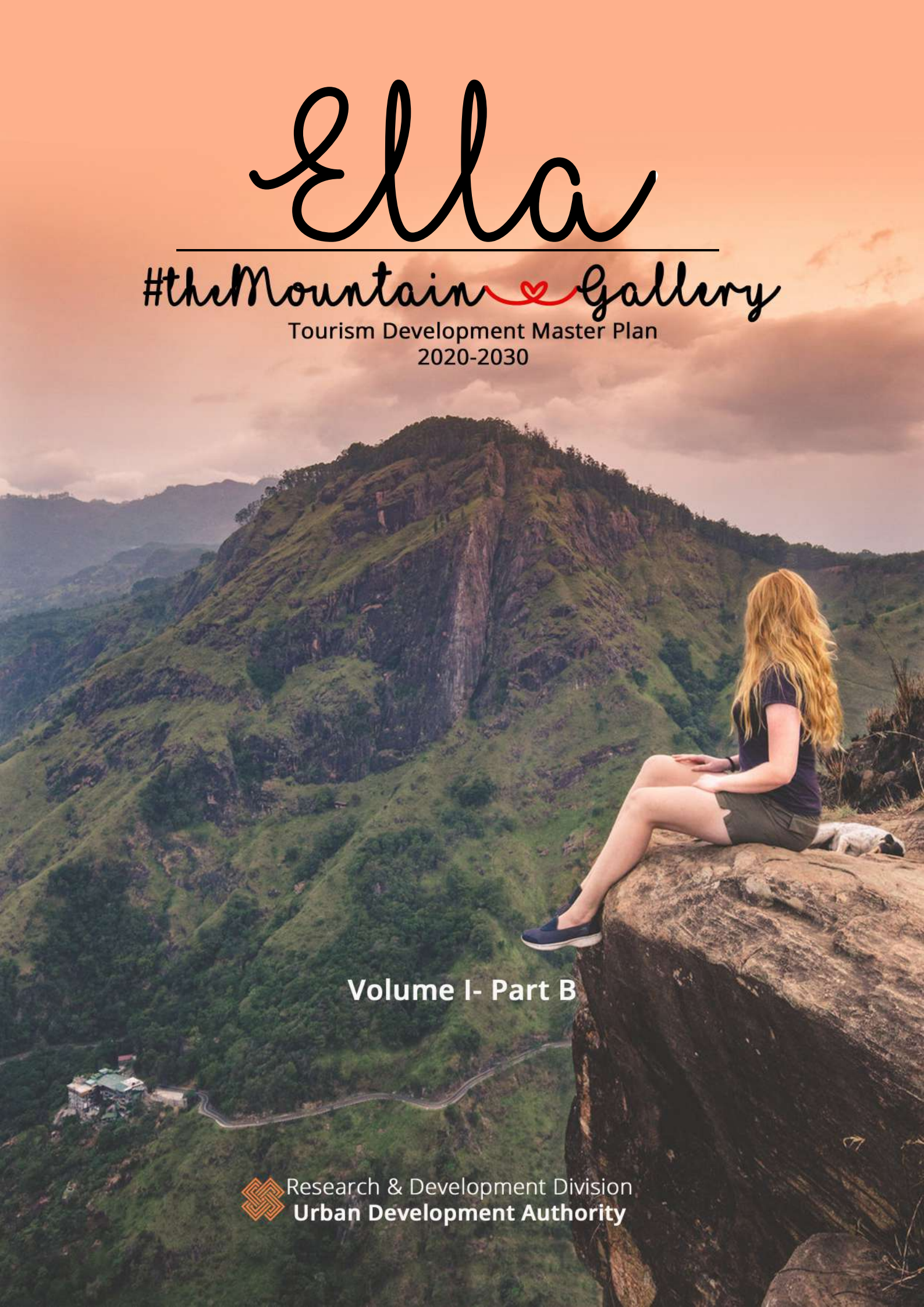
Ella

#theMountain Gallery

Tourism Development Master Plan
2020-2030



Volume I- Part B

Research & Development Division
Urban Development Authority

Ella

Tourism Development Master Plan

2020-2030

Consultancy Assignment on Preparation of Tourism Development Master Plans for Seven Tourism Areas Identified by Sri Lanka Tourism Development Authority

Final Report

August, 2020

Submitted by

Urban Development Authority

Sri Lanka

Ella Tourism Development Master Plan

2020-2030 Final Report

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Consultant	Urban Development Authority of Sri Lanka
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The
Plan

PLANNING FRAMEWORK

01

1. The Planning framework

As explained in the section 1.5 of the Volume I-A (Interim Report) of the Ella Tourism Development Master Plan (TDMP)– 2020-2030, the geographic scope of the Ella TDMP covers 8 Grama Niladari Divisions of Ella Divisional secretariat Division which have been declared as 'Urban Areas' under the Section 03 of Urban Development authority Act No. 41 of 1978 by the Gazette Notification No. 1558 /5 dated 08/07/2008 and No. 2122/41 dated 09/05/2019.

Volume I of Ella Development Plan – 2019-2030 prepared and published by the UDA through the Gazette Notification No. 2139/68 dated 09/06/2019 is the current plan in effect for the above declared area. Ella Development Plan – 2019-2030 is the principle legal document which manages the physical, economic, social and environment development in this particular area.

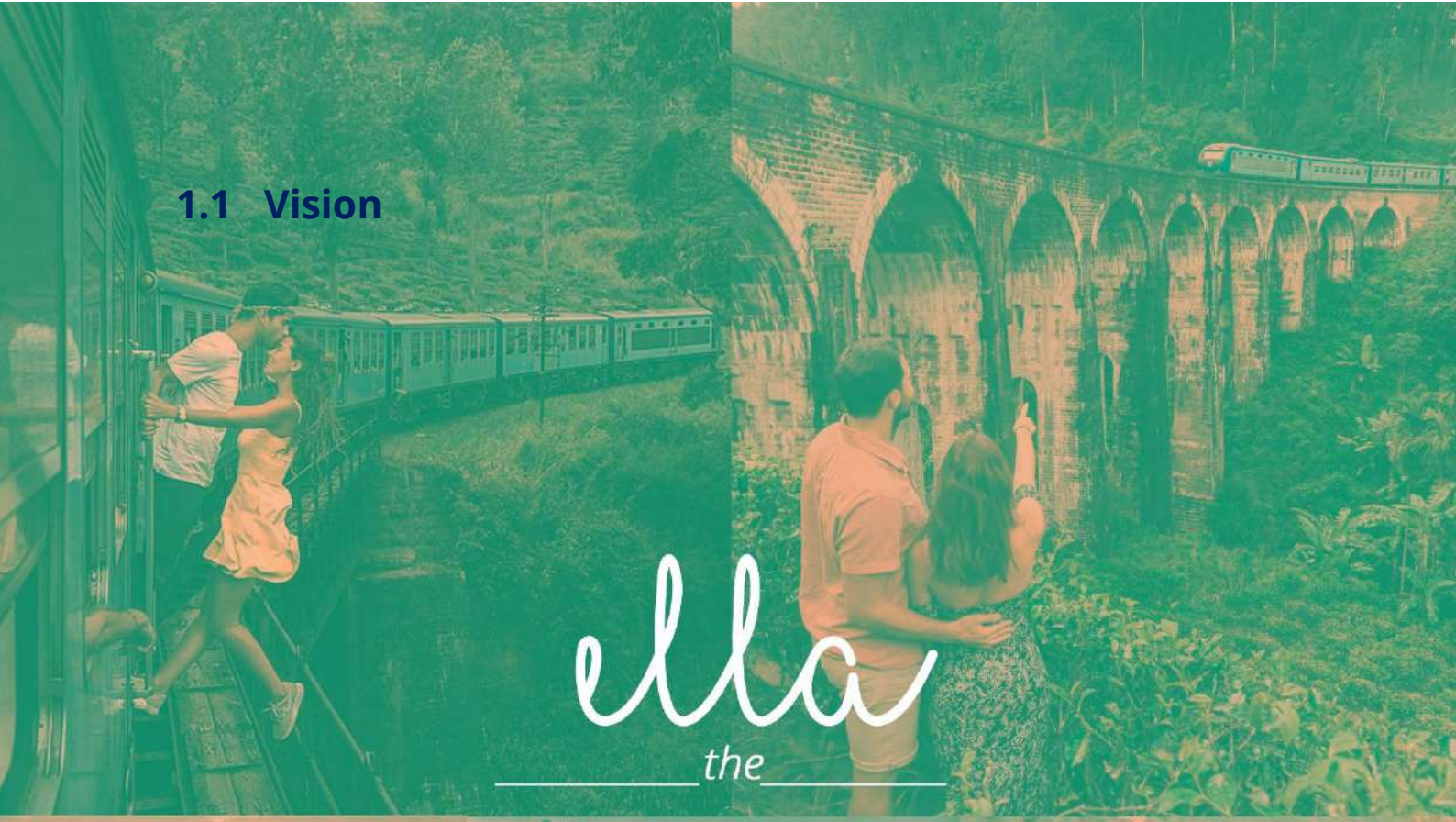
The key focus of Ella Tourism Development Master Plan – 2020-2030 is tourism development and it has been prepared considering Ella Development Plan – 2019-2030 as the basis. The vision of Ella Development Plan – 2019-2030 is 'Nature Paradise of Mound Guard' and it envisages to protect and nurture the natural environment of Ella and maintain a balance between environment conservation and development while providing infrastructure facilities needed by the tourism industry of the area.

The vision, goals, objectives, strategies, strategic projects, guidelines and regulations coming under Ella Tourism Development Master Plan – 2020-2030 have been prepared aligned with the same of Ella Development Plan – 2019-2030 with a special focus and in the theme of tourism development. Hence, strategies, strategic projects, guidelines, and regulations proposed in the Ella TDMP – 2020-2030 have been formulated with the objective of further strengthening the vision of Ella Development Plan in a more detailed and comprehensive level.

It is remarked that Ella TDMP does not include any proposal which is contradictory to the proposals of Ella Development Plan and that it is an extended version of Ella Development Plan which further facilitates its vision with more focus on tourism development.

This chapter presents the future envisaged vision for Ella as a major tourism destination, along with goals and objectives aligned towards the anticipated vision. Further, the chapter also presents the proposed concept plan based upon which all strategies are developed. The concept plan is the key tool which represents the overall physical or real ground transformation required to achieve the envisaged future vision of Ella.

1.1 Vision



ella
the

#Mountain_Gallery

"The Ella hamlet, to be the secured picturesque destination in the world which offers diverse collection of virgin landscapes in misty hills"

The safe, resilient & photographic mountains cape tourism destination sought by voyagers who treasure the intimacy of a small-scale destination and wish to make pictorial memories while capturing the picturesque virgin landscapes and relaxing breeze.

Ella is one of the most prominent tourism destinations which popped up in recent history of Sri Lankan tourism industry due its natural serenity and calmness mingled with unique green landscape, misty hills, green spectrum, and natural beauty. Ella is a self-emerged brand in the world tourism industry which has been explored and promoted by tourists themselves. Ella is renowned as one of the most demanded mountain photo location in south Asia.

This plan envisions to protect that brand and further promote Ella as the Mountain Gallery. Every angle focused, every frame taken, and every window captured in Ella will be a photo of serenity, a photo of calmness and a photo of misty hills under floating clouds.

The envisaged vision for Ella is set with the focus to enhance the picturesque quality of Ella turning it to be the most famous mountain gallery of all time in mountain tourism history. A gallery is a place where people enjoy visual arts, crafts and especially photos.

Capturing photos at Ella, especially selfie photographs has been trending during the past years and today it has come to a state where a one is not believed to belong to the world travelers' cult if he or she has not yet posted a selfie image taken at Ella in social media.

This plan intends to perceive this trend as a potential to further promote Ella as the #Mountain_Gallery. In future, Ella is envisaged to be the world's best mountain city for photo capturing. The plan includes several strategies to ensure that the spatial arrangement of Ella would enhance its picturesque landscapes enabling to achieve its vision.

Turning Ella to be a picturesque mountain gallery paves the path to protect its environment while benefitting the tourism industry. It is evident that present development trend driven by high demand for tourism related activities have degraded the serenity and calmness of Ella and also barricaded many picturesque views. View sheds of Ella Rock, Little Adams Peak, Demodara and Kital Ella offer stunning mountain gallery features to Ella. Providing prominence to these features is one of the main objectives of this plan.

The plan focuses on maintaining a tourism supportive pleasing environment while ensuring that it does not exceed its carrying capacity in terms of available infrastructure and maximum tourist gathering capacities at each attraction sites. Facilitating Ella to be a safe and responsible tourism destination is a core principle of this plan. The plan envisages Ella to be an imaginary destination that exists in reality.

G1 G2 G3 G4

The most picturesque mountain scrim of the South Asia

The best infrastructure facilitated mountain tourism town of the South Asia

The most secured mountain tourism town of the South Asia

A sustainable tourism economy within a smooth, sensed, and responsible tourism space in hill country of Sri Lanka

1.2 Objectives

G1 - The most picturesque mountain scrim of the South Asia

- To protect best mountain sceneries with three types of viewsheds by 2025.
- To develop three identified routes as picture capturing corridors while conserving their inherent landscapes by 2025.
- To conserve the unique green spectrum of the Ella by 2030.
- To ensure the continuation of natural drainage system of the Kiridi Oya water catchment within Ella planning area 2025.
- To maintain an urban form compatible with natural landscape of the Ella by 2030.

G2 - The best infrastructure facilitated mountain tourism town of the South Asia

- To transform Ella town center as a smart tourism town hidden in the montane green mountain range by 2030.
- To ensure availability of 100% of the tourism complementary infrastructure facilities for identified 09 potential tourist attractions places 2030.
- To have zero negative impacts due to solid waste and wastewater disposal in Ella by 2025.
- To establish a smooth connectivity between identified 09 tourist attraction places with unique landscape by 2030.

G3 - The most secured mountain tourism town of the South Asia

- To have zero air pollution in Ella by 2030
- To arrange the physical setting to create a sense of security within Ella by 2030
- To maintain the landslide prone areas in Ella as no development zones

G4 - A sustainable tourism economy within a smooth, sensed, and responsible tourism space in hill country of Sri Lanka

- To promote diversified tourism activities by 2025
- To achieve a five time increment of the current per day tourist's expenditure by 2030

1.3 Concept Plan

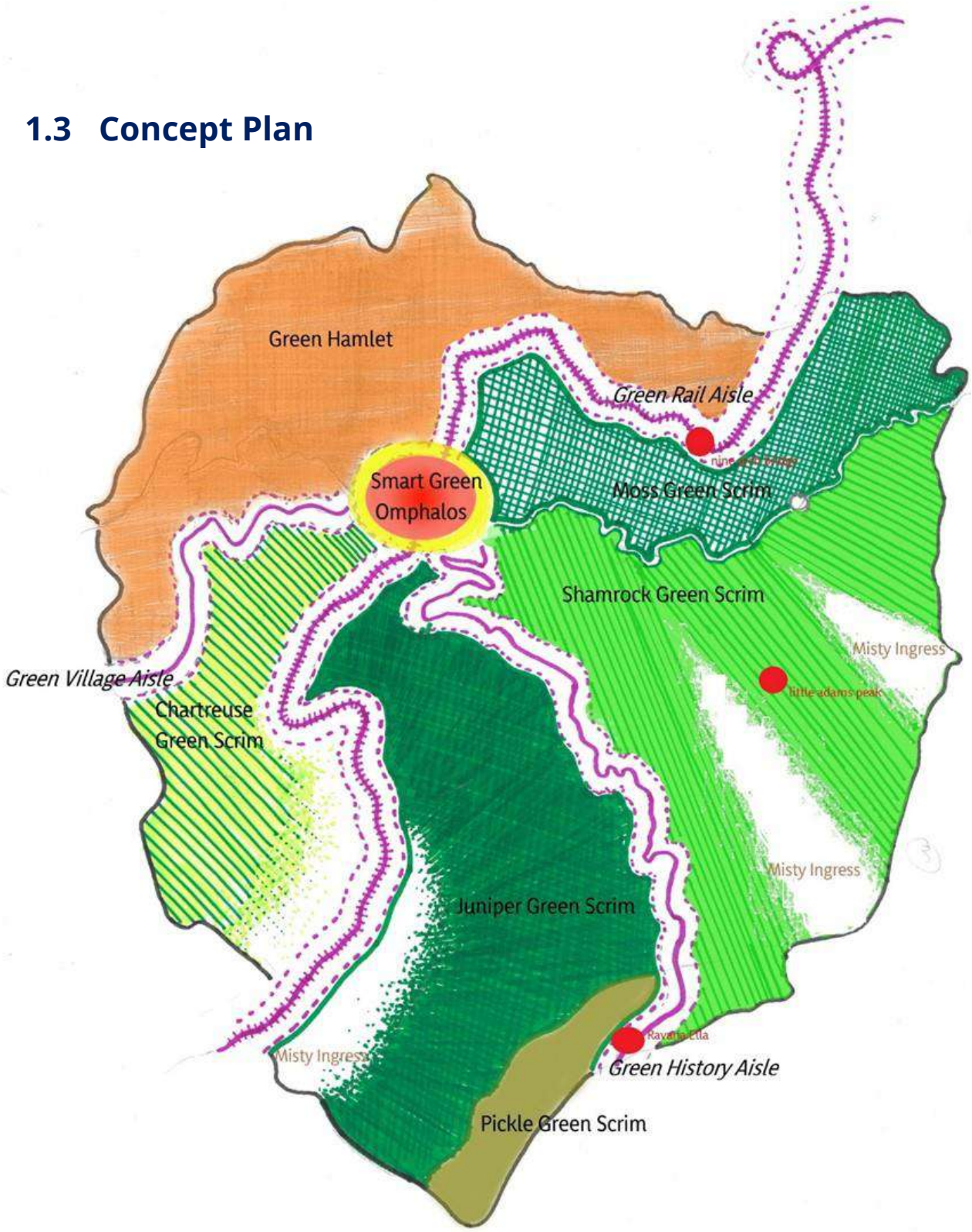


Figure 1-1:Concept Plan of Ella Tourism Development Master Plan – 2020-2030

The basic concept of Ella Tourism Development Master Plan consists of three major components.

1) conservation of unique green spectrum,
2) direction of development towards less sensitive areas and
3) visual isle development as a major tourism promotion strategy.

Conservation of Green Spectrum

Ella is blessed with a green spectrum consisting of five (05) green shades. These five shades exist due to different vegetation types namely; grasslands, tea, paddy and a mix of montane forests, dry evergreen forests and low land rainforests.

The existence of five different green shades is one of the unique characteristics of Ella and this plan intends to conserve this unique character and promote it as one of the main attraction features of Ella. Ella TDMP – 2020-2030 envisions Ella to be a picturesque mountain gallery thus the existence of five different shades of green is one of the main potential that can be harnessed to achieve that vision.

