location and land cover of BBEFR in the southeast portion of the NSPSF

2. Assessments at Bukit Belata (Ext.) Forest Reserve

Field surveys were carried out in March, April and June 2020 at FC 2, 3, 4, 7, 23, 24, 25, 35, 37 and 38, respectively. The surveys were focused on identifying access points to the forest compartments, degraded sites, on-going anthropogenic activities, existing drainage canals, aerial mapping of land use, canals and peat depths as well as assessments on water quality, plants and fish along the boundary of forest compartments. During the field surveys, degraded sites that need to be rehabilitated with rewetting, replanting and natural regeneration were identified. In accordance with the NSPSF's Integrated Management Plan (IMP), the findings of the current and on-going surveys will be used to supplement the development of appropriate strategies to monitor, manage and protect the peatland forests and biodiversity from further threats.



Oil palm with drainage adjacent to the FC 25 affecting peatland water levels.



Area of FC 23 that was formerly flooded due to blockage of drainage by smallholders in buffer zone.



Poorly managed drainage and former log extraction canals at FC 2



Cleared and degraded area in FC 3 that need to be restored with rewetting and revegetation.



Fire affected area adjacent to FC 25 that need to be controlled to prevent fire spread into forest.



The flooded conditions of the oil palm plantations adjacent to FC 2, 3 and 24 due to peat subsidence and poor water management.

Figure 2. Field observations of land use at different forest compartments (FC) of BBEFR

3. Land use, peat depth, drainage canals and hotspots in Bukit Belata (Ext.) Forest Reserve

Remote sensing analysis using satellite image time series (sources: Google earth, Landsat, 4,5,7 & 8 and Sentinel 2), aerial and ground assessments were conducted to identify the type of land uses, peat depth distribution and fire hotspot clusters over nine years in BBEFR. The following are the initial findings

which will be used in the implementation of rehabilitation strategies in BBEFR in collaboration with SSFD.