The plan conceptualizes these five shades of green spectrum as five different backdrops of the mountain gallery. Each backdrop consisting of an inherent green shade is promoted by the term 'scrim' which expresses the meaning of a theatre drop.

The green spectrum spans over more than 2/3 of the Ella tourism area and the areas falling within each green shade is as follows.

Green Scrim	Major Vegetation Type	Geographical Area
Moss Green Scrim	Tea	Strip along the Passara Road towards Namunukula
Shamrock Green Scrim	Grasslands	Scrim around Mini Adams Peak
Juniper Green Scrim	Mix of Montane and Dry Evergreen Forests	Scrim around Ella
Chartreuse Green Scrim	Paddy	Scrim closer by Kithal Ella
Pickle Green Scrim	Mix of Dry Evergreen Forests and Low Land Rainforests	Entrance at Ella Gap

Table 1-1: Five green shades of unique Green Spectrum of Ella

Figure 1-2: Conceptual illustration of five green shades

A key principle of the concept plan is to protect this green spectrum adopting both conservation and preservation approaches. The same has been ensured in the Ella Development Plan – 2019-2030 as well. As explained in the section 4.1 of the Volume I-A (Interim Report) of the Ella Tourism Development Plan – 2020-2030, environment sensitive areas being disturbed due to haphazard development is one of the main issues in Ella. The conservation of the green spectrum while allowing limited or no developments based on levels of sensitivity of each green scrim will enable protection of environment sensitive areas, vistas, visual corridors and view sheds, reduction of disaster risks and safeguard the overall picturesque serene character of Ella.

Promotion of Tourism Development at Green Hamlet and Ella City Center

As it is proposed to conserve nearly 2/3 of Ella as a Green Spectrum with less development concentration, it is required to promote an alternative area to direct the future developments attracted to Ella. As explained in the section 4.1 of the Volume I-A (Interim Report) of the Ella Tourism Development Plan – 2020-2030, areas such as Hettipola, Idamegama and Maduragama, Udukumbalwala, which are located in the northern part of the Ella planning area indicate less environment sensitivity thus are more suitable to accommodate comparatively higher density of development.

Accordingly, these four areas together are named as the Green Hamlet and promoted for future tourism accommodation and residential developments. The same concept is promoted in Ella Development Plan – 2019-2030 as well. It is proposed to maintain the character of a small hamlet throughout this area in order to suit the existing rural character blended with large paddy lands. It is proposed to facilitate the Green Hamlet area with adequate infrastructure facilities to accommodate the future residential demand as well as the tourism accommodation demand given that strict measures would be taken as not to exceed the carrying capacities.

Further, it is proposed to promote concentrated development at Ella city center. The idea is to develop Ella city center as a smart tourism facilitation center which is equipped with state-of-the-art amenities.

Three Photo Capturing Corridors

The concept plan proposes to develop three corridors where tourists can capture a variety of picturesque backdrops for their photographs. These corridors will be designed in such a way to facilitate capturing such unique views and will be facilitated with continuous walk trails and decks at various viewpoints. Tourists who follow each of these trails will definitely come across two or more attractions where they would be amazed by delightful experiences. These three sceneries capturing corridors are conceptually proposed in three themes and with three different purposes of scenery capturing to boost Ella tourism.

Green Rail Aisle

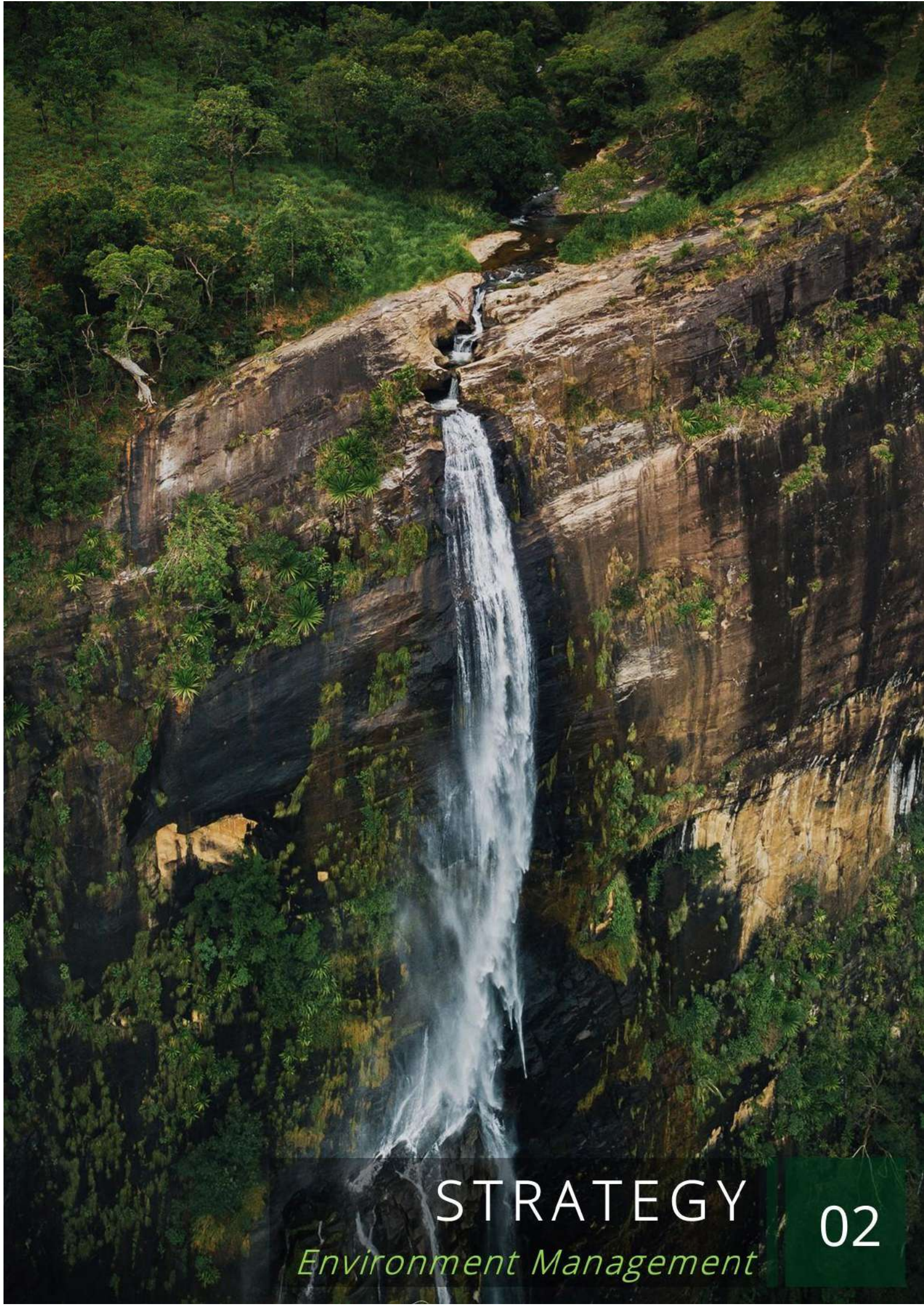
Rail journey through Ella is well famous among worldwide communities in social media as the most stunning view capturing travel corridor. The Green Rail Corridor runs parallel to the railway track fallen within Ella planning area. This trail enables the tourists to experience the same picturesque landscapes viewed throughout the rail journey at a slower pace while walking through a misty corridor.

Green Village Aisle

Green Village Aisle runs parallel to the Kithal Ella road and it is fallen via serene village landscape. A tourist walking along this aisle will experience village sceneries and have the opportunity to explore and share village lifestyle and culture. It will be an aisle to capture the cultural richness and rural experience in Ella. The Green Village Aisle will also act as a space to enhance community engagement in tourism activities and provide more opportunities for improvement of local economy.

Green Historical Aisle

The Green Historical Aisle runs parallel to the Ella – Wellawaya Road and it covers the two main shades; Juniper and Shamrock of the green spectrum of Ella at the either sides of the aisle. One of the main features of the Green Historic Aisle is that it provides access to number of historically important attractions in Ella including Ravana Ella, Ravana Cave and Ravana Ella Temple.



STRATEGY

Environment Management

02

Once Destroyed, nature's beauty cannot be replaced at any price, thus economic growth, and environmental protection needs to go hand in hand

Ansel Adams & Christopher Dedd

Value the inherited assets of Ella

Precious Ella is blessed with

- *1430 ha of **Green Spectrum***

  500ha of forest cover with,

  - *305 ha of montane forest*
  - *70ha of dry ever green forest*
  - *115ha of low land rainforest*

  930ha green cover with,

  - *57ha of tea estates*
  - *43ha of scrubs*
  - *114ha of grasslands*
  - *14ha of other types of crops*
  - *300ha of total agricultural lands*

- *25 km^2 **span of varying Topography***

  1768 ha of Mountain (700m above elevation)
  540 ha of Montane mountain (1000m above elevation)
  Steep lands:

  - *1571ha of 30-degree angle*
  - *371 ha of 30 - 45degree angle*
  - *85 ha of more than 45-degree angle*

- *32 km length of **Blue Network***

- *5 number of **Patrimonial Sites***
  - *Ravana cave*
  - *Ravana waterfall*
  - *Nine arch bridge*
  - *Three arch bridge*
  - *Steel bridge*

These great valued assets; are not to be wasted or treated carelessly. We Sri Lankans are determined to safeguard all of these treasures. Thus, we request you to love and behave gently upon them.
This approach is to protect the Mother Nature while ensuring sustainability in tourism industry.

2. Environment Management Strategy

The very purpose of Ella TDMP is to make Ella a sustainable tourism destination. Over the past decades, massive tourism population growth has been occurred within 23% of the Ella terrestrial surface, but the environmental impact has been widespread as discussed in the Volume I – A of the Ella TDMP. Therefore, attention has been drawn to the importance of urban planning towards Ella as a means through which to address the environmental challenges and to transform Ella beyond day today tourism.

Environment management strategy of Ella refers to the green coverage conservation, blue network management and heritages conservation of Ella under following sub strategies.

1. Green network management strategy
2. Blue network management strategy
3. Heritage conservation and promotion strategy

2.1 Green network management strategy (Project Code - ES -1)

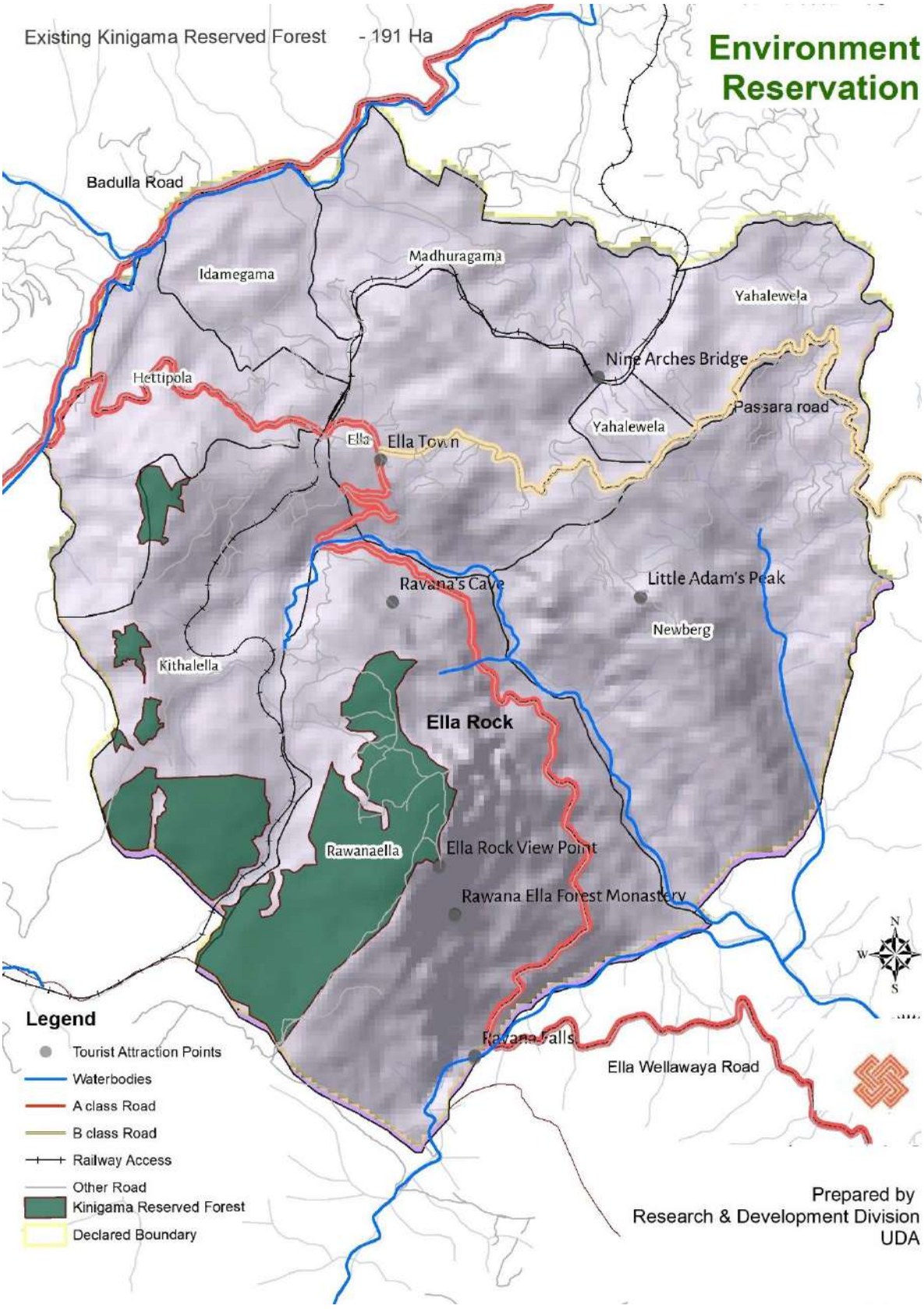
The main focus of the Green Network Management Strategy is to conserve the unique Green Spectrum of Ella. This is one of the key strategies which define the reservations, special protection areas and conservation areas within Ella. This strategy also acts as a base for the proposed zoning plan of Ella.

2.1.1 Protecting the existing declared reserved forests and sanctuaries while introducing physical demarcations for their boundaries. (Project Code: ES-1-1)

Type of Natural Asset	Name	Extent falling with the planning boundary	Date of Declaration	Relevant Governing Acts/ Laws and Agencies	Recommended Guidelines
Sanctuaries	Ravana Ella Sanctuary	649 ha	18.05.1979 Total extent – 1932 ha	Department of Wildlife	Access fully restricted except for the identified sites for camping and routes for trekking/ hiking All camping & hiking activities should be done with strict supervision of the Department of Wildlife

					Demarcate physical boundaries with appropriate demarcation methods such as boundary posts/ broad walk/ foot path & tree fencing etc.
Reserved Forests	Kinigama Forest Reserve	191 ha		Forest Department	Access fully restricted except for the identified sites for camping and routes for trekking/ hiking All camping & hiking activities should be done with strict supervision of the Forest Department Demarcate physical boundaries with appropriate demarcation method such as boundary posts/ broad walk/ foot path/ tree fencing etc.

Table 2-1: Existing Reserved Forests and Sanctuaries in Ella and proposed guidelines to protect them



Map 2-1: Existing Reserved Forests and Sanctuaries in Ella

**NOTE: The boundary of the Ravana Ella Sanctuary was declared on 18/05/1979 by the Department of Wildlife Conservation*

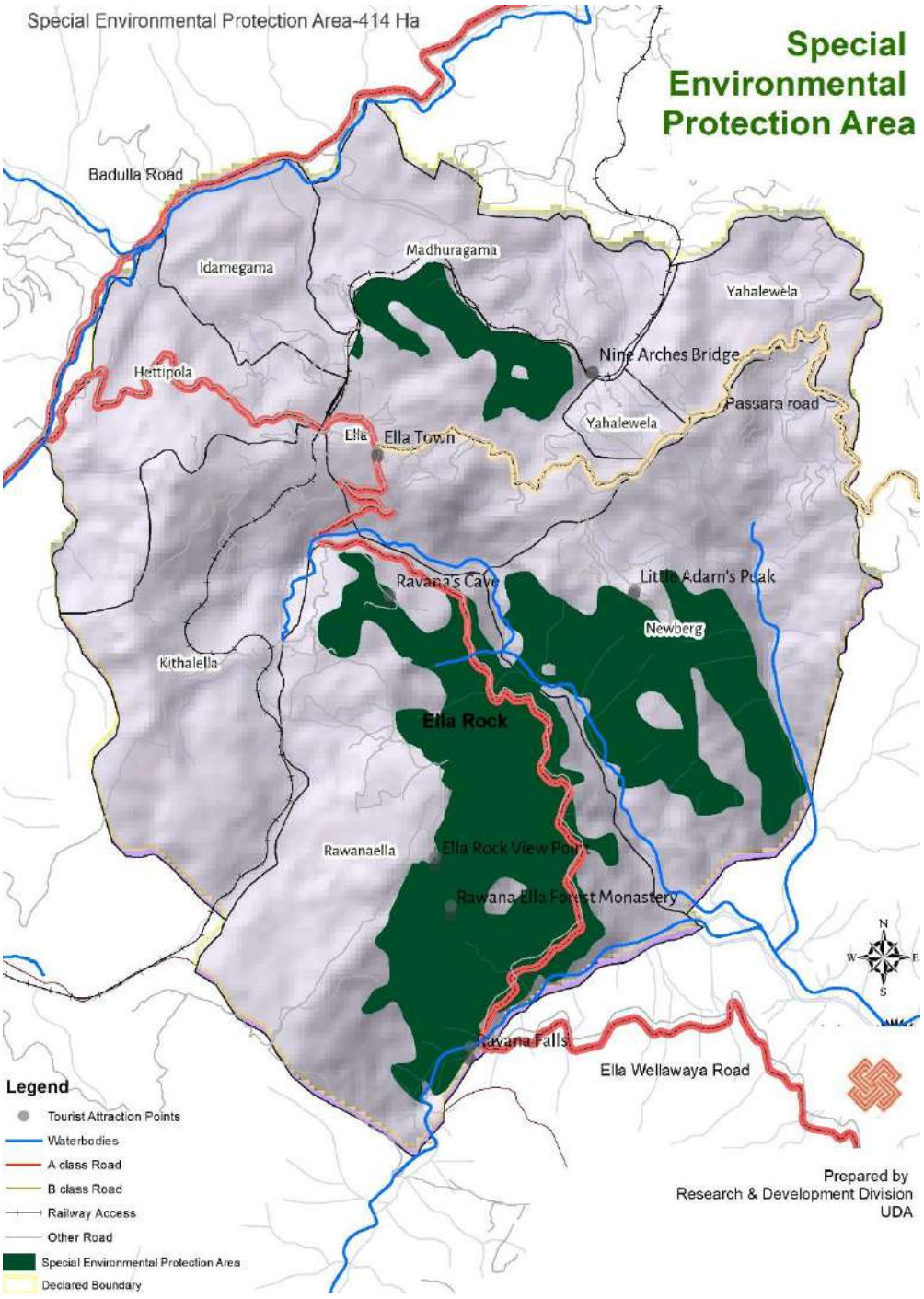
2.1.2 Designating 414 ha of environmental sensitive areas as Special Environment Protection Areas and physically demarcating their boundaries (Project Code: ES-1-2)

Type of Natural Asset	Extent	Relevant Agencies	Recommended Guidelines
Forests and Grasslands	414 ha Existing Pines Forest in Ella GND (The Ella TDMP proposes to regrow the Pines Tree and maintain it as a Pinus Forest Reserve) Newberg Grassland Patch, Ravana Ella Forest	Forest Department	Control Access for permitted/ proposed activities by the plan No permanent constructions/ developments allowed All activities to be strictly monitored by the Forest Department and relevant custodian state agencies Demarcate physical boundaries with appropriate demarcation method such as boundary posts/ broad walk/ foot path/ tree fencing etc.