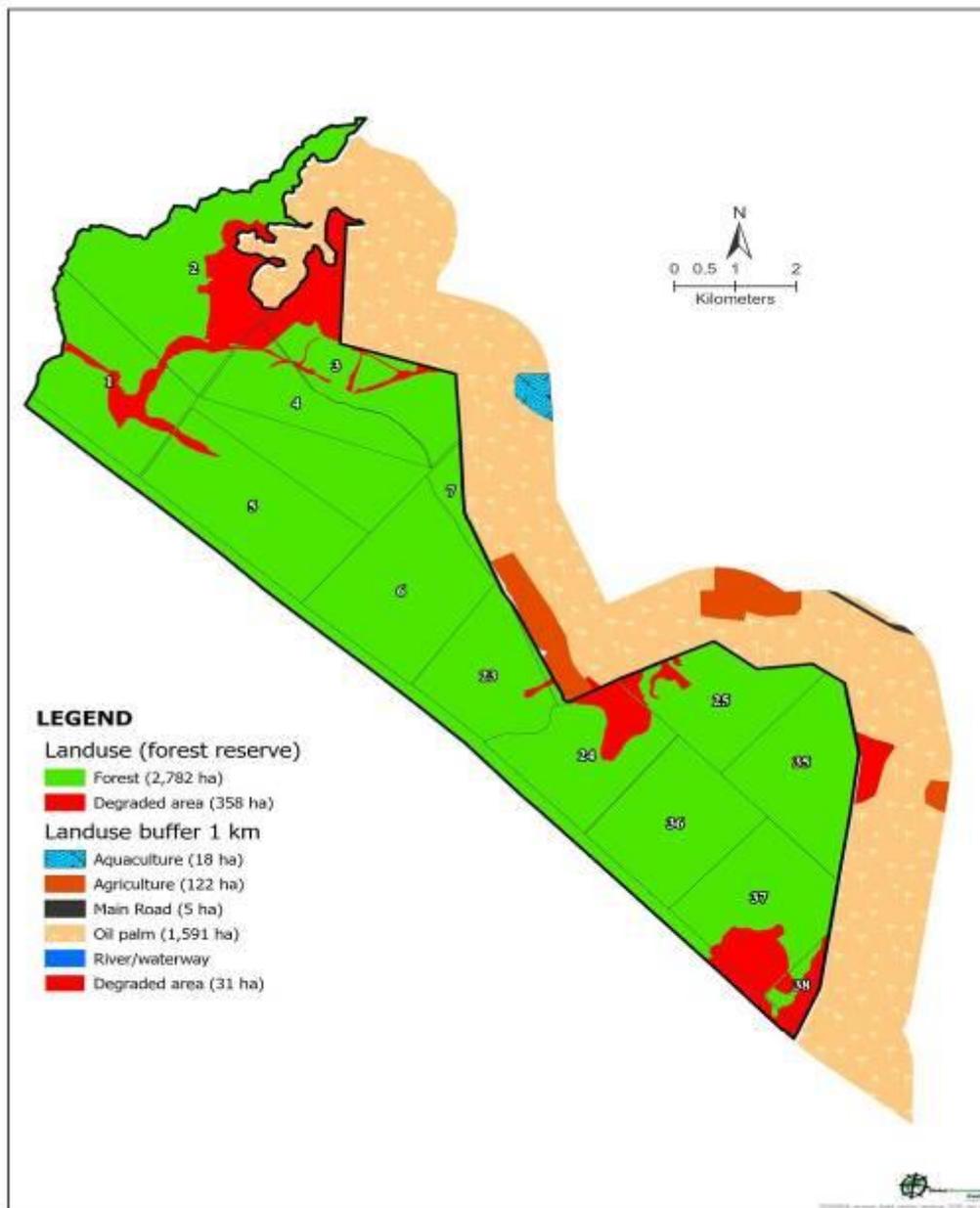


Figure 3. Initial landuse analysis of Bukit Belata (Ext.) Forest Reserve

BBEFR covers an area of 3,140 ha of lowland and peat swamp forest. Among this, 2,782 ha is still forested whereas the remaining 358 ha comprised of degraded land. Within 1 km of land use buffer, oil palm plantations (1,591 ha) cover the major portion of the buffer, followed by residential (122ha) and degraded areas (31ha).

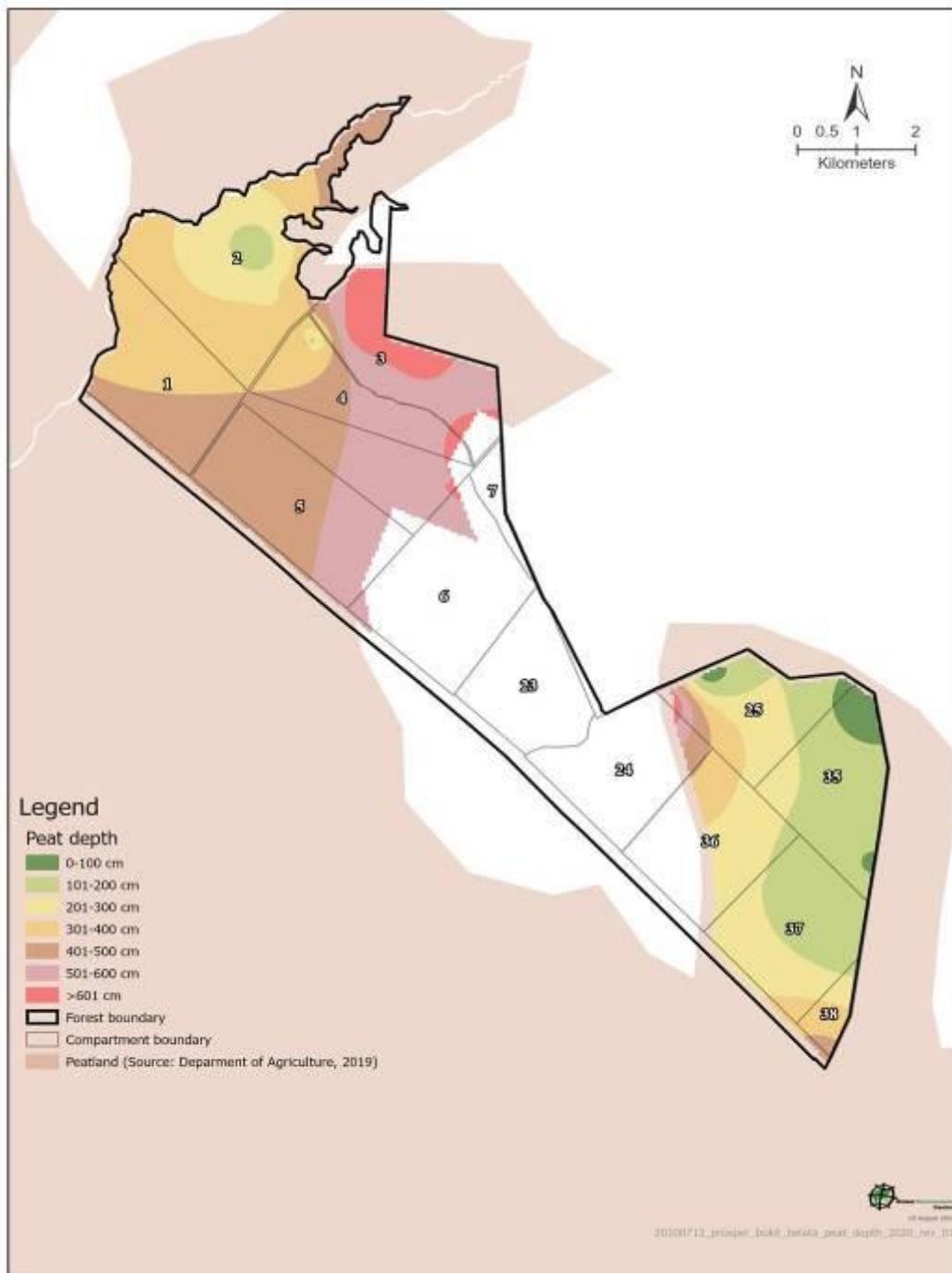


Figure 4. Preliminary map of peat depth in Bukit Belata (Ext.) Forest Reserve

Peat depth assessments were undertaken at eighteen locations within FC 2, 3, 4, 7, 25, 35, 37 and 38 and revealed peat depths ranging from 0.6 m to more than 6.8 m. Deeper peats, particularly the one exceeding 6.8 m were mostly recorded along the forest boundary (Figure 4). A network of 32km of drainage canals is present in the forest as illustrated in Figure 5. These were developed for earlier logging and agricultural drainage to drain water from the peat, leading to peat subsidence and higher risk of forest fires. Water samples collected from different locations for the selected perimeter canals

indicated pH within the range of 5.23 and 6.36, which was higher compared to the normal peat water (3.5 in average). This can be attributed to the leaching of cations during irrigation or drainage of peat water, usage of anion-rich fertilizers as well as cation uptake by the crops adjacent to the BBEFR. Therefore, restoring the hydrology of the area and Best Management Practices (BMPs) in agriculture were essential to reduce fire risks while supporting natural regeneration and conservation of the peatland ecosystem. On top of that, most of the fire hotspot clusters over the last seven years (2012-2018) in BBEFR were concentrated along the drainage canals and the boundary of perimeter canals. The hotspots were also concentrated at the degraded forest sites. Therefore, restoring the hydrology of the area via canal blocking and rewetting is essential to reduce fire risks while supporting natural regeneration of the forest. Meanwhile, forest rehabilitation and fire prevention activities are pivotal to restore the peatland ecosystem of the degraded areas, which are likely to lead to enhanced carbon storage and biodiversity conservation.