Table 2-2: Areas identified to be designated as Special Protection Areas and recommended guidelines

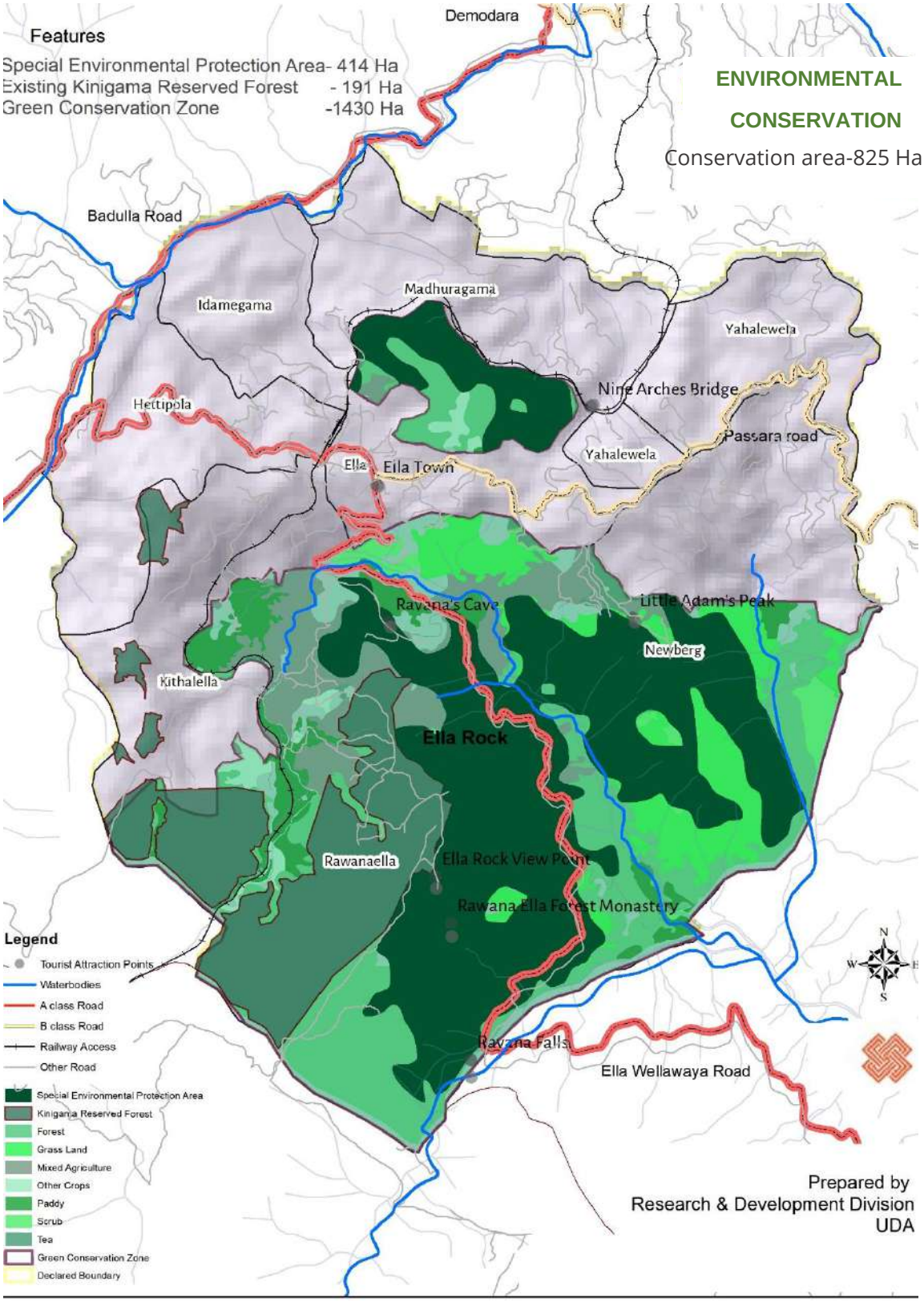
**NOTE: The forests located along the Ella – Wellawaya Road which do not fall within the declared Ravana Ella Sanctuary are also proposed to designate as Special Protection Areas by the Ella TDMP considering their environmental sensitivity.*

Justification – As per the environment sensitivity analysis it was identified that these areas have special bio-diversity unique to Ella and have significantly higher environmental sensitivity. Currently, these areas are not declared by any state agencies thus are vulnerable for encroachments and degradation due to rapidly increasing development pressure. Thus, Ella TDMP proposes to fully protect these areas by designating them as Special Protection Areas.



Map 2-2: Proposed Environmental Protection Areas

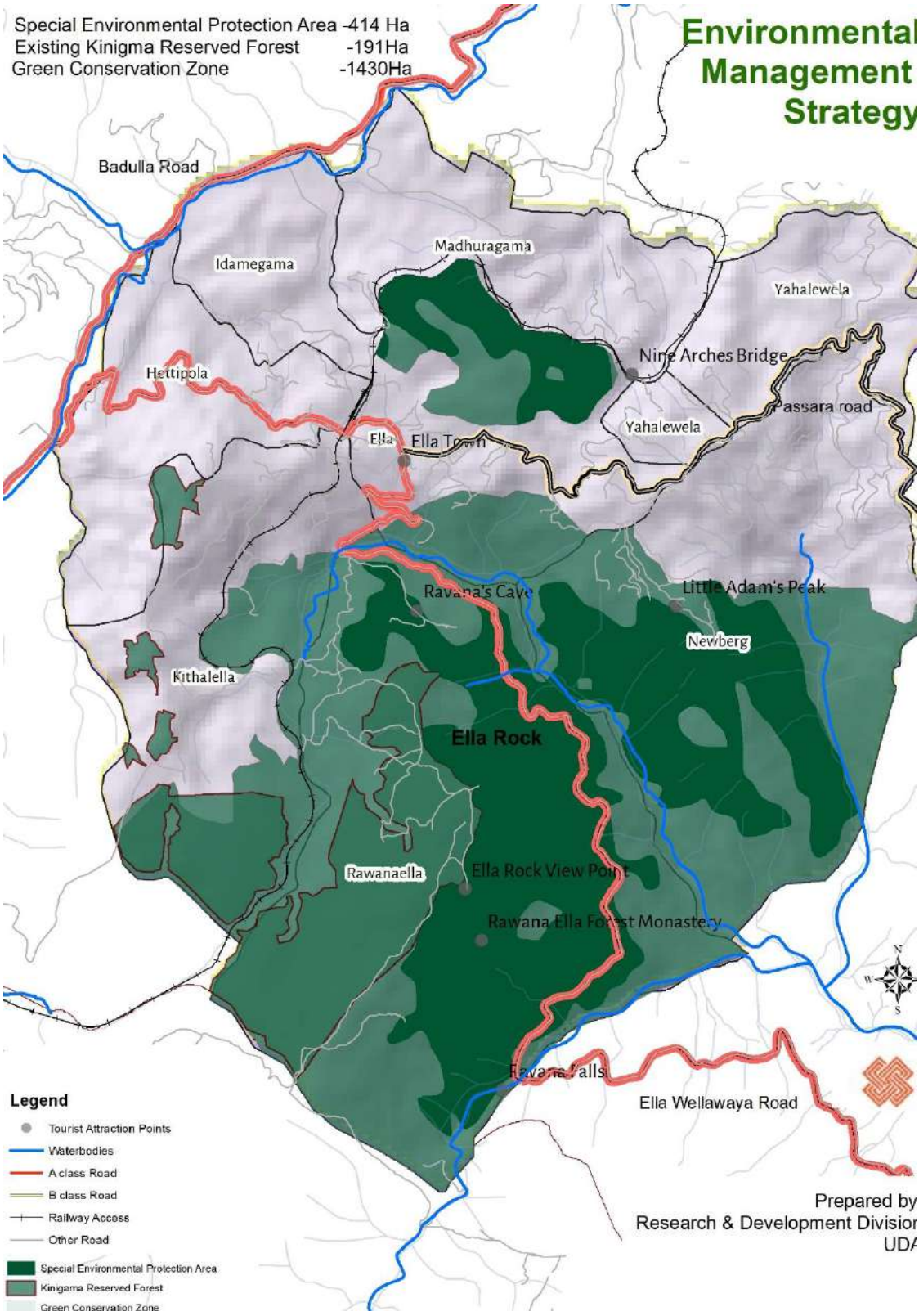
2.1.3 Designating 790 ha of land as Environment Conservation Areas in Ella



Map 2-3: Proposed Environmental Conservation Areas in Ella

Type of Land use within identified Environment Conservation Areas	Extend	Relevant Agencies	Recommended Guidelines
Paddy	64ha	Agricultural Department/ Urban Development Authority	Limited constructions/ developments are allowed as per the guidelines given for respective zone with careful supervision of relevant agencies Access allowed Transformation of land uses are restricted
Tea	129ha	Relevant state agencies	
Mixed Agriculture	129ha		
Grasslands	83ha	Forest Department	
Scrubs	25ha	Forest Department	

Table 2-3: Land use categories within identified Environment Conservation Areas and recommended guidelines



Map 2-4: The composite map of Green Network Management Strategy

2.2 Blue network management strategy (Project Code – ES-2)

Blue network management strategy focuses on the management of natural drainage system of Ella. Ella is a high landslide risk area as identified by the National Building Research Organization (NBRO) of Sri Lanka. NBRO, has identified the either sides of Ella – Wellawaya Road, Kithal Ella Road and Ella town area as high landslide risk areas and has strictly announced to control the existing developments. As the hydrological functioning of the area has a huge impact on landslide risks it is important to manage the blue network of the area. The strategy proposes to define the natural water flow as identified by the sub catchment analysis, clean the network and take necessary measurements to reduce potential disturbance for water network.

2.2.1 Maintaining reservations of all water bodies based on the stream order of the entire blue network

It is proposed to maintain the reservations for all types of water bodies including rivers, streams, canals and natural drainage ways as specified by the relevant agencies; Irrigation Department, Sri Lanka Land Development Corporation. For any canal, stream or natural water way for which a specific reservation is not introduced by relevant agencies, it is proposed to maintain the reservations as mentioned in the below table which have been introduced by the Sri Lanka Land Development Corporation by the gazette notification no. 1662/17 dated 14th July 2020.

River Width (m)	**Reservations (m)**	
	Open Canal	**Closed Canal**
1.0 - 1.1	1.0	0.3
1.3 - 3.0	2.0	1.0
3.1 - 4.5	2.75	1.0
4.6 - 6.0	3.5	1.5
6.1 - 9.0	4.5	1.5
9.1 above	6.5	2.0

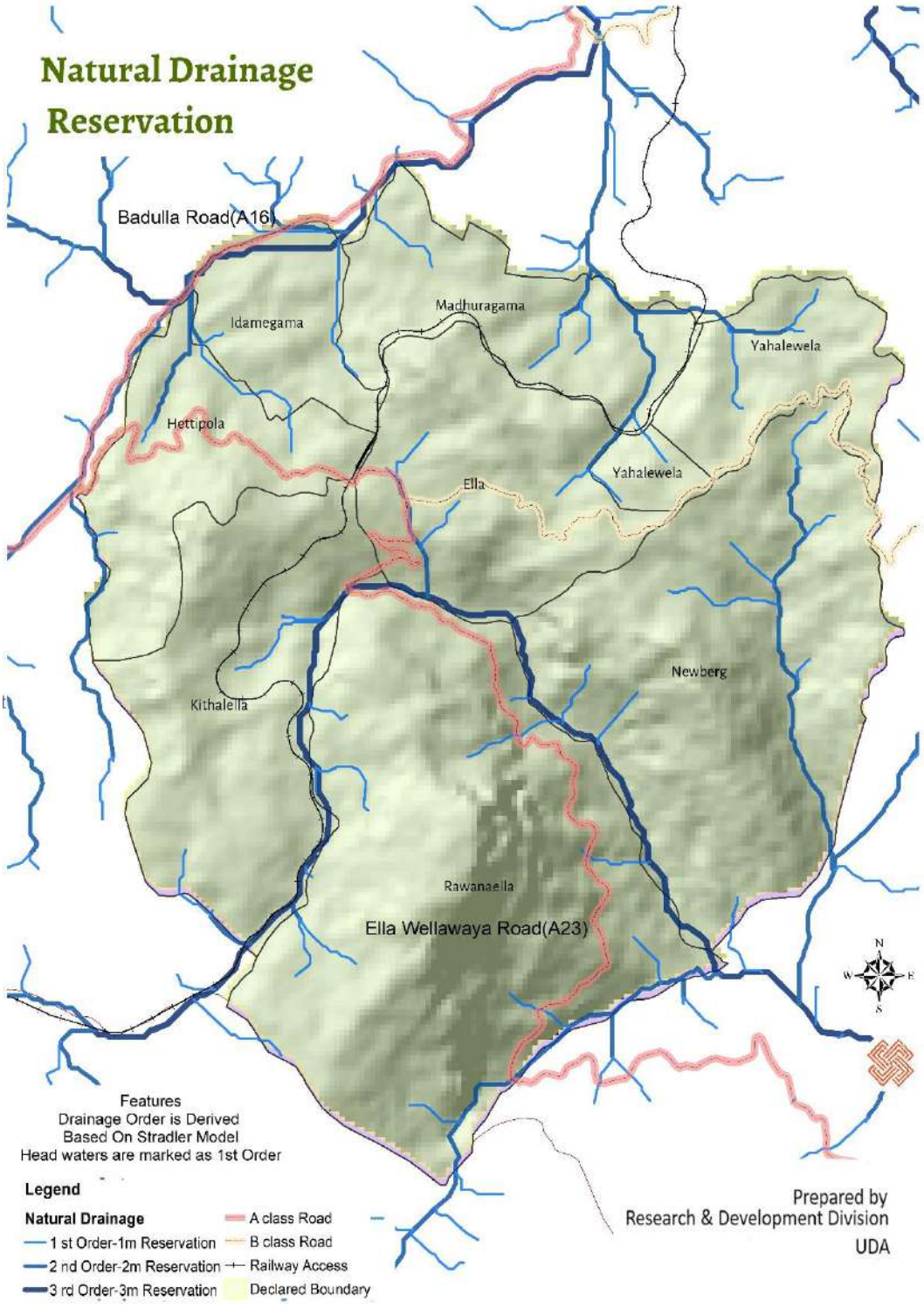
Table 2-4: Stream reservations introduced by the SLLDC

2.2.2 Carrying out a tree planting project at the either sides of water bodies to strengthen the maintenance of reservations (Project Code - ES-2-1)

Stream Order	Recommended width between the stream bank and the tree line	Relevant Institutes	Recommended Types of Plants
1st Order Stream	1m	NBRO/Irrigation/ Forest Department	• Cassia spectabilis (Kaha Kona) • Mangifera indica (Atamba) • Or any native plant suitable for stream banks of the intermediate climate zone (These plants have been given in the Annexure I)
2nd Order Stream	2m	NBRO/Irrigation/ Forest Department	
3rd Order Stream	3m	NBRO/Irrigation/ Forest Department	

Table 2-5: Recommendations for the Tree Planting Project at Stream Banks

**NOTE: The stream order of the entire water body network of Ella was identified using Strahler Model in Arc GIS. Accordingly, the order of the stream is defined as higher order streams have larger widths and lesser order streams have smaller widths. The recommended width to be maintained in between the stream bank and the tree line is determined based on the stream order of the relevant stream.*

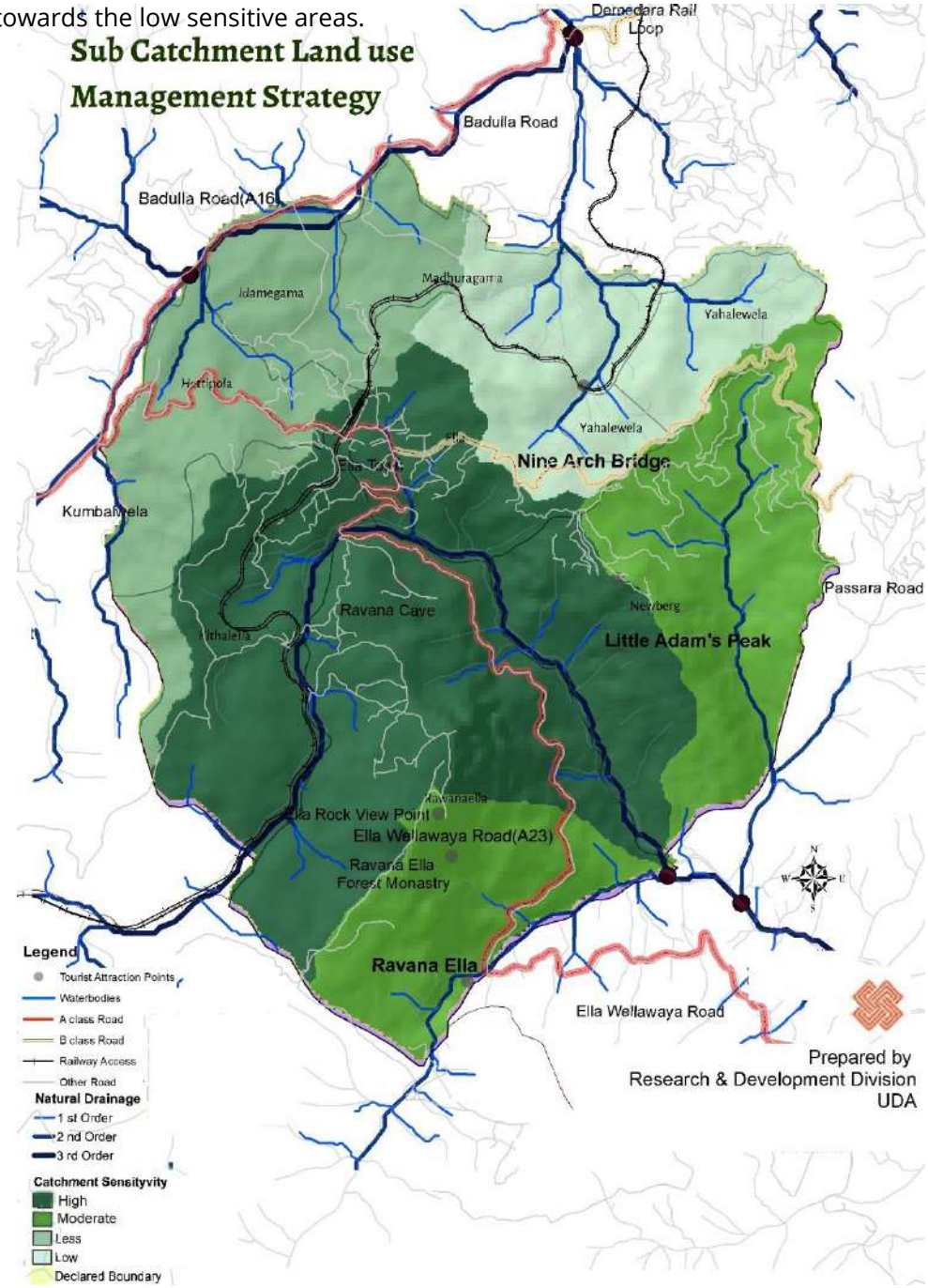


Map 2-5: The stream order of the water body network in Ella

2.2.3 Providing guidelines for land use management in different hydrological sub catchment areas of Ella

Ella planning area is located within the Kirindi Oya basin which consists with four sub catchments. These sub catchments have different sensitivity levels such as high, moderate and low as identified by a combined analysis of environment sensitivity and wetness index analysis.