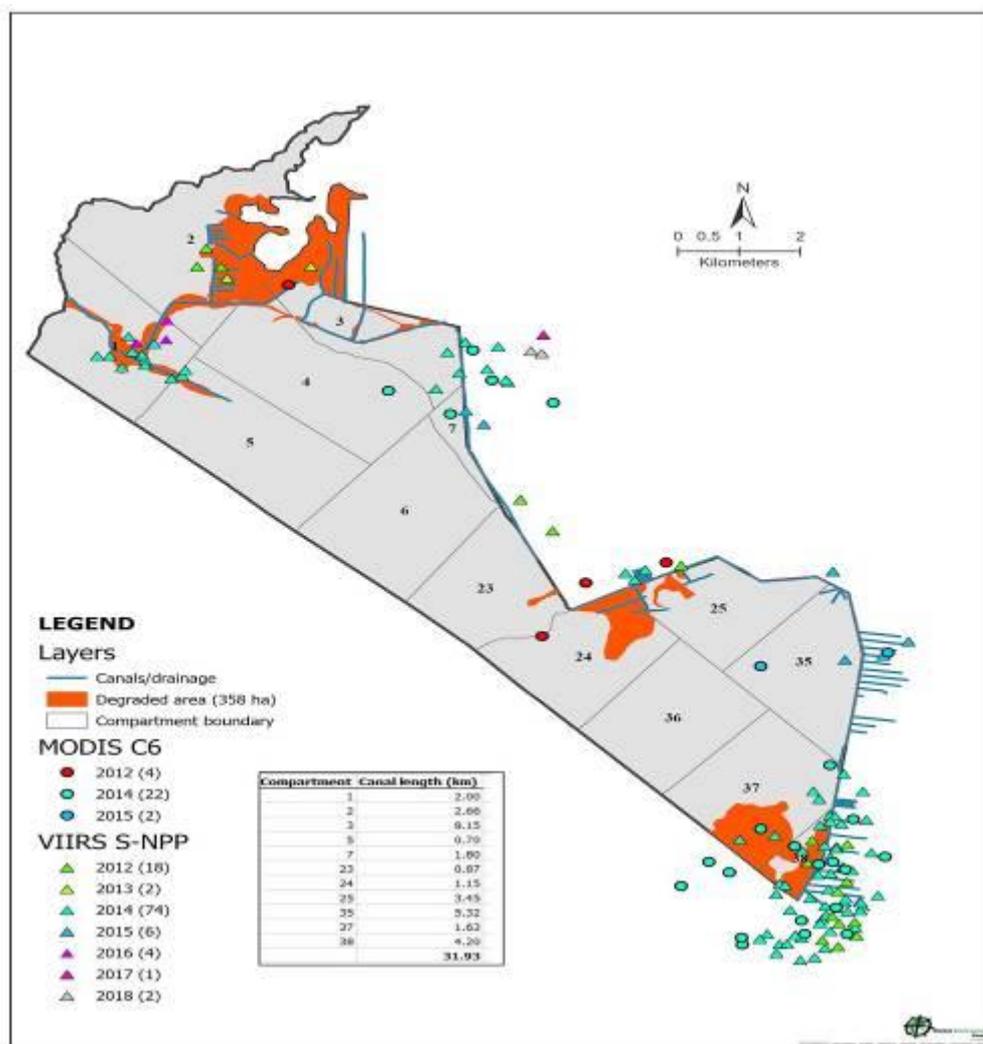


Figure 5. Fire Hotspot clusters over seven years (2012-2018) in relation to drainage canals and degraded land in Bukit Belata (Ext.) Forest Reserve

4. Biodiversity assessments: flora, fish, insects and wildlife monitoring at Bukit Belata (Ext.) Forest Reserve

A rapid flora survey (tree and non-tree species survey) were conducted along the boundary of the forest compartments via random sampling method at BBEFR. Throughout the survey, about 16 tree species and 12 non-tree species were found along the boundary of the forest compartments. Being a preliminary assessment, Myrtaceae was one of the family recorded more number of species, especially in FC 3. Meanwhile, species from Apocynaceae, Dipterocarpaceae, Elaeocarpaceae, Guttiferae and Rubiaceae family were the least found along the boundary of the forest compartments. The presence of Euphorbiaceae such as *Macaranga pruinosa* and *Macaranga giganteae* in almost all the degraded and encroached sites of the forest compartments indicated the regeneration status of the secondary forests. On the other hand, fish assessments were conducted at the perimeter canals of the forest compartments at BBEFR. There were 15 fish species identified at BBEFR. It was noteworthy that the species known as *Betta livida* that was listed as 'endangered' by the IUCN Red List of Threatened Species was also found at BBEFR. Meanwhile, one endemic species to the state of Selangor, known as *Paedocypris sp.* 'North Selangor', one of the world's smallest vertebrates was also encountered in FC 35 and 37.

Assessments of insects (invertebrates) highlighted ten species of insects, which mainly comprised of Libellulidae and Papilionidae families. Essentially, the presence of Libellulidae insects (dragonfly) can be considered as a bio-indicator that reflects good quality of the water at the forested areas. Wildlife footages from FC 3 and 25 revealed wild boars (*Sus scrofa vittatus*) as one of the common fauna that present in big numbers in the forest compartments. Meanwhile, the presence of Malayan sun bears (*Helarctos malayanus*) with their claw marks occasionally discovered on many trees in both forest compartments. Rated as vulnerable by IUCN, sun bears are a keystone species that play many important ecological roles in the forest ecosystem such as excellent seed dispersers. Besides, endangered species such as southern pig-tailed macaque (*Macaca nemestrina*) and Malayan tapir (*Tapirus indicus*) were also encountered in FC 3. Small mammals such as mouse deer (*Tragulus kanchil*) and rodents such as slender squirrel (*Sundasciurus tenuis*) and Malayan field rat (*Rattus tiomanicus*) were among the most observed species in the camera trap stations. These small mammal faunae are a good source of prey for small carnivorous predators. It should be noted that the current biodiversity assessments were subjected to limited timeframe and study locations. Meantime, extensive surveys were essential to reveal more species of conservation priority.