It was identified that the current town area, part of Passara road and Part of Kithal Ella GND which have high development pressure fall within the high sensitive sub catchment. Further, the Ravana Sanctuary and surrounding grassland areas also fall within this sub catchment. Moderate sensitive area comprises with grassland area and small scale development area which do not show high threat to the water catchment. Sub catchment three and four show the low sensitivity level thus have higher potential to cater future developments. Accordingly, it is needed to control the developments coming in high sensitive areas and encourage developments towards the low sensitive areas.



Map 2-6: Sub catchments of Kirindi Oya Basin

Sub Catchment	Level of Sensitivity	Extent of the Catchment	Recommended Guidelines	Remarks
1st sub catchment	High	872ha	• Constructions/ developments and land use transformations are allowed only within the limits of Ravan City (Tourism Service Zone) and the part of Tourism Promotion Service Zone falling within the 1st sub catchment. The development intensity within these areas will be maintained at a lower level. • All development activities permitted within the 1st sub catchment need to be strictly monitored by relevant agencies; UDA, SLTDA to ensure that they do not cause any disturbances to the sub catchment. Regulations to guide such permitted activities are given in the Volume II – Part A of the Ella Development Plan.	The zones falling within the 1st sub catchment are; A part of Green Conservation Zone, Tourism Service Zone & A part of Tourism Service Promotion Zone
2nd catchment	Moderate	504ha	• Limited constructions/ developments allowed based	The zones falling within the 2nd sub catchment are;

			on permitted activities of each zone • No development/ land use transformation allowed within grasslands located within this sub catchment • All development activities permitted within the 2nd sub catchment need to be strictly monitored by relevant agencies; UDA, SLTDA to ensure that they do not cause any disturbances to the sub catchment. Regulations to guide such permitted activities are given in the Volume II – Part A of the Ella Development Plan.	A part of Green Conservation Zone, A part of Green Tourism Zone & A part of Tourism Service Promotion Zone
3rd Catchment	Low	286ha	• Constructions/ developments are allowed with appropriate zoning regulations to ensure that they would not bring any harm to the natural drainage paths of the sub catchments. Regulations to guide such developments	The zones falling within the 2nd sub catchment are; Tourism Accommodation Zone Tourism Accommodation Promotion Zone A part of Green Tourism Zone
4th Catchment		374ha		

			are given in the Volume II – Part A of the Ella Development Plan. • Limited transformations are allowed for agricultural based land uses	

Table 2-6: Recommended Guidelines for land use management with in the identified sub catchments

2.2.4 Cleaning the main storm water drain flowing via Ella Town and redesigning as to maintain it as a natural water path (ES-2-2)

There is a 300 m long drain having an average width of 2m flowing via the Ella Town starting from the abandoned paddy field located beneath the Pines Forest and connecting to the Kirindi Oya. Currently, the existing commercial, restaurants and hotels located within the town area directly and indirectly discharge waste water to this storm water drain and it has caused several hygienic issues and pollution in Kirindi Oya basin.

Therefore, the Ella TDMP proposes a project with following two components;

(a) Construction of a retention pond at the existing abandoned paddy field beneath the pines forest to enrich the existing water flow of the storm water drain

It is proposed to carry out a comprehensive hydrological study and construct the retention ponds with suitable materials to avoid any possibility of water infiltration toward ground soil to avoid low friction of soil particles that leads to landslides.

(b) Cleaning and redesigning the existing storm water drain for a length of 300 m from the retention pond to the south boundary of Ella city center

It is proposed to close and barricade all pipes discharging waste water into the storm water drain and fully clean it. Further, it is proposed to redesign it as a natural water path and landscape its banks with appropriate native plants and landscaping materials. A walking path of 1m is also proposed at the right-side bank of the storm water drain with the intention of encouraging the existing shops and restaurants which currently treat the drain as a backyard to open up and maintain their rear side also as a façade.

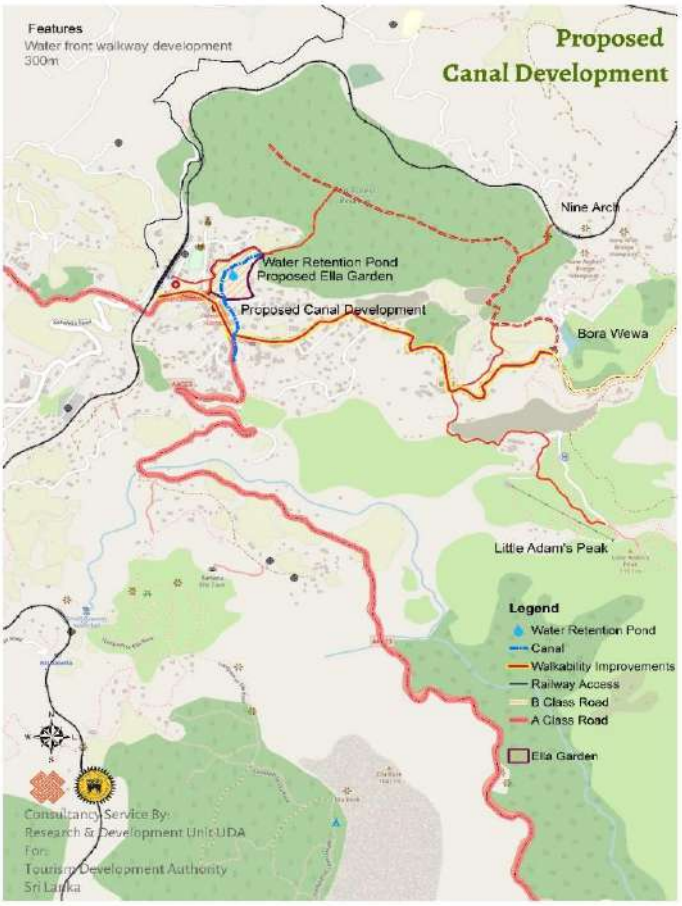


Figure 2-1: Proposed Storm Water Drain Redesign and Retention Pond Development Project

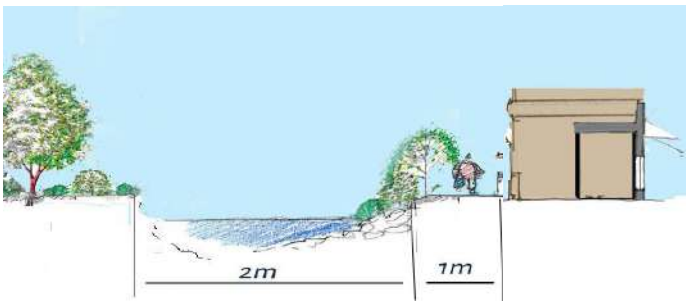


Figure 2-2: Conceptual cross section of the proposed storm water drain design with the walking path

Figure 2-3: Existing storm water drain running via the Ella city center

Figure 2-4: Conceptual images of the proposed storm water drain and the retention pond

2.3 Heritage Conservation & Promotion Strategy (Project Code – ES-3)

Ella is not just a place which emerged within 10 or 100 years, but it has a history dated more than 25000 as discussed in the Volume I – Part A of Ella TDMP. With the development of tourism industry, people visit Ella to enjoy not only the nature but also the historically renowned and archeologically important places associated with the great history. Heritage Conservation and Promotion Strategy of Ella TDMP proposes to conserve declared archeological sites both in and around Ella Planning area and also to conserve few identified sites/ monuments which have not yet been declared.

2.3.1 Conservation of archeologically important places in Ella

(a) Conservation of declared archeological sites by the Department of Archeology in Ella Planning Area

Ravana Ella Ancient Temple & Cave

Ravana Ella Ancient Temple and Ravana Cave are Historic sites that enriched with high tourist attraction. It's located approximately 02Km away from the Ella town. Ravana Cave and Temple can be accessed from a 12 ft wide 700 m long road starting from Ella –Wellawaya road (A23 road). Ravana Ella Ancient Temple was declared as a Protected Monument by the Department of Archeology on 01/11/1996.

This temple is located in the 69A Ravana Ella Grama Niladhari Division in the Ella District Secretariat Division of the Badulla District of the Uva Province.

It is 1½km along the narrow road to the right of the 16km post reached traversin1km past Ella town from Bandarawela on the Ella Wellawaya road.

Legend has it that this temple built in a cave on an escarpment had been originated by King Valagambahu in the 2 c B.C. The cave with a drip-ledge has paintings and sculptures that exhibit the features of the Kandyan period.

The roof of the cave has a thin layer of mortar with paintings of circular patterns of lotuses, creeper designs and floral designs. Though the sculptures in the cave temple are ancient it appears that they had been painted with modern day paints. The inner walls and the tiled canopy built to protect the cave from the elements that had undergone decay have been recently restored.

The renowned Ravana Ella Cave is located close by the cave temple. The excavations done by the Archaeological Department has revealed evidence of human habitation dating back to 25000 years.

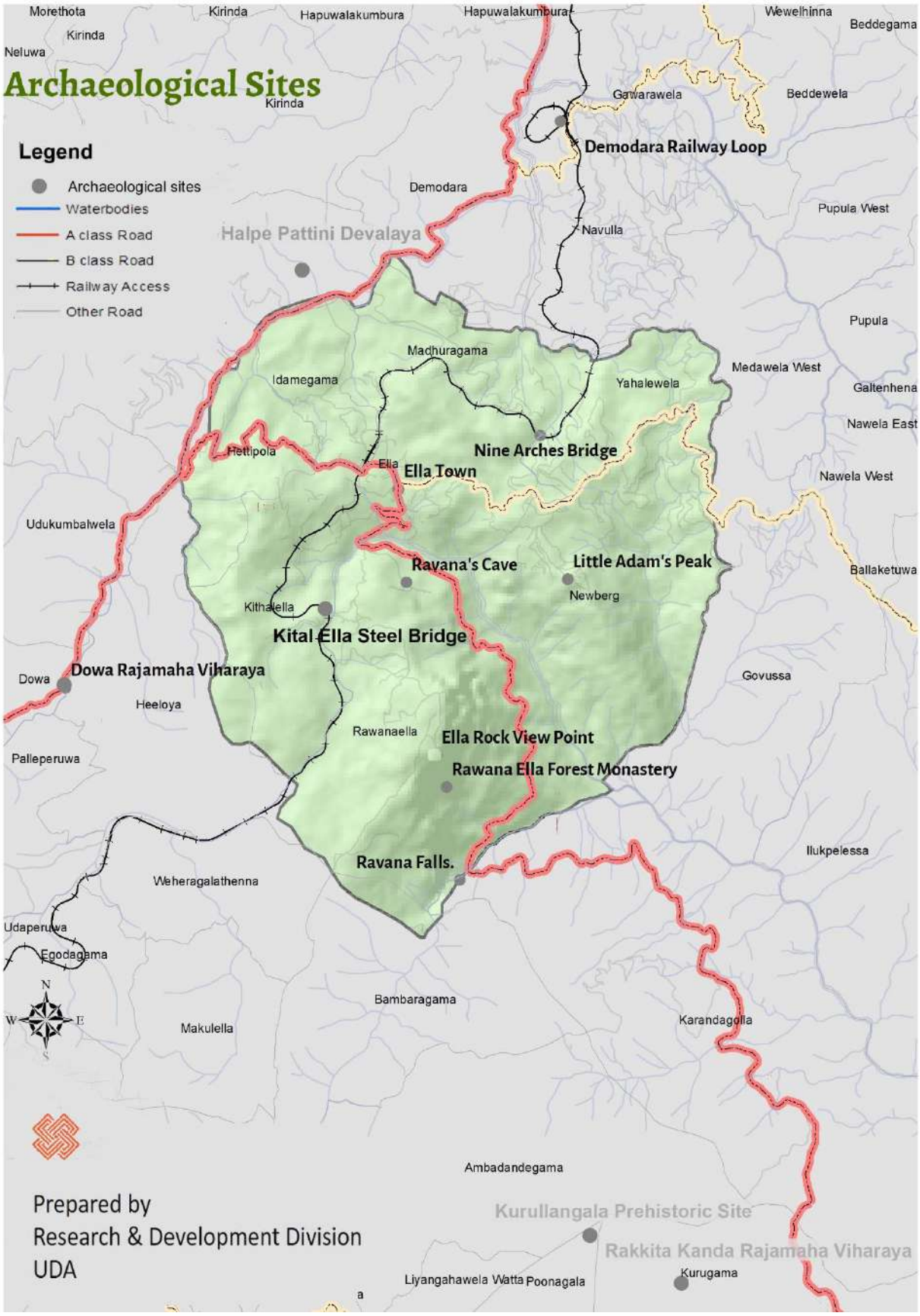
(b) Conservation of declared archeological sites by the Department of Archeology around Ella Planning Area

There are number of declared archeological sites located outside of the Ella Planning Area which are also key attractions frequently visited by tourists coming to Ella. Hence, Ella TDMP recommends the conservation of such archeological sites mentioned below.

- Dowa Purana Rajamaha Viharaya - 01/11/1996
- Rakkhitha Kanda Purana Viharaya – 22/11/2002
- Bogoda Raja Maha Viharaya – 22/11/2002
- Ella Halpe Pattini Dewalaya – 8/4/2009

(c) Conserving the non-declared archeological sites located in and around the Ella Planning Area as protected monuments/ sites

- Demodara Railway Station
- Nine Arch Bridge
- Kithal Ella Steel Bridge
- Kurullangala Prehistoric Cave Art Site



Map 2-7: Locations of archeologically important places identified for conservation

2.3.2 Application of suitable conservation measures and techniques at each archeological site in collaboration with the Department of Archeology (Project Code – ES-3-1)

This strategy is applicable for all identified archeological sites mentioned in the sections (a), (b) and (c) above. It is recommended to conduct an Archeological Impact Assessment (AIA) for any development carried out at archeological sites exceeding the extent of 0.025 hectares under the supervision of Department of Archeology.

2.3.3 Physically demarcating the boundaries of the declared and conserved archeological sites with appropriate boundary demarcation methods (Project Code – ES-3-2)

2.3.4 Promoting the declared and conserved archeological sites as tourist attractions.

	Project Name	**Project Code**
01	Ravana Ella Ancient Temple Access Way Improvement	TP-1-1
02	Construction of a viewing deck at Demodara Loop	TP-1-2
03	Nine Arch Bridge Access Way Improvement	TP-1-3
04	Nine Arch Bridge Service Area Improvement	TP-1-4

Table 2-7: Proposed Archaeological Site Improvement Projects

Each above project has been detailed in the section 4.1.1. of Tourism Promotion Strategy.

STRATEGY

Development Management

03

Build here
but protect the environment
of Ella

3. Development Management Strategy

The previous chapter; Environment Management Strategy presented the sensitive areas identified to be reserved, protected and conserved in order to conserve the unique green spectrum in Ella. Given that Ella Planning Area is relatively small in extent and that a larger portion of the total area is environmentally sensitive, conservation is not merely adequate but all developments should be well managed as not to cause any environmental damage.

Thus this strategy elaborates the proposed measures to manage the future development in identified developable zones within Ella Planning Area. The decisions on future development have been drawn based on the predictions on future development demand and the carrying capacities of Ella. Ella has limited developable areas as well as there are infrastructure capacity limits. All these limits have been evaluated against the predicted future development demand including both residential demand as well as the tourism development demand.

3.1 Predicted future residential and tourism demand in Ella

The future residential and tourism demand have been calculated with reference to the residential population and no. of tourist arrivals.

The below sections present a summary of predicted residential population and tourist arrivals and their distribution within Ella Planning area.