Paedocypris sp. 'Noth Selangor', one of the world's smallest vertebrates and endemic species to the state of Selangor



Betta livida, an 'endangered' an endemic species found at BBEFR



Malayan sun bear (*Helarctos malayanus*), an endangered species feasting on stingless bee colony



An endangered herbivore, *Tapirus indicus*, encountered in BBEFR



Diverse species of Libellulidae as bio-indicators reflect good quality of the water at the forested areas



The abundance of trees such as *Macaranga pruinosa* and *Mallotus macrostachyus* are a sign of forest regeneration.

Figure 6. Selected pictures of biodiversity assessments at Bukit Belata (Ext.)

5. Project monitoring session and field visit to FC 25 and 38 of Bukit Belata (Ext.) Forest Reserve (BBEFR) by Prosper team

Project-monitoring visits to FC 25 and 38 of BBEFR were organized on 26 August 2020 to provide the Prosper team members with an exposure on the nature of BBEFR and selected types of rehabilitation activities (e.g. canal blocks, tree planting and regular patrolling and monitoring) as described in the recovery plan. The visits were attended by Prosper team members and accompanied by officers from Global Environment Centre, representatives from the SSFD and a local patroller from Sahabat Hutan Gambut Selangor Utara (SHGSU). Prior to the visits, a briefing session was conducted at Ladang Prosper Tagar 3 to present the current condition of the forest compartments and the initial findings of the field assessments as described in section 3 and 4. During the visits, peat depth measurements and water table monitoring were demonstrated at FC 38 to provide an understanding of peat soil properties, peat hydrology and ecosystem services. Later on, site visits to FC 82 (Raja Musa Forest Reserve) were conducted to showcase the existing planting sites, canal blocks and on-going maintenance activities at the planted sites. After that, the team was brought to FC 25 to see the current conditions of another selected rehabilitation site and on-going rehabilitation initiatives by SSFD. During the visit, the Prosper team members were also managed to see the claw marks, footprints, droppings and abandoned nests of sun bears and tapir along the trail towards the selected planting sites.



Briefing on the conditions of the peatland, water tables and canal block construction

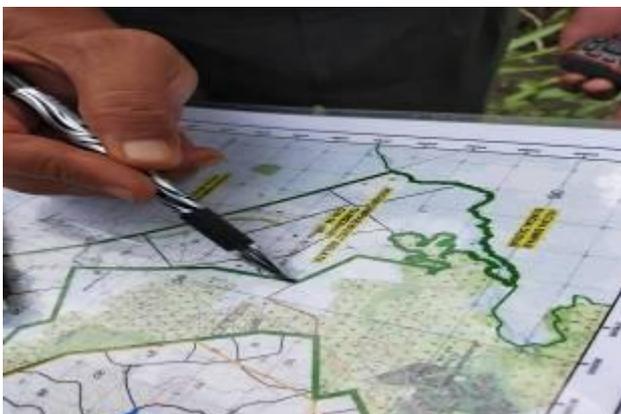


Group photo session with the Proposer team, representatives from SSFD and GEC officers.

Figure 7. Selected pictures of project monitoring session and field visit to FC 25 and 38 of Bukit Belata (Ext.) Forest Reserve (BBEFR) by Prosper team

6. Forest boundary demarcation at Bukit Belata (Ext.) Forest Reserve

Forest boundary demarcation surveys were conducted in association with SSFD from July to September 2020 at BBEFR covering the forest compartments such as FC 2, 3, 4, 7, 23, 24, 25, 35, 37 and 38, respectively. Initial observations and land use assessment at BBEFR by GEC revealed active encroachments into the forest reserve by the local settlers and small holders for the agricultural activities. During the surveys, the exact boundary of BBEFR was identified and marked with the boundary poles to indicate the permanent reserved forest. Such initiative provides a reminder to any potential encroachers and hunters on the status of the protected forest reserve while restricting the use of forestlands at a rate that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil the relevant ecological, economic and social functions at the local levels. Besides, these surveys also help GEC and SSFD to determine degraded and encroachment areas at the forest reserves to plan for the appropriate rehabilitation programmes at BBEFR.