3.1.1 Residential Population Forecast

Existing (2019)

Residential Population of Ella Planning Area – 2011	- 8682
Residential Population of Ella Planning Area – 2019	- 9000
Annual Average Population Growth Rate (2011-2019)	- 0.45%

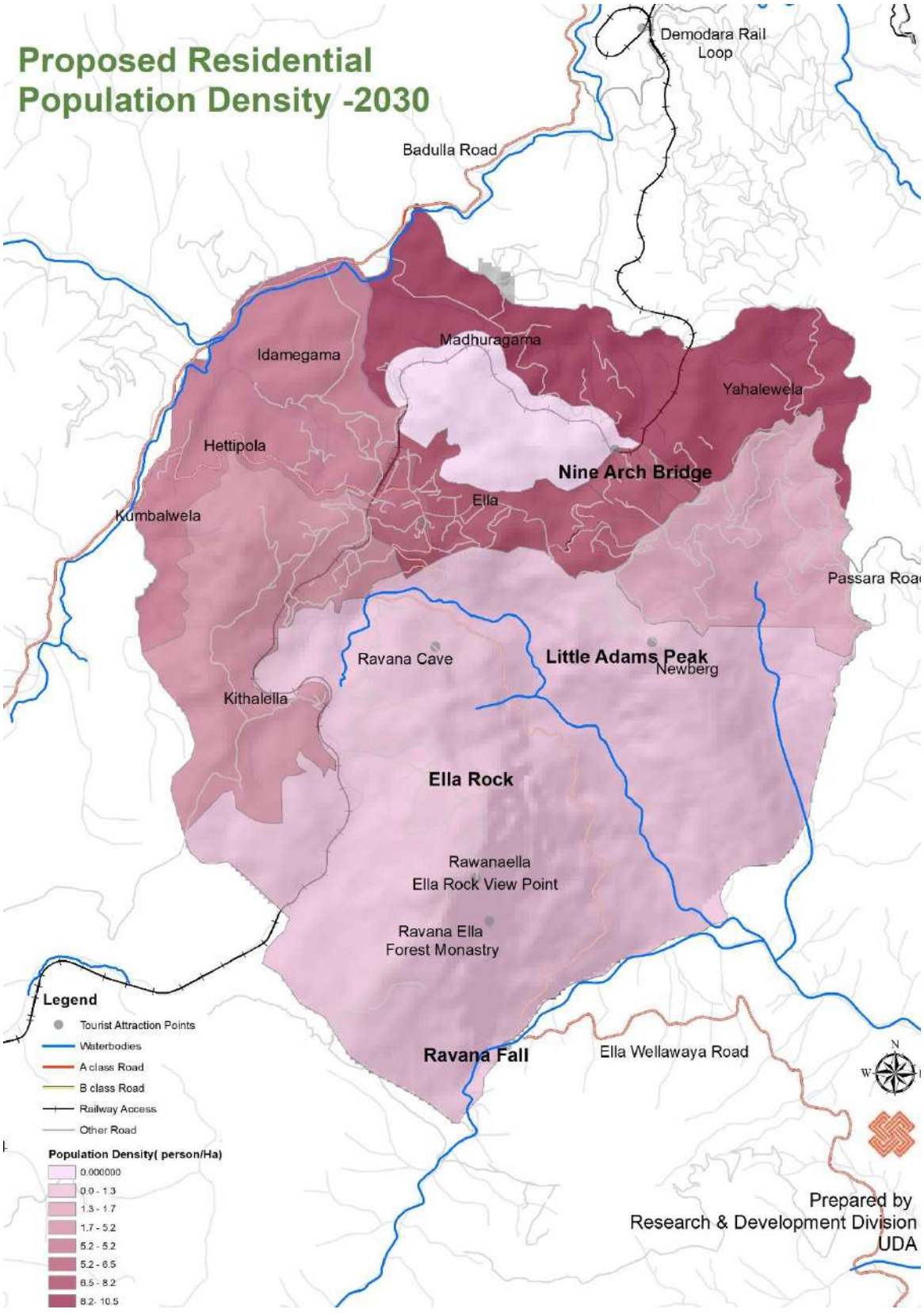
Forecast (2030)

Estimated Residential Population – 2030	- 9600
Estimated Annual Average Population Growth Rate (2019-2030)	- 0.6%

Zone wise Distribution of Residential Population – 2030

No.	Zone	Residential Population - 2030
01	Limited Tourism Service Zone	145
02	Green Conservation Zone	2428
03	Tourism Service Promotion Zone	798
04	Tourist Accommodation Zone	1716
05	Tourist Accommodation Promotion Zone	2653
06	Green Tourism Zone	1860

Table 3-1: Zone wise Distribution of Residential Population - 2030



Map 3-1: Zone wise Distribution of Residential Population - 2030

3.1.2 Forecast of No. of Tourist Arrivals

The estimation of no. of tourist arrivals at Ella has been explained in the section 4.3 of the Volume I – Part A of the Ella TDMP. The no. of expected tourist arrivals were calculated considering three scenarios;

- Tourist carrying capacity in terms of possible accommodation capacity
- Tourist carrying capacity in terms of space availability of visiting places
- Tourist carrying capacity in terms of infrastructure availability

Evaluation results indicated that the scenario considering the tourist carrying capacity in terms of space availability of visiting places is the most appropriate and reasonable scenario to predict the No. of Tourist Arrivals in Ella Planning Area.

Accordingly, the estimated no. of tourist arrivals for year 2030 is as follows.

Existing (2019)

Annual No. of Tourist Arrivals in Ella Planning Area – 2018	- 210,000
Annual Average Growth Rate (As per Business as Usual Scenario)	- 25%
Per Day No. Tourist Arrivals in Ella Planning Area – 2018	- 500

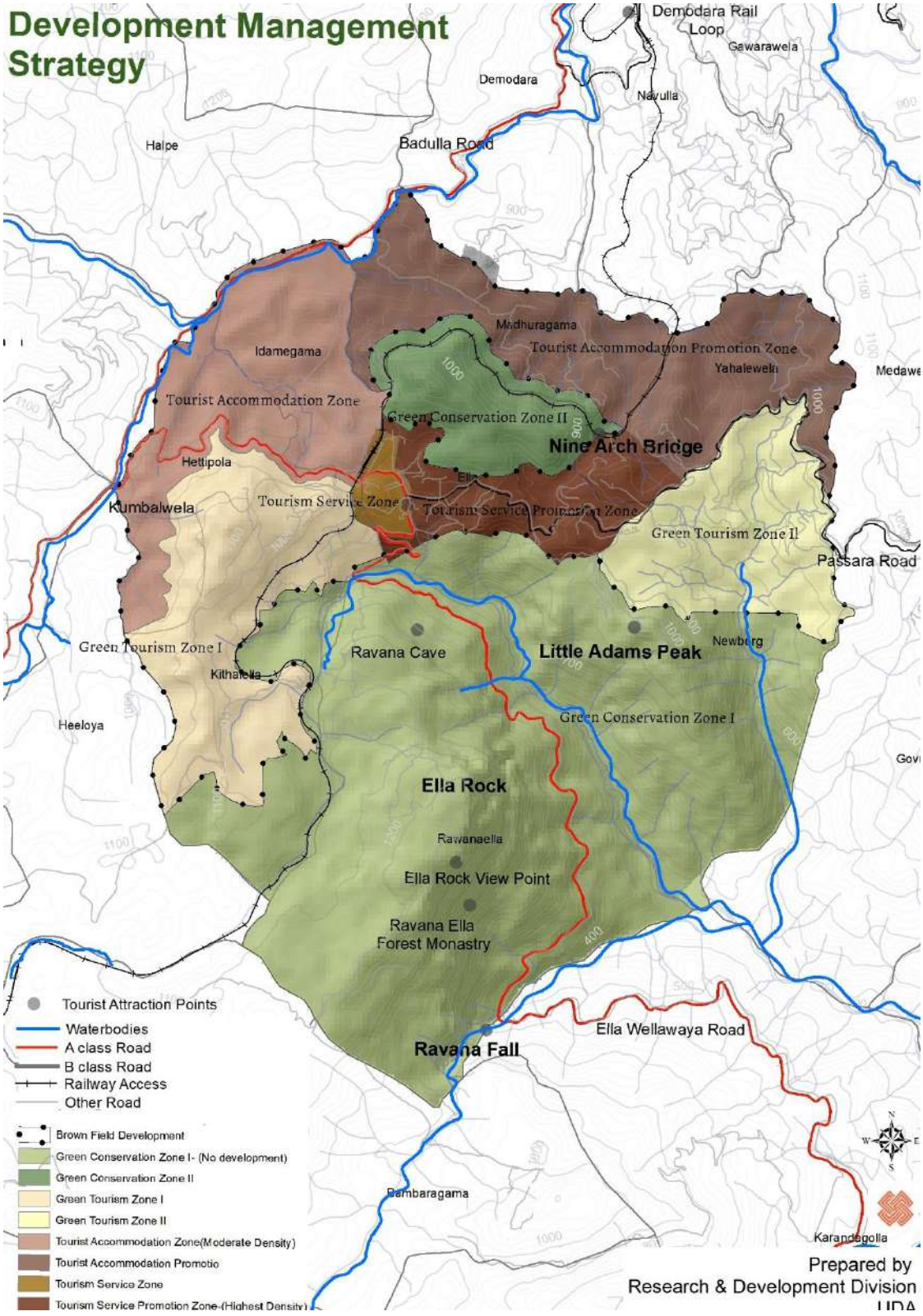
Forecast (2030)

Estimated Per Day No. of Tourist Arrivals – 2030	- 1600
Estimated Annual No. of Tourist Arrivals – 2030	- 576,000
Estimated Annual Average Growth Rate	- 8.4%

3.2 Proposed Development Management Zones within Ella Planning Area

Based on various analysis such as environment sensitivity analysis, development pressure analysis, agglomeration potential analysis, carrying capacity analysis and visibility analysis, the Ella TDMP has identified and proposed five (05) developable zones. Further to that, there is another zone namely, Environment Conservation Zone which includes reserved areas, special environment protection areas and conservation areas.

According to the Carrying Capacity Analysis, it was identified that the maximum capacity of Ella Planning Area based on the capacity of each tourist attraction in terms of space as not to reach congestion is, 1600 tourists per day. However, the current per day tourist attraction is 500. Therefore, the Ella TDMP proposes to accommodate the maximum carrying capacity of 1600 tourist per day by 2030 and to freeze the total tourism promotion in Ella from 2030 onwards. The plan proposes to cater the 1600 tourists per day, by 2030, by promoting tourism development at identified relatively low sensitive potential lands and providing required facilities. As 56% of total area is proposed to be freezed as the environmental conservation zone, only 44% can be released for the new developments. This 44% portion of land which is termed as Developable Area is divided into five zones as elaborated in the below table.



Map 3-2:Composite Map of Development Management Strategy

No.	Name of the Zone	% Built up Coverage within the zone	Total Extent/ (Ha)	Areas Covered
01	Tourism Service Promotion Zone	90%	106	Along the Passara Road up to Access point of Nine Arch Bridge including a part of the Town Area
02	Tourism Service Zone	80%	20	Existing Ella Town Area
03	Tourism Accommodation Promotion Zone	55%	266	Madhuragama and Yahalewala Grama Niladhari Areas including Nine Arch Bridge site
04	Tourism Accommodation Zone	45%	207	Hettipola and Idamegama Grama Niladhari Areas
05 - I	Green Tourism Zone – I (Kithal Ella)	40%	220	Kithal Ella Grama Niladhari Area
05 - II	Green Tourism Zone – II (Newberg)	20%	146	Newberg Grama Niladhari Area

Table 3-2: Proposed Development Management Zones in Ella Planning Area

The Ella TDMP proposes to maintain different characters and development densities as suitable for each above zone and they have been explained in the table below.

No.	Name of the Zone	Proposed Character	Justification
01	Tourism Service Promotion Zone	This zone will be an extension of the existing town area. It will be the zone having the highest development density compared to the other development management zones in Ella. The main land uses of this zone will be tourist service facilities such as restaurants, banking facilities, health care, parking, mini-supermarkets and spas & gymnasium etc.	This area is allowed with relatively higher density as it has the potential with more developable lands which are having relatively low environmental sensitivity, low disaster risk and higher carrying capacity.
02	Tourism Service Zone	This zone covers the existing town area which has been rapidly developed during the past decade. This zone is proposed to have two characters; vibrant character along the main street (Ella – Wellawaya Road) and a serene eco-friendly character in the remaining area. It is envisaged to pause the	Although, Ella is renowned for its unique serene character, it cannot be experienced when entering to the Ella town as many haphazard developments have been occurred surrounding the Ella town area. If this is continued, it will degrade the unique image of Ella and eventually decrease its attraction. Further, NBRO has identified

		existing rapid haphazard development trend within the town given that it is harmful to the environment as well as the most sought character of Ella which is the serenity.	Ella town area as a high landslide risk area and has advised to fully control the development. Considering both above reasons, the Ella TDMP proposes to control the development while preserving the green area and to define and maintain its character as to convey the tourists that they are entering to one of the most serene destinations.
03	Tourism Accommodation Promotion Zone	In future, this zone will be the main tourism accommodation zone having all types of accommodation options ranging from 1 – star to 7 – star. This area will have a moderate density with approximately 50% built coverage. However, the developments of this zone will be regulated to maintain serene and eco-friendly character throughout the zone.	This zone has relatively low environmental sensitivity, low landslide risk thus has a higher potential for development. Therefore, this zone is ideal to direct the future tourism development.
04	Tourism Accommodation Zone	This area will also open for tourism development but yet it would also have provisions for residential development as well.	Just as the Tourism Accommodation Promotion Zone, this zone also has relatively low environmental sensitivity, low landslide risk thus has a higher potential for development.
05 - I	Green Tourism Zone – I (Kithal Ella)	This area is envisaged to have a relatively low density distributed development in harmony with the unique green spectrum of Ella.	This zone has visual access to five key attractions of Ella namely Ella Rock, Ella Gap, Kithal Ella waterfall, Kithal Ella steel bridge as well as the entire green spectrum of Ella. Thus, it is important to manage the development as not to disturb these view sheds and view corridors. Therefore, this zone is proposed to have a relatively low density distributed development.
05 - II	Green Tourism Zone – II (Newberg)	This area is also envisaged to have a relatively low density	This zone has visual access to Mini Adam's Peak which is one

		distributed development in harmony with the unique green spectrum of Ella.	of the main attractions of Ella. On the other hand, this area has a large extent of tea estates and grasslands. Therefore, this zone is proposed to have a relatively low density distributed development.

Table 3-3: Characters of the Proposed Development Management Zones

3.3 Proposed Development Management Strategies within Ella Planning Area

Several strategies have been proposed to manage the developments within the Development Management Zones explained in the previous section. There are two types of strategies;

- Spatial Development Projects and Guidelines
- Character Enhancement Projects and Guidelines

3.3.1 Spatial Development Projects and Guidelines (Project Code – DM-1)

Several direct spatial development projects and guidelines have been introduced for each Development Management Zone as elaborated in the following sections.

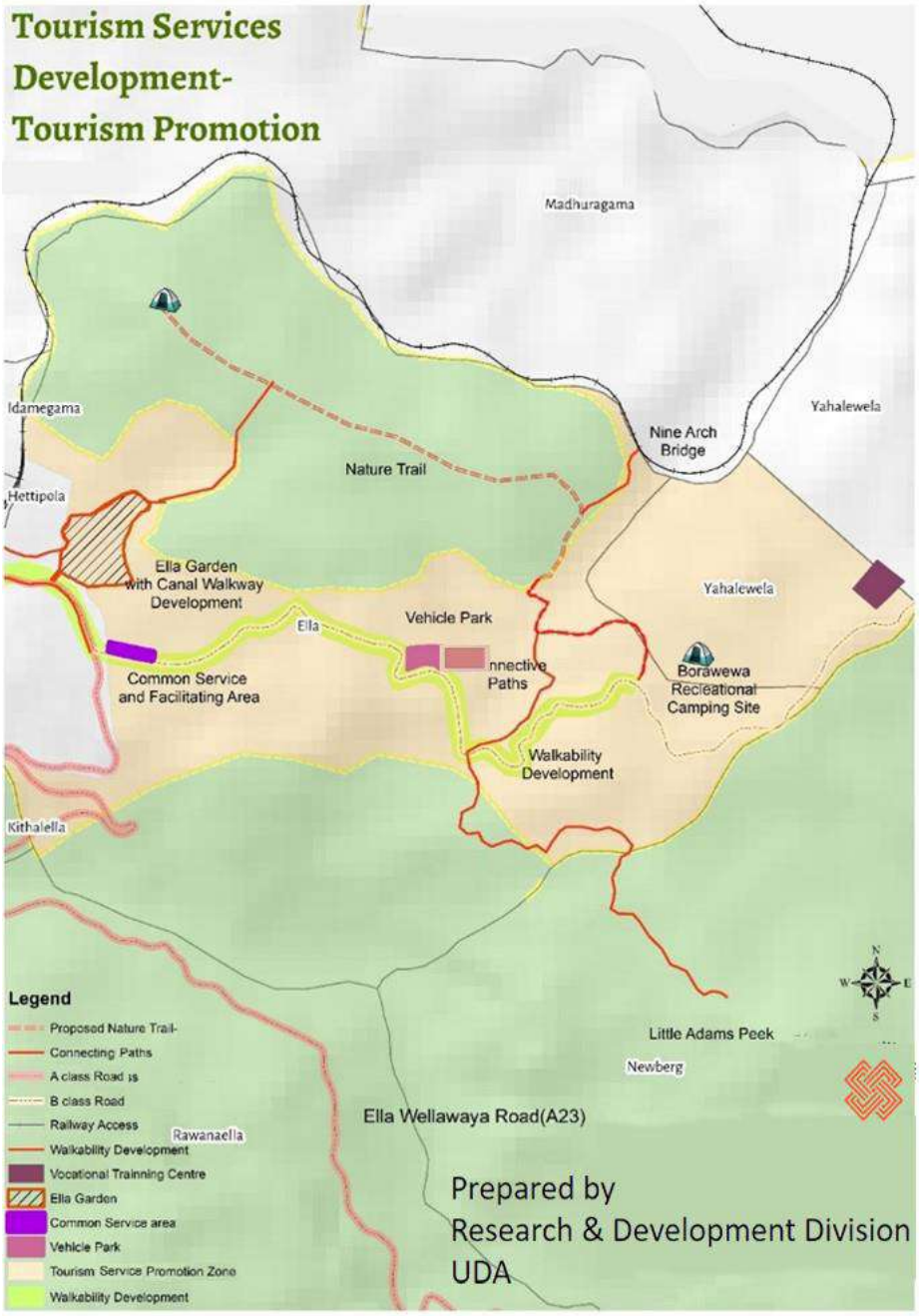
a) Tourism Service Promotion Zone (Project Code – DM-1-1)

106 ha stretch located nearly 1.5km along the Passara Road is identified as the Tourism Service Promotion Zone. This zone will be the main service facilitating area as well as the development promotion area. As it is planned to limit the development in town area, it is required to accommodate the demand for the tourism related developments in order to cater the needs of tourists expected in next ten years. As this zone has relatively low landslide risk, it is proposed to encourage development along the Passara Road. This zone will specially facilitate the tourists who visit Ella Garden, Mini Adams Peak, Bora Wawa and Nine Arch. This zone is not promoted for accommodation facilities. This strip will act as a service strip for all tourists. At present, there are serious issues due to lack of parking spaces, common facilities and sanitary facilities thus it is proposed to locate required common facilities and services and commercial developments within this strip.

The below table includes all types of spatial development projects proposed within the limits of Tourism Service Promotion Zone. These projects mainly include road and foot paths developments, services improvements and landscape improvements and these projects will be elaborated in respective strategies.

No.	Project Name	Project Code	Reference
01	Ella garden development project	TP-2-2	Section 4.1.2.2 of Tourism Promotion Strategy
02	Common service facility development project	TP-3-1	Section 4.2.1 of Tourism Promotion Strategy
03	Parking area development project	TD-4-2	Section 5.3.2 of Transport Development Strategy
04	Road and Foot Path Development at Ella Town	TD-02	Section 5.1.2.2 of Transport Development Strategy
05	Borawewa landscaping and camping project	TP-2-5/TP-2.1.2	Section 4.1.2.5,4.1.2(b) of Tourism Promotion Strategy
06	Sanitary Facilities Development Project	TP-3-2	Section 4.2.2 of Tourism Promotion Strategy

Table 3-4: Proposed projects within Tourism Service Promotion Zones



Map 3-3: Proposed projects within Tourism Service Promotion Zones

The zoning and building regulations introduced to maintain the anticipated developments within Tourism Service Promotion Zone are given in the Volume II – Part A of the Ella TDMP.

b) Tourism Service Zone – Ravan Township Development (Project Code – DM-1-2)

20 ha land stretch located along the Ella - Wallawaya road which is bounded by own mountainous setting is proposed as the Tourism Service Zone. This zone covers the existing Ella town area which experienced a rapid development past few years and it has also led to a haphazard development trend in Ella town. However, National Building Research Organization has identified this zone as a moderate hazard zone with high landslide risk which has imposed a high threat for human lives. Based on this identification, the NBRO has recommended to install early warning systems and control further developments.

Following through the NBRO guidelines as well as considering the fact that Ella town is located within the most sensitive sub catchment of the Kirindi Oya, future developments will be managed with controlled subdivisions and regulatory guidelines as elaborated in the Volume II – Part A of the Ella TDMP.

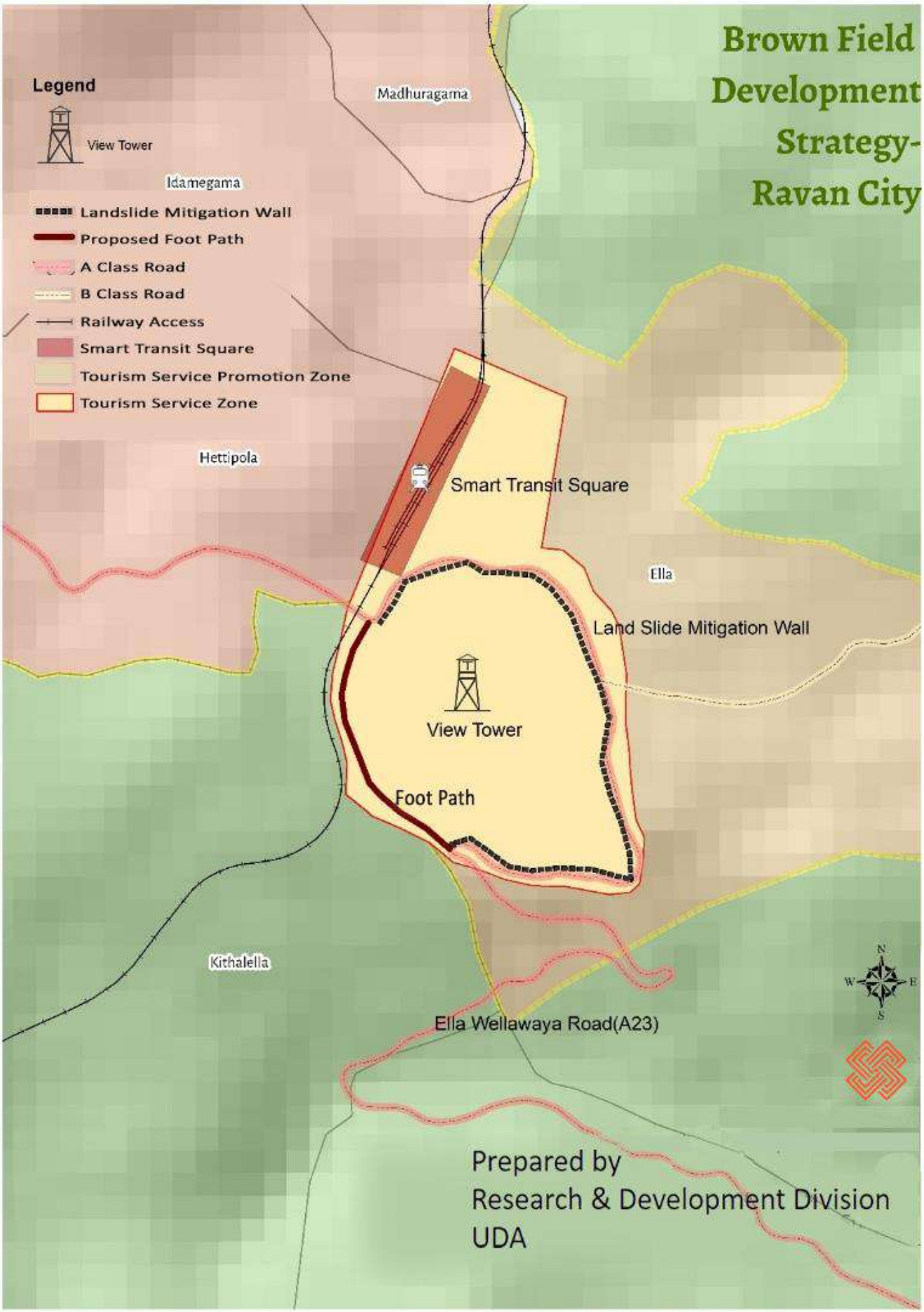
The future spatial development of this zone will be guided through the proposed Ravan Township Development Project. The Ella has a long history connected to the Ravan Legend and its ideal to brand Ella town by the name Ravan City given that the proposed boundaries of the Ella town development also reflects the shape of the Sinhala letter form 'ර' which is pronounced as 'Ra'.

The reason for introducing such a branding is to promote the link between the Ella and Ravan Legend and also to have a unique spatial identity for the Ella Town. As perceived by many of the tourists, Ella Town is currently losing its unique image as a destination of serenity due to haphazard development taking place all over the city disturbing its unique landscapes and natural views. Thus, the proposed Ella Township Development Project includes many proposals to enhance its landscape and overall architectural character of the built area and to protect of special view corridors and view sheds.

The projects proposed under Ella Township Development are given in the following table.

No.	Project Name	Project Code	Reference
01	Cleaning the main storm water drain flowing via Ella Town and redesigning as to maintain it as a natural water path	ES-2-2	2.2.4 of Environment Management Strategy
02	Construction of a foot path by-passing the Ella Town Center	TD-2	Section 5.1.2 of Transport Development Strategy
03	Development of a SMART Railway Square at the existing Ella Railway Station Premises	TD-4-1	Section 5.3.1 of Transport Development Strategy
04	Construction of a view tower at the mountain top of Ella town center	TD-2-6-4	Section 4.1.2.6(d)of Tourism Promotion Strategy
05	Landscaping the roadsides of Ella main strip (along the Ella-Wellawaya Road)	TD-1-1-1	Section 5.1.1.1 Transport Development Strategy
06	Construction of Retention Walls at identified locations prone for landslide	SI-1-1	Section 6.1.1 of Safety Improvement Strategy
07	Physical demarcation of the boundary limits of Ravan City with a tree line	DM-1-2-1	
08	Establishing a landslide early warning system in Ella	SI-1-3	Section 6.1.2 of Safety Improvement Strategy
09	Construction of Urban Square at existing tea estate of Low Dense Special Regulation Area	DM-1-2-2	

Table 3-5: Proposed projects under Ravan Township Development Project within Tourism Service Zone



Map 3-4: Proposed projects under Ravan Township Development Project within Tourism Service Zone

(c) Tourism Accommodation Promotion Zone (Project Code - DM-1-3)

An area having the extent of 266 ha including Yahalawela and Madhuragama GNDs is proposed as the Tourism Accommodation Promotion Zone. As per the environmental sensitivity, disaster risk and carrying capacity analysis, it was identified that this area is a relatively low environment sensitive area with less landslide hazard risk and higher carrying capacity in terms of developable lands. This area has a relatively flat terrain.

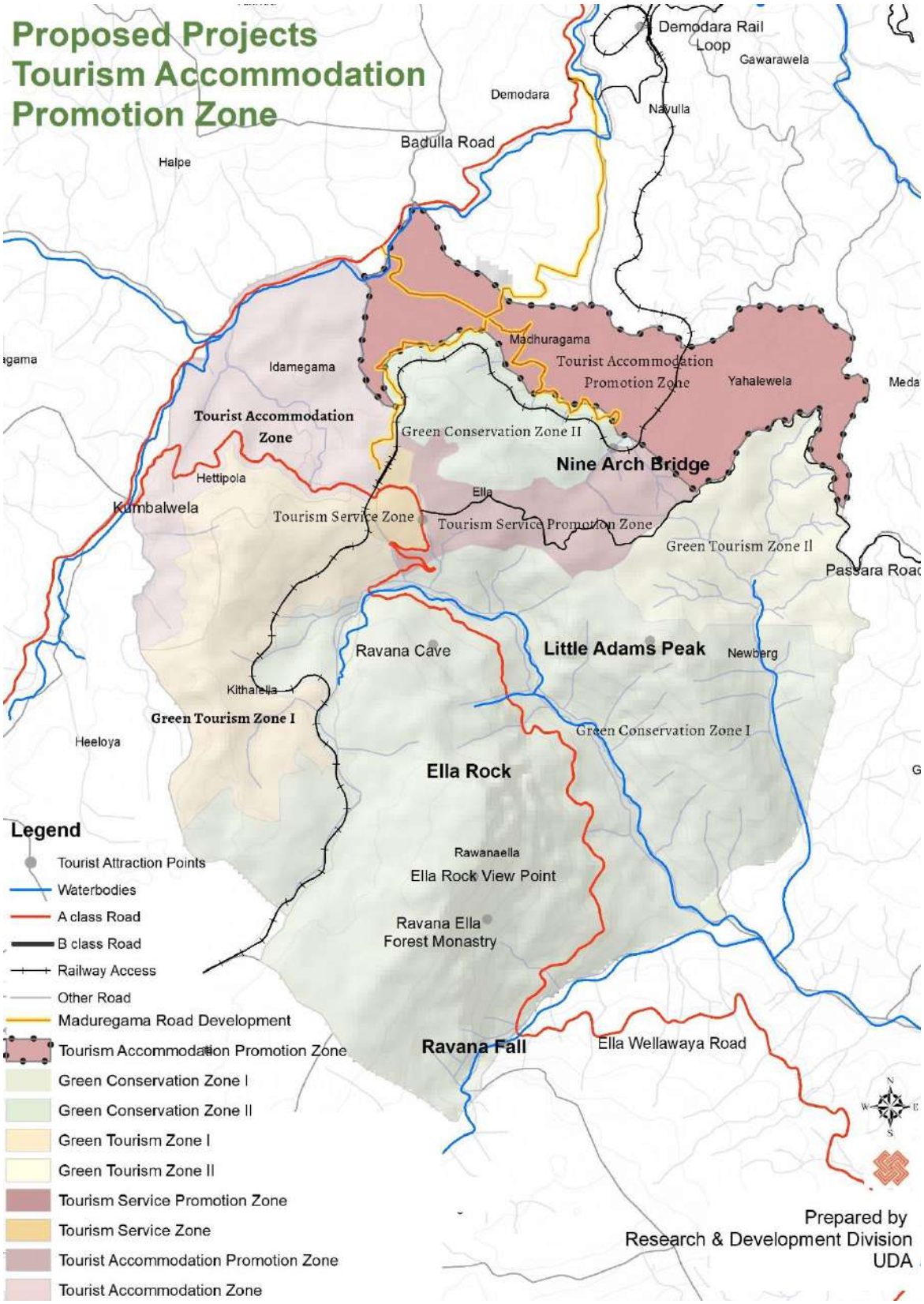
Therefore, this zone is proposed as the main tourism accommodation zone within Ella Planning Area. As the Ella TDMP proposes to conserve more than 50% of the entire planning area and discourage the current development trend within Ella Town and surrounding area, the Tourism Accommodation Promotion Zone will be the alternative zone to attract the future tourism accommodation demand at Ella.

Currently, this area has a unique landscape and scenic view blended with large tea estates, pinus forests, railway track and nine arch bridge. It is also perceived as one of the great potentials to promote tourism accommodation activities within this area. Since, the Ella TDMP aims at making Ella an exclusive tourism destination this zone has the highest potential to induce a high-end tourism accommodation trend at Ella.

However, this area needs transport and infrastructure development interventions to cater the anticipated future tourism accommodation developments.

No.	Project Name	Project Code	Reference
01	Improvement of Madhuragama Road	TD-1-5	Section 5.1.1.5 of Transport Development Strategy

Table 3-6: Proposed projects within Tourism Accommodation Promotion Zone



Map 3-5: Proposed projects within Tourism Accommodation Promotion Zone

(d) Tourism Accommodation Zone (Project Code - DM-1-4)

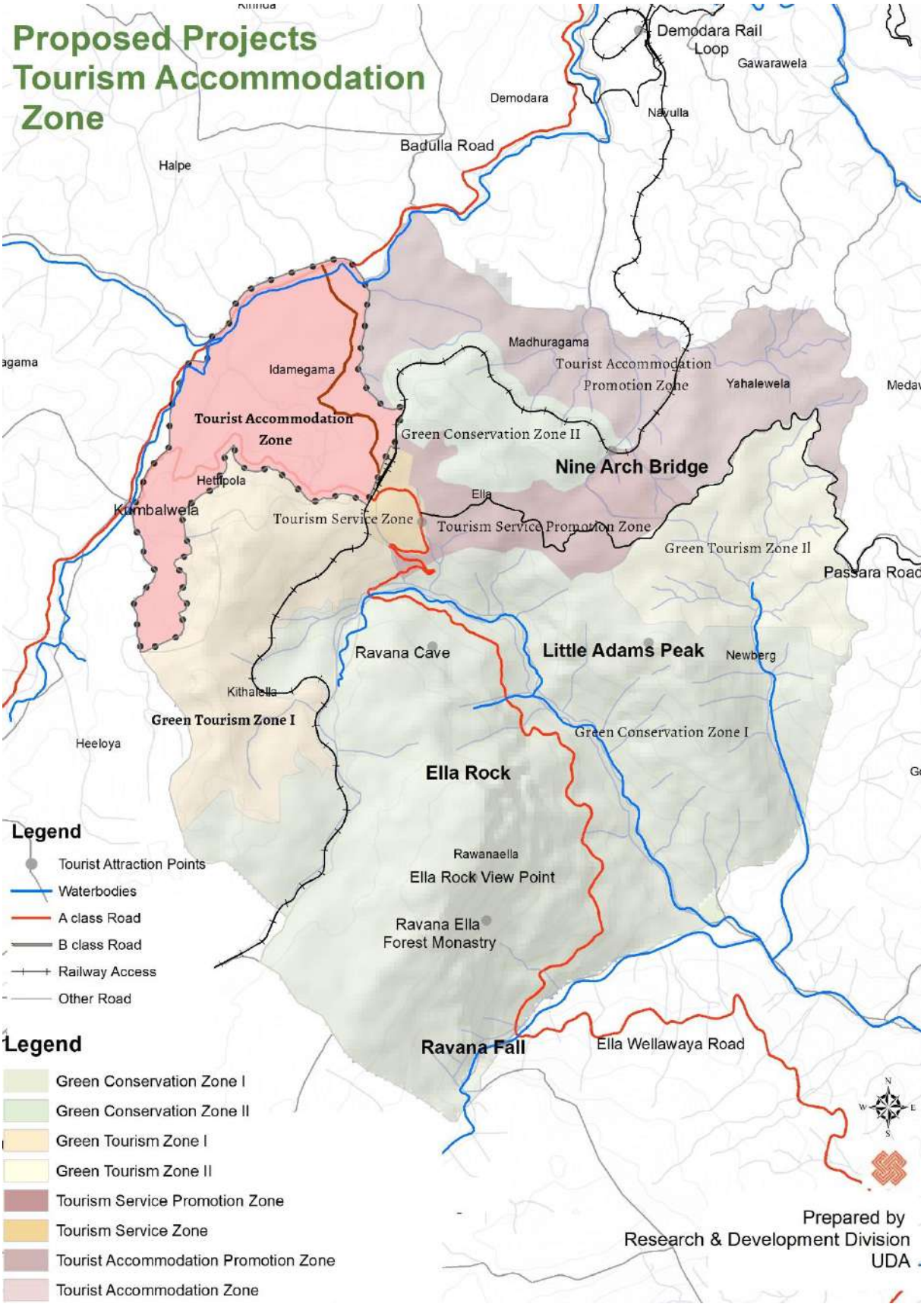
Ella TDMP proposes a zone having an extent of 207 ha including the Hettipola and Idamagama GNDs as the Tourism Accommodation Zone. This zone also has a relatively low environmental sensitivity and low landslide disaster risk thus has a higher potential for development. Currently, this area is predominantly a residential and agricultural area with a growing trend of homestay tourism activities.

Compared to the Tourism Accommodation Promotion Zone, this zone has a larger proportion of residential and agricultural uses. Thus, Ella TDMP proposes a balanced mix of residential and tourism accommodation development within this zone.

The infrastructure development projects proposed within Tourism Accommodation Zone are given in the below table.

No.	Project Name	Project Code	Reference
01	Halpe Road Improvement Project	TD-1-4	Section 5.1.1.4 of Transport Development Strategy

Table 3-7: Proposed projects within Tourism Accommodation Zone



Map 3-6: Proposed projects within Tourism Accommodation Zone

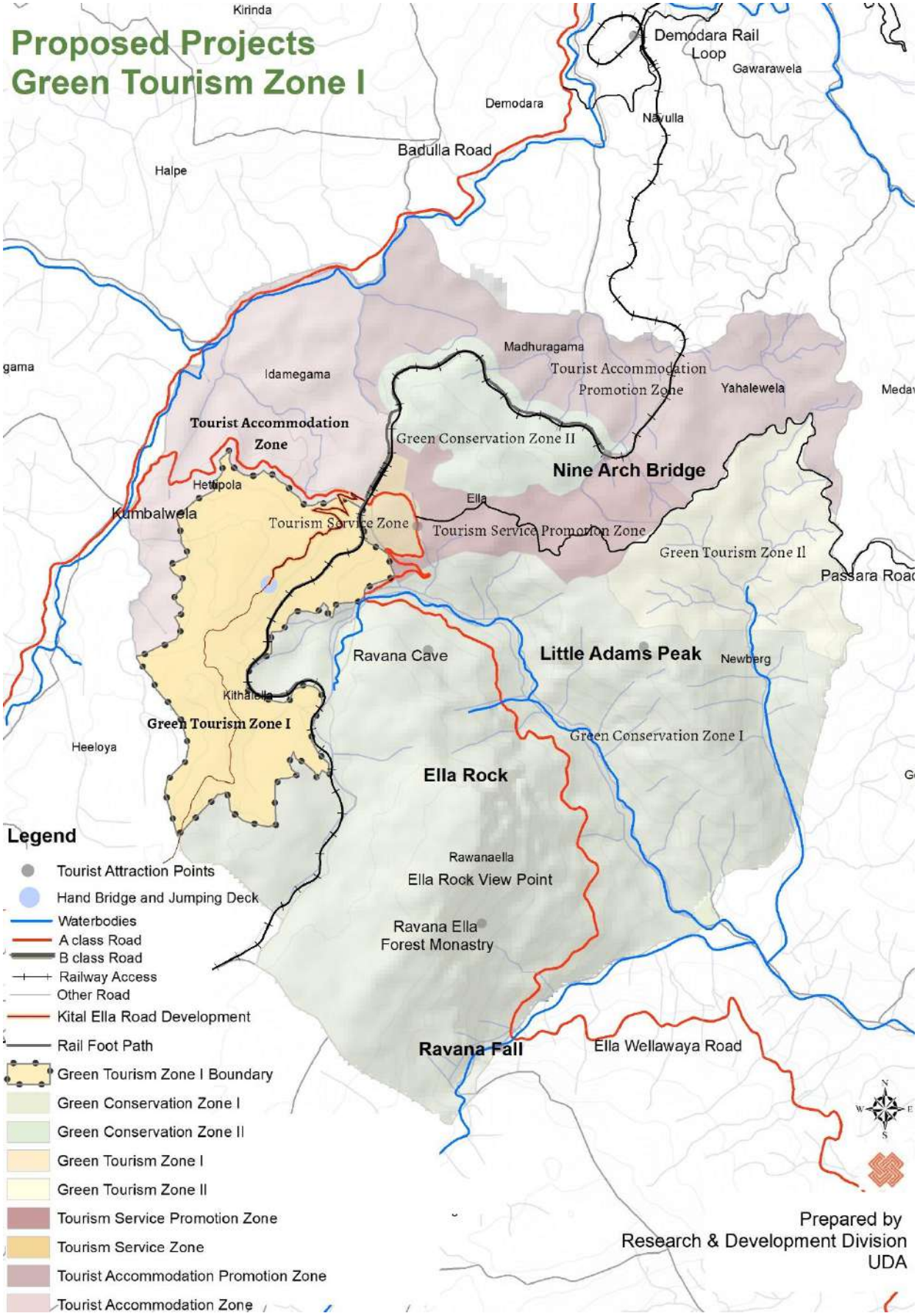
(e) Green Tourism Zone – I (Kithal Ella) (Project Code - DM-1-5)

Green Tourism Zone – I consists of 220ha land area and includes Kithal Ella GND. This zone gives visual access to the entire Green Spectrum and five key tourism attractions of Ella. Currently this area consists of large tea estates and grass lands. Kithal Ella Road passes through this zone and at the either sides of the road reveals beautiful mountainous landscapes, Ella Gap and vistas. This zone has a unique character because of these views.