Identification of the exact boundary of BBEFR



Installation of the boundary poles to indicate the forest reserves.

Figure 8. Forest boundary demarcation at Bukit Belata (Ext.) Forest Reserve

7. Piezometer installation at FC 25 and 38 of Bukit Belata (Ext.) Forest Reserve

Two (2) units of piezometers were installed at each FC 25 and 38 to monitor the water tables. In particular, one piezometer was installed inside the forested area and another piezometer was installed at the buffer zone at both forest compartments. Besides illustrating the existing water tables of the sites, these piezometers were deemed essential tools to monitor the improvisation of the water levels at the peat land upon the completion of the rehabilitation activities such as canal blocks.



Figure 9. The installation of 4 units of piezometers at FC 25 and 38 of Bukit Belata (Ext.) Forest Reserve

8. Introductory meeting with Penghulu Mukim Hulu Bernam Utara (Head of Hulu Bernam Sub-district), Felda managers, 'Ketua Peneroka' and other associates from Felda Sungai Tengi, Felda Sungai Tengi Selatan, Felda Soeharto and Felda Gedangsa

An introductory meeting with Penghulu Mukim Hulu Bernam Utara, Felda managers, 'Ketua Peneroka' and other associates from Felda Sungai Tengi, Felda Sungai Tengi Selatan, Felda Soeharto and Felda Gedangsa was conducted on 11 September 2020 at Pejabat Jawatankuasa Kemajuan dan Keselamatan Rancangan (JKKR), Felda Sungai Tengi Selatan. The main purpose of the meeting was to share the forest rehabilitation and conservation initiatives of GEC at North Selangor Peat Swamp Forests, to introduce the recovery project at BBEFR as well as to acquire support to form a community group at Felda Sungai Tengi Selatan to undertake forest patrolling and monitoring activities at BBEFR. The Penghulu has agreed and suggested that the community group to be formed with 15 community representatives from each Felda Sungai Tengi and Felda Sungai Tengi Selatan for the initial stage. At the same time, the next coordination meeting will be conducted once the 30 community representatives from Felda Sungai Tengi and Felda Sungai Tengi Selatan were successfully recruited to participate in the community group. This meeting will describe the process of forming, trainings, planned activities and registering (if required) the Felda community group in the Registrar of Societies (ROS), Selangor.



The introductory meeting: presentation session and discussion with the Penghulu of Mukim Hulu Bemam, Felda managers and others



Group photo session with the attendees of the meeting

Figure 10. The introductory meeting with the Penghulu of Mukim Hulu Bernam, Felda managers and other associates

9. Main activities to be completed in the remainder of 2020 to mid of 2021

The following activities will be implemented in the remainder of 2020 (October - December 2020) and to mid-2021 (January - June 2021):

- a) Conduct seven (7) ha of tree planting activities at the degraded and ex-burnt sites of FC 24 and 25, BBEFR
- b) Installation of Permanent Reserved Forest (PRF) signboards and Fire Danger Rating System (FDRS) boards along the boundary of BBEFR
- c) Installation of another 16 units of piezometers in selected sites of BBEFR to undertake water table monitoring at the forested sites and buffer zones
- d) 20 blocks will be placed in the existing drainage canals in and adjacent to BBEFR
- e) Formation of a community group at Felda Sungai Tengi Selatan to undertake community-based forest patrolling, monitoring and conservation activities at the degraded areas of BBEFR
- f) Undertake dialogues with the smallholders near BBEFR to enhance their understanding on the risks from poor peatland management, including subsidence and fire risks.
- g) Promote Malaysian Good Agriculture Practices (MyGAP), Malaysian Sustainable Palm Oil Standard (MSPO) and Roundtable on Sustainable Palm Oil (RSPO) BMP Manuals to the smallholders to engage with sustainable management of peatland for agricultural practices
- h) Explore options for collaboration with the local communities and other land managers to organize patrols to monitor and prevent fire incidences and encroachment issues