The Ella TDMP proposes to conserve this unique character and use it as a potential to promote it as a Green Tourism Zone. The projects proposed in this zone are elaborated in the below table.

No.	Project Name	Project Code	Reference
01	Kithal Ella Road Improvement Project	TD-1-3	Section 5.1.1.3 of Transport Development Strategy
02	Hand bridge development project	TP-2-6-3	Section 4.1.2.6 of Tourism Promotion Strategy
03	Bungee Jump Project	TP-2-3	Section 4.1.2.3 of Tourism Promotion Strategy
04	Foot Path Extension from Ella Town to Stargazing Camping Site	TD-2	Section of 5.1.2.2 Transport Development Strategy

Table 3-8: Proposed projects within Green Tourism Zone – I (Kithal Ella)



Map 3-7: Proposed projects within Green Tourism Zone – I (Kithal Ella)

(f) Green Tourism Zone – II (Newberg)

Ella TDMP proposes a zone having an extent of 146 ha of Newberg GND as the Green Tourism Zone. The zone mainly covers the visibility area of the Mini Adam's Peak. Therefore, Ella TDMP proposes to conserve the unique character and green spectrum of this zone with regulated tourism developments. The regulations applicable for this zone is also given in the Volume II – Part A of the Ella Development Plan.

3.3.2 Character Enhancement Projects and Guidelines

As explained in the section 4.2, of the Volume I - Part A of the Ella TDMP degradation of the image of Ella and depletion of sense of place are key issues threatening the attraction of Ella. Mountainous views, unique green spectrum, Ella Gap and landmarks such as Nine Arch Bridge are key attractions of Ella thus it is mandatory to protect their visible areas. However, the situation analysis revealed that there are many constructions in these special visible areas and especially at the best viewpoints thereby obstructing the unique scenic views. Further, the architecture and the physical appearance of these constructions are usually contrasting to the natural setting of Ella thus ruin the beautiful views downgrading the image of Ella.

The perception surveys revealed that this trend was hugely criticized by the tourists and they demanded strict interventions to control this situation.

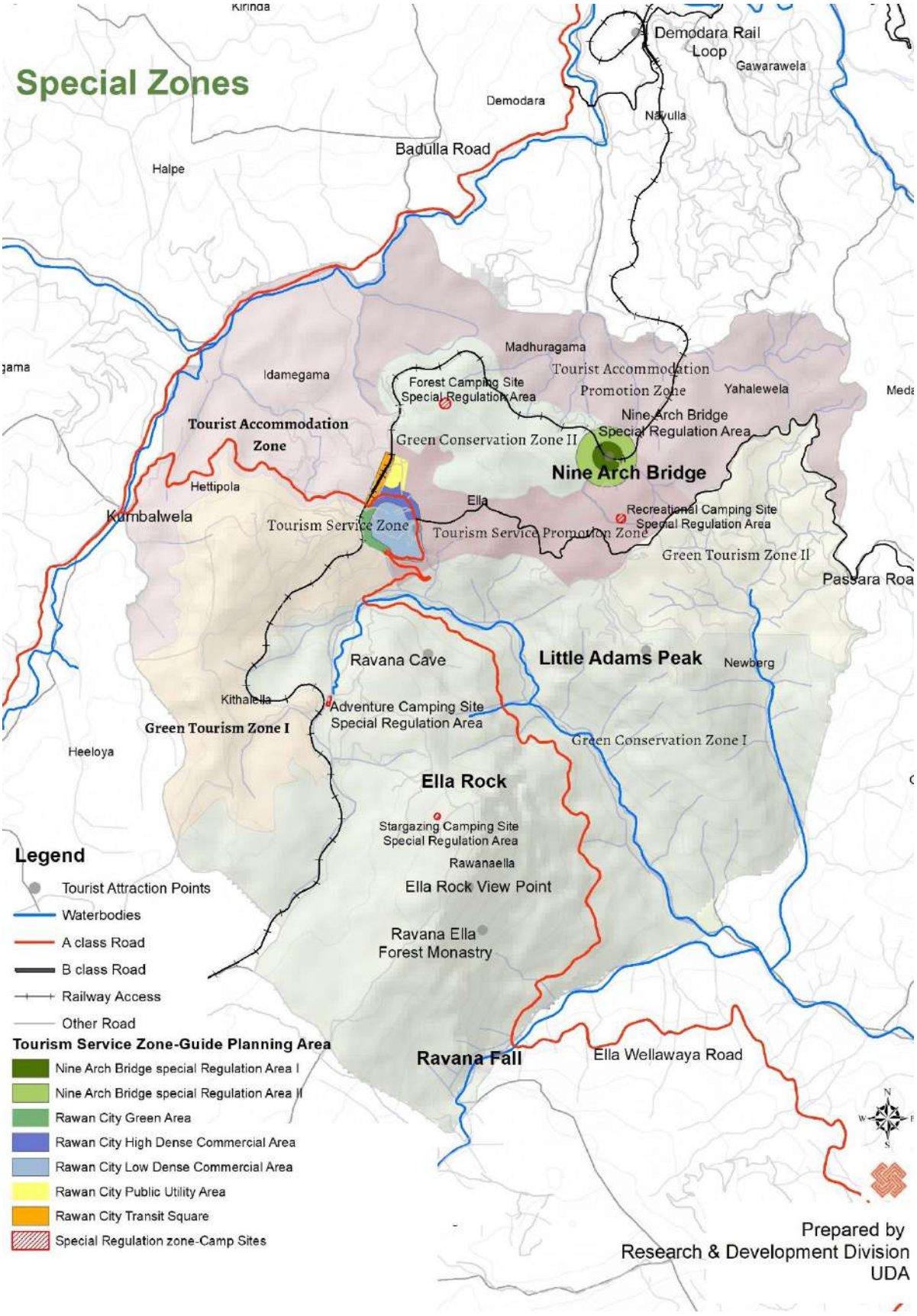
Taking all above into consideration Ella TDMP proposed number of strategies to enhance the unique image of Ella and introduce regulatory measures to manage the developments in harmony with its image.

3.3.2.1 Introducing architectural and landscaping guidelines for developments in Development Management Zones and identified Special Regulation Areas of Ella

Special architectural and landscaping guidelines proposed for each Development Management Zones and identified Special Regulation Zones are given in the Volume II – Part A of the Ella Development Plan.

The proposed Special Regulation Zones of each Development Management Zones which have been identified based on tourism attraction sites are as follows.

- Rawan City Transit Square
- Rawan City Public Utility Area
- Rawan City High Dense Commercial Area
- Rawan City Low Dense Commercial Area
- Rawan City Green Area
- Nine Arch Bridge Special Regulation Area I & II
- Recreational Camping Site Special Regulation Area
- Forest Camping Site Special Regulation Area
- Adventure Camping Site Special Regulation Area
- Stargazing Camping Site Special Regulation Area



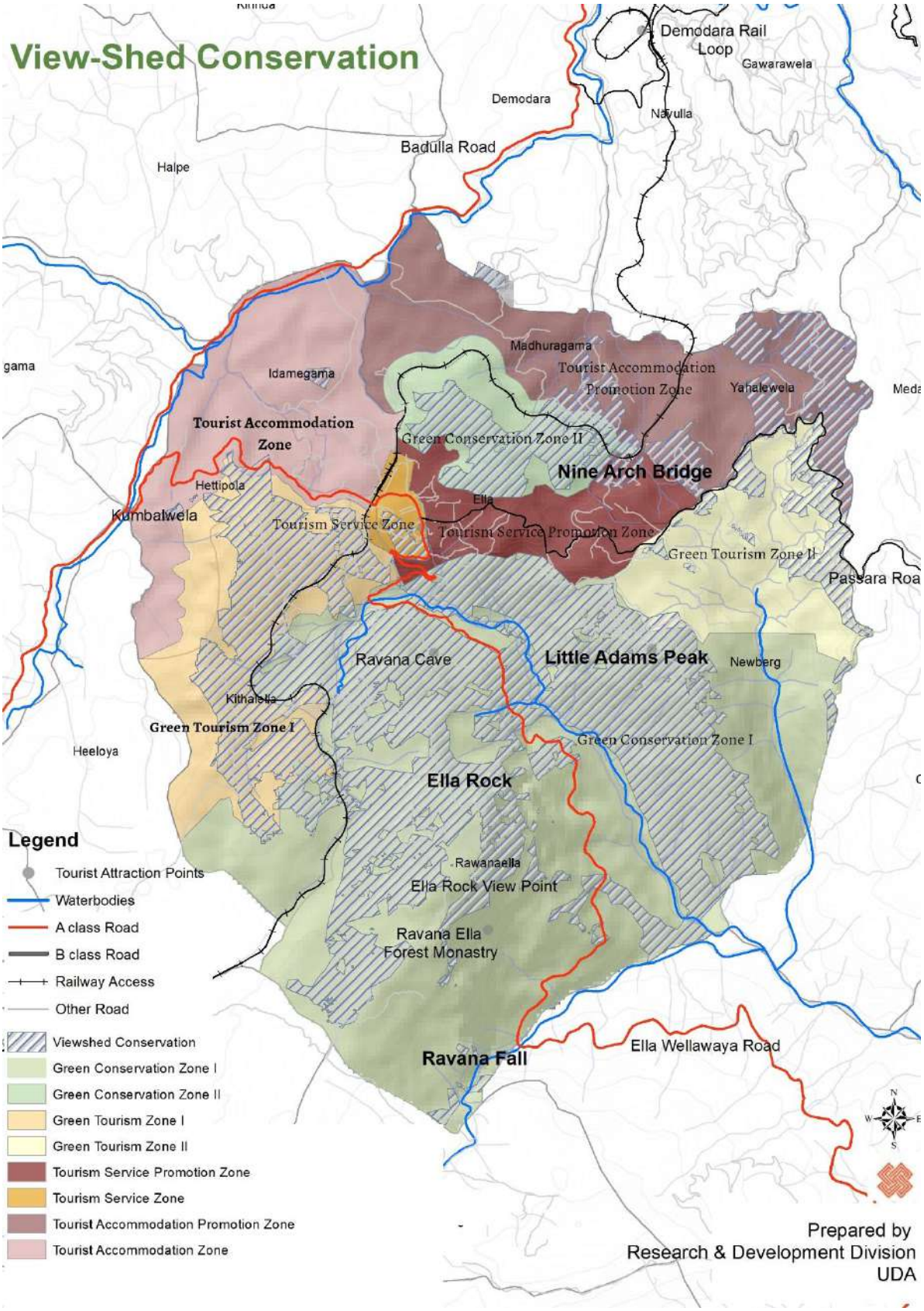
Map 3-8: Special Regulation Zones in Ella

3.3.2.2 Regulating developments in identified view sheds in Ella

Mainly there are three types of view sheds identified based on the considered viewpoints as follows.

No.	Type of view shed	Extent of the view shed protection area
01	View sheds of the viewpoints located along the Ella – Wallawaya road and Passara road (For selected 08 public view points)	330 ha of view shed area along the Ella - Wallawaya road
02	Site specific View sheds – (For Nine Arch Bridge, Little Adam's Peak and Ella Rock)	500 ha of view shed area of the specific sites
03	View sheds of proposed observation decks	704 ha of surrounding area of the proposed observation decks

Table 3-9: The types of view shed protection areas in Ella

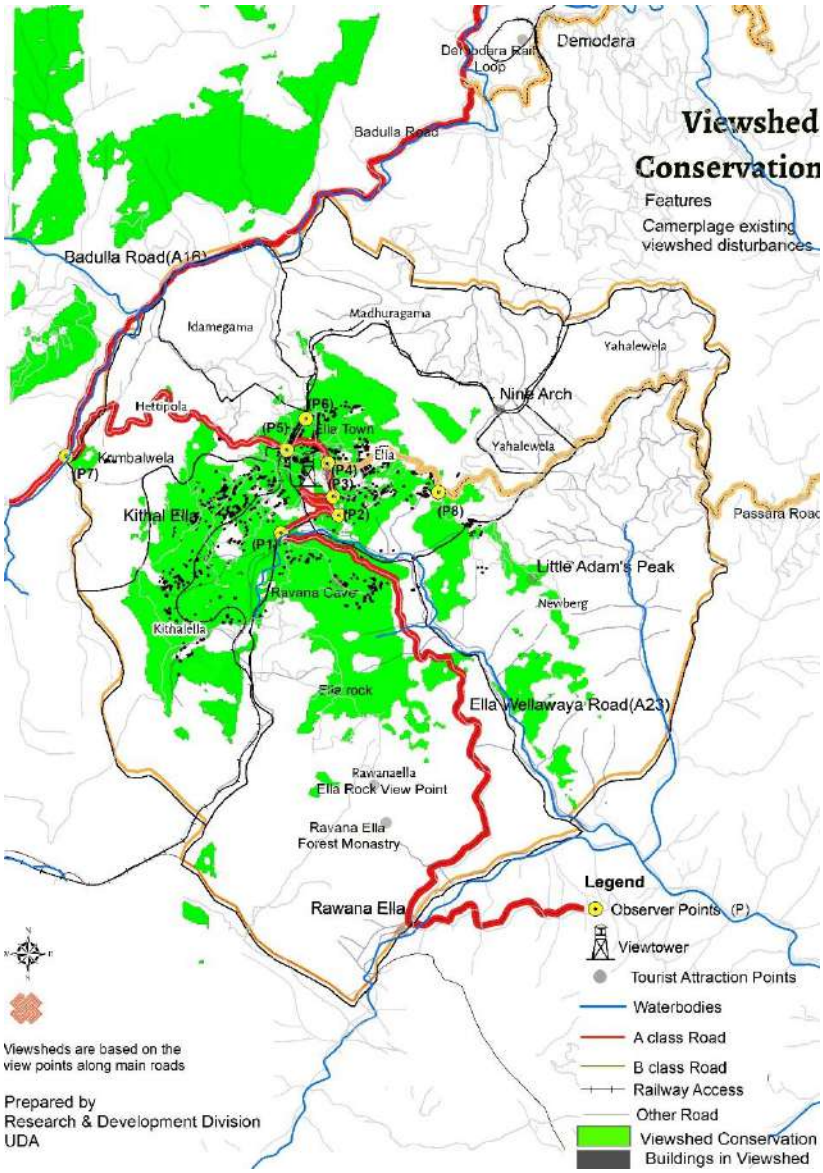


Map 3-9: Overall view shed protection area of Ella

**NOTE - The view sheds were identified by carrying out a view shed analysis using Arc GIS software.*

The developments in these view sheds will be managed with special regulations introduced for existing developments and new developments separately as explained in the below sections.

(a) View sheds of the viewpoints located along the Ella – Wallawaya road and Passara road



Map 3-10: View shed protection area of the viewpoints located along the Ella – Wellawaya road and Passara road (... Public Viewpoints)

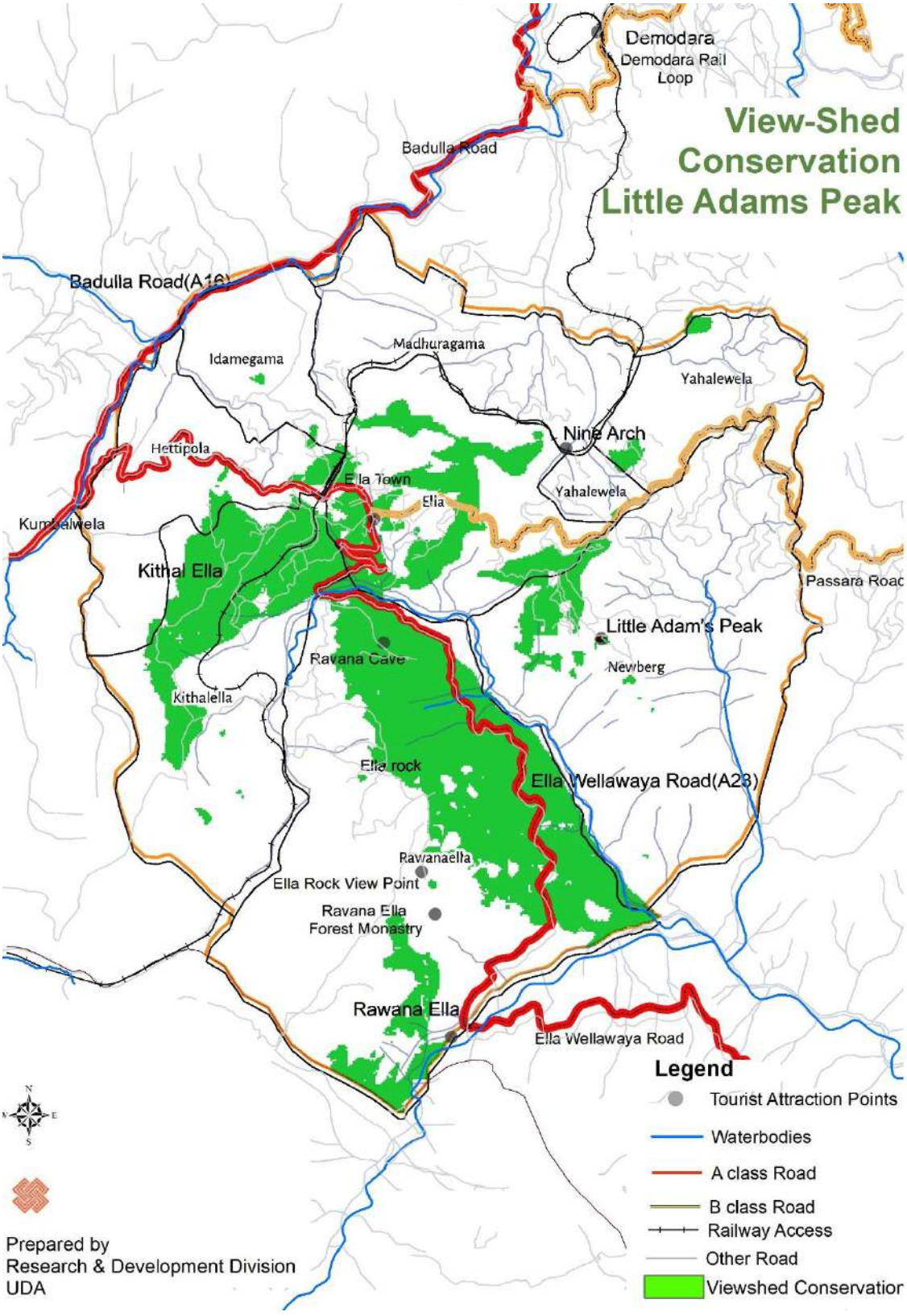
	Point Name	latitude	longitude
P1	To ravana cave	81.04760253	6.876048265
P2	Wanguwa	81.04915368	6.872970917
P3	Last Point	81.04633493	6.873857829
P4	Near Sumangalaramaya-	81.03128508	6.873444611
P5	Bridge Exite – P5	81.0495217	6.87067587
P6	Infront of Ella Railway Station	81.04991802	6.869402152
P7	Entrance Pointe to	81.0460138	6.868155997
P8	Path to Little Adams peak	81.05669962	6.870993204

Table 3-10: GPS coordinates of the view points

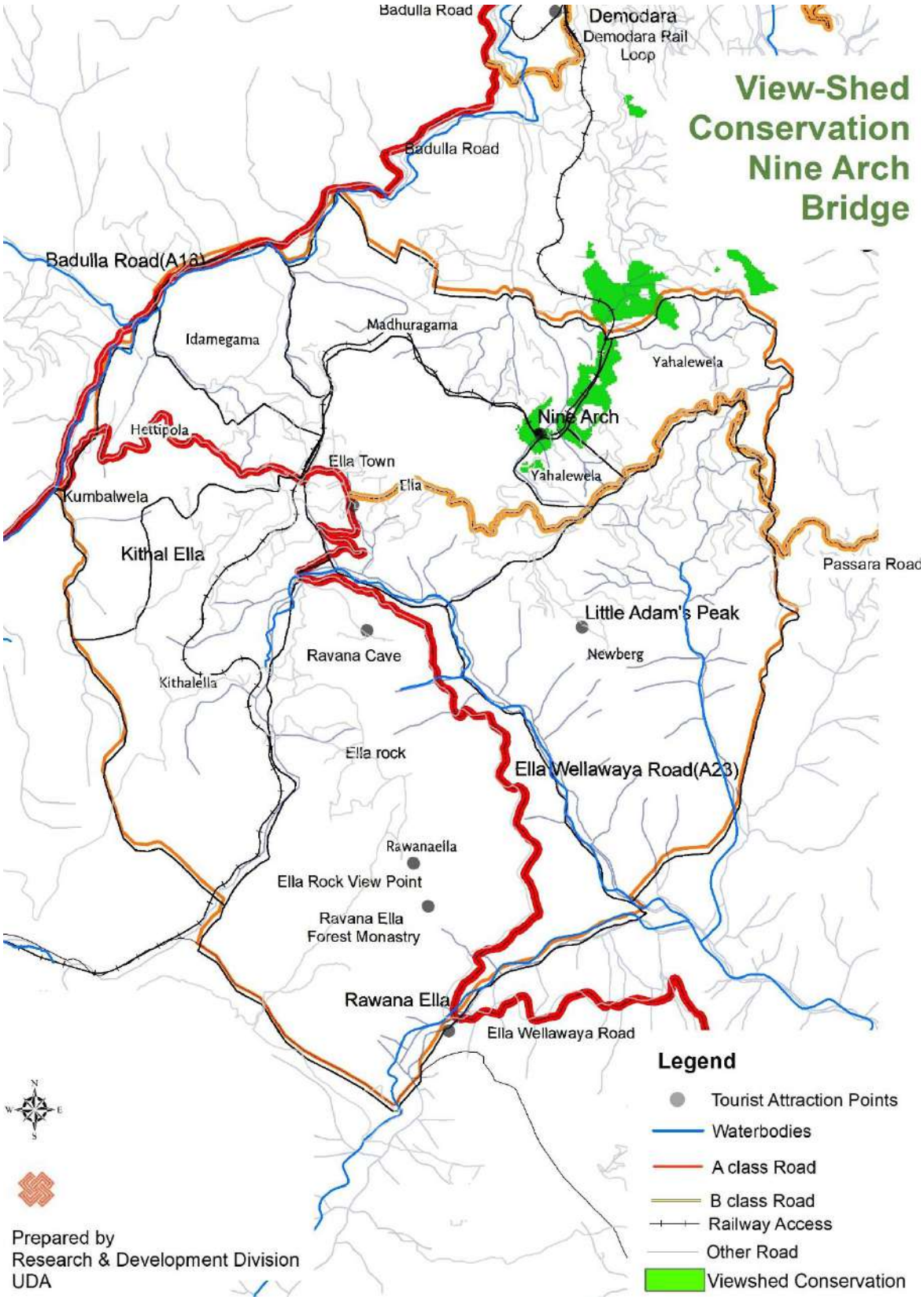
Regulatory guidelines applicable for existing developments within the view shed protection area shown in the Map 3.7	• Camouflage the existing constructions with native vegetation of Ella • No expansions of the existing development area allowed
Regulatory guidelines applicable for **new developments** within the view shed protection area shown in the Map 3.7	• No new developments are allowed • No Bill boards, digital screens or any type of physical advertisements/ information boards are allowed

Table 3-11: The Regulatory guidelines applicable within the view shed protection area shown in the Map 3.7

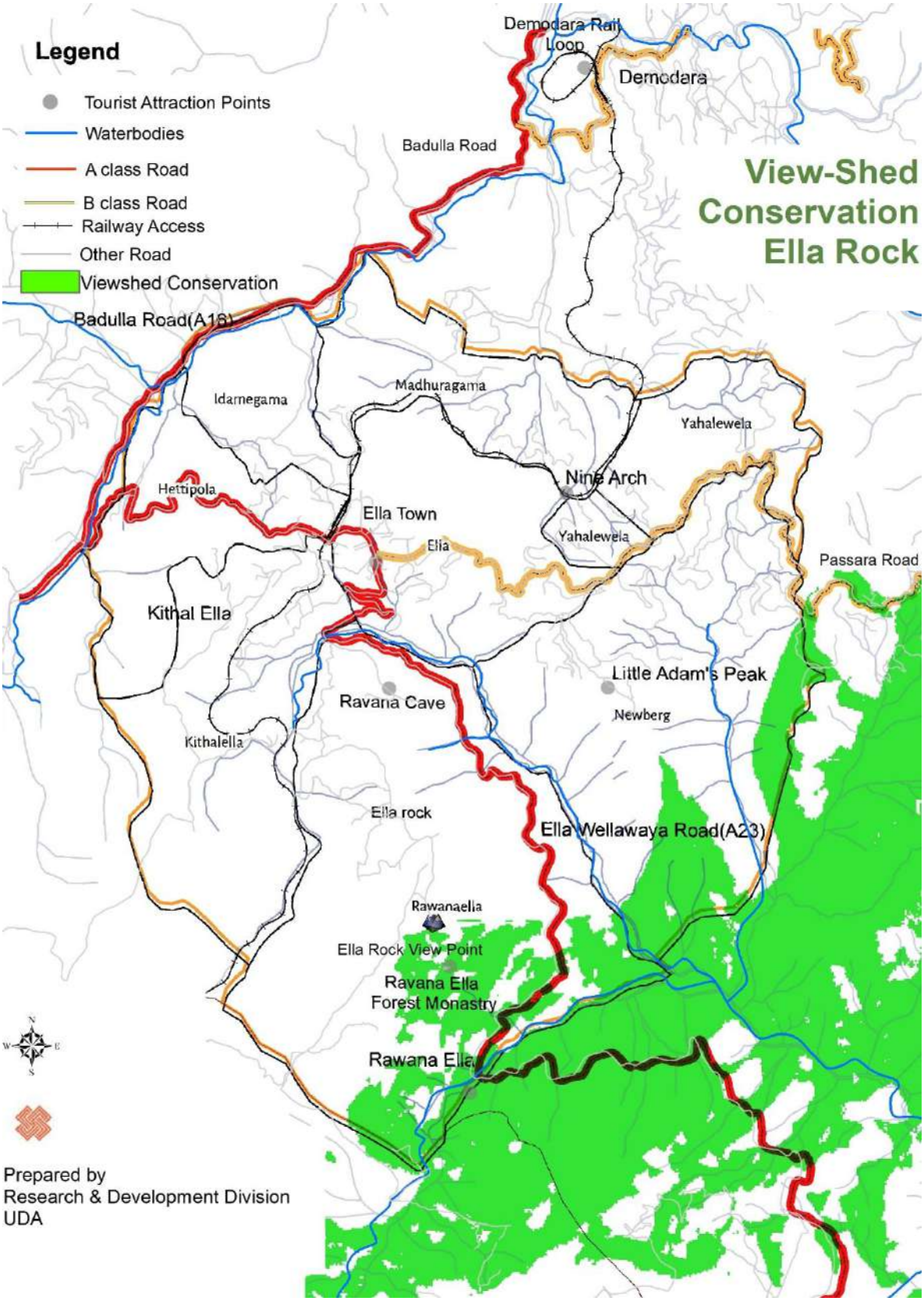
(b) Site specific View sheds – (For Little Adam's Peak, Nine Arch Bridge and Ella Rock)



Map 3-11: View shed protection area of the Little Adam's Peak



Map 3-12: View shed protection area of the Nine Arch Bridge



Map 3-13: View shed protection area of the Ella Rock

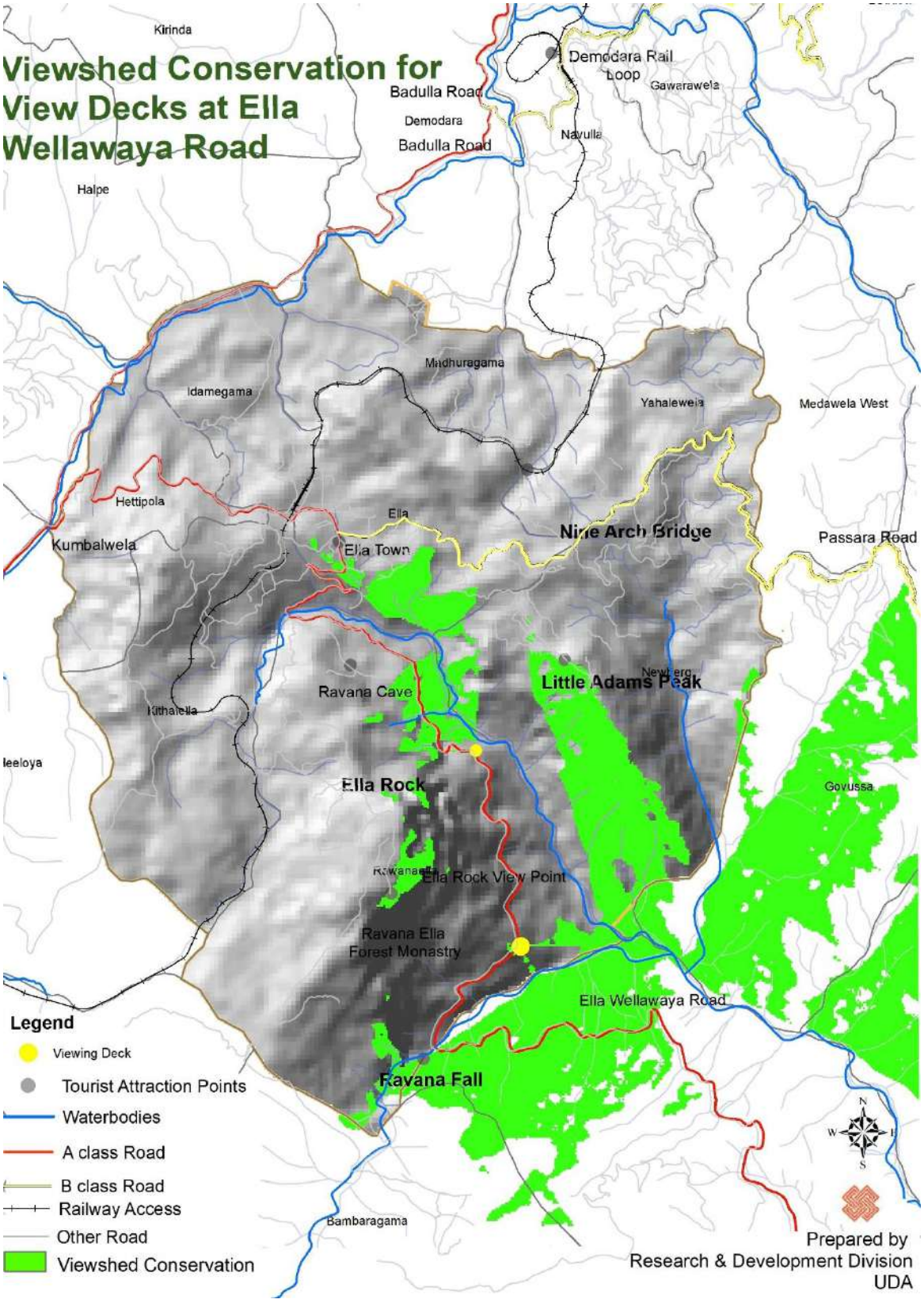
Regulatory guidelines applicable for existing developments within the view shed protection areas shown in the Maps 3.8, 3.9 & 3.10	• Camouflage the existing constructions with native vegetation of Ella • No expansions of the existing development area allowed
Regulatory guidelines applicable for new developments within the view shed protection area shown in the Maps 3.8, 3.9 & 3.10	• No new developments are allowed except within the view shed areas falling within the limits of Development Management Zones • The developments within Development Management Zones overlapping the view shed protection areas will be strictly regulated with imposed conditions & guidelines • No Bill boards, digital screens or any type of physical advertisements/ information boards are allowed

Table 3-12: The Regulatory guidelines applicable within the view shed protection areas shown in the Maps 3.8, 3.9 and 3.10

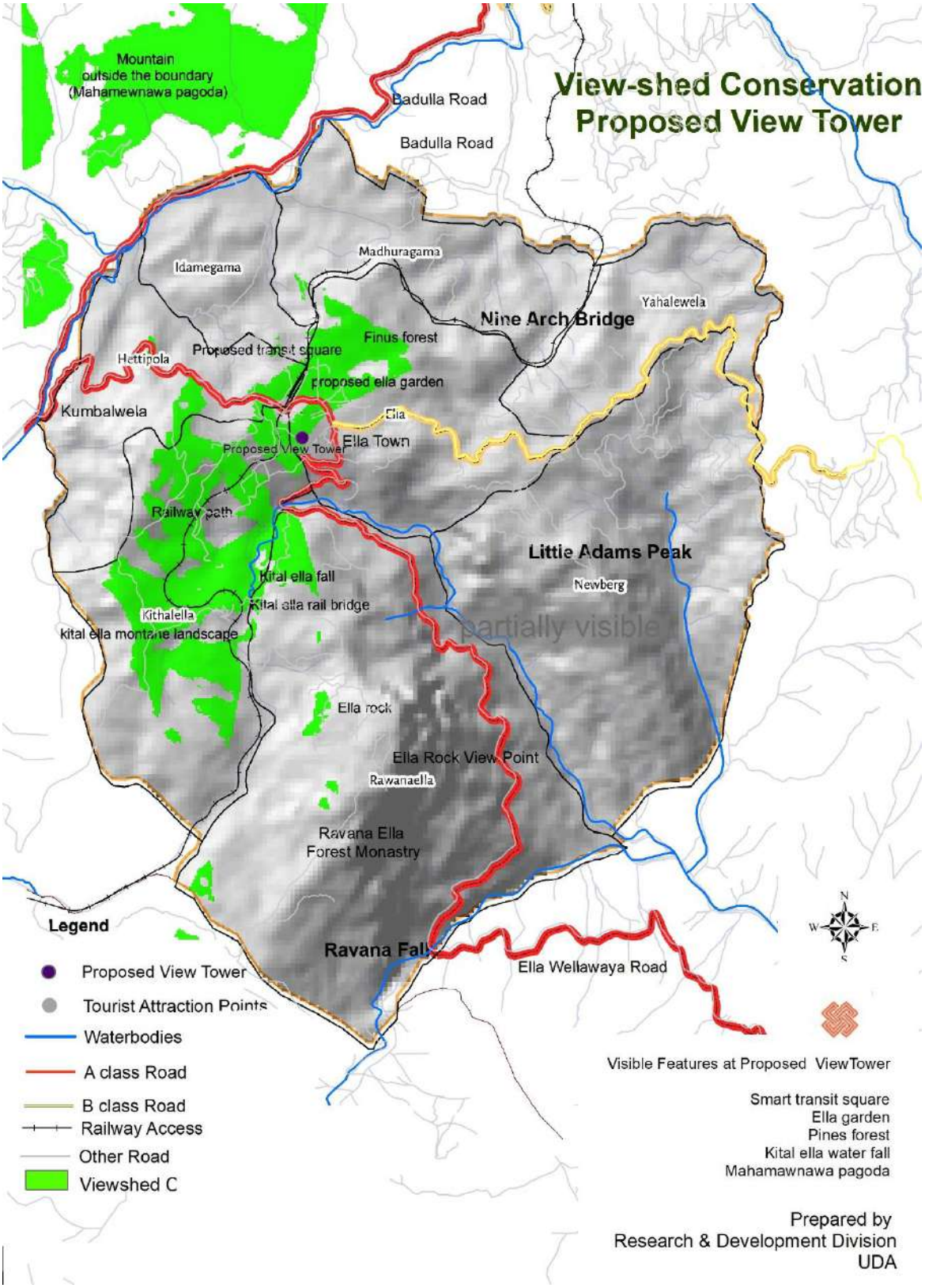
(c) View sheds of proposed observation decks

The Ella TDMP proposes five observation decks; at selected two points at the roadside of the Ella – Wellawaya road, at the point of the proposed Kithal Ella hand bridge, at the low dense commercial area of Rawan City and at the viewpoint of the Demodara Loop. The proposals of these observation decks are explained in the section 4.1.2.6 of the Chapter Tourism Promotion Strategy of this report.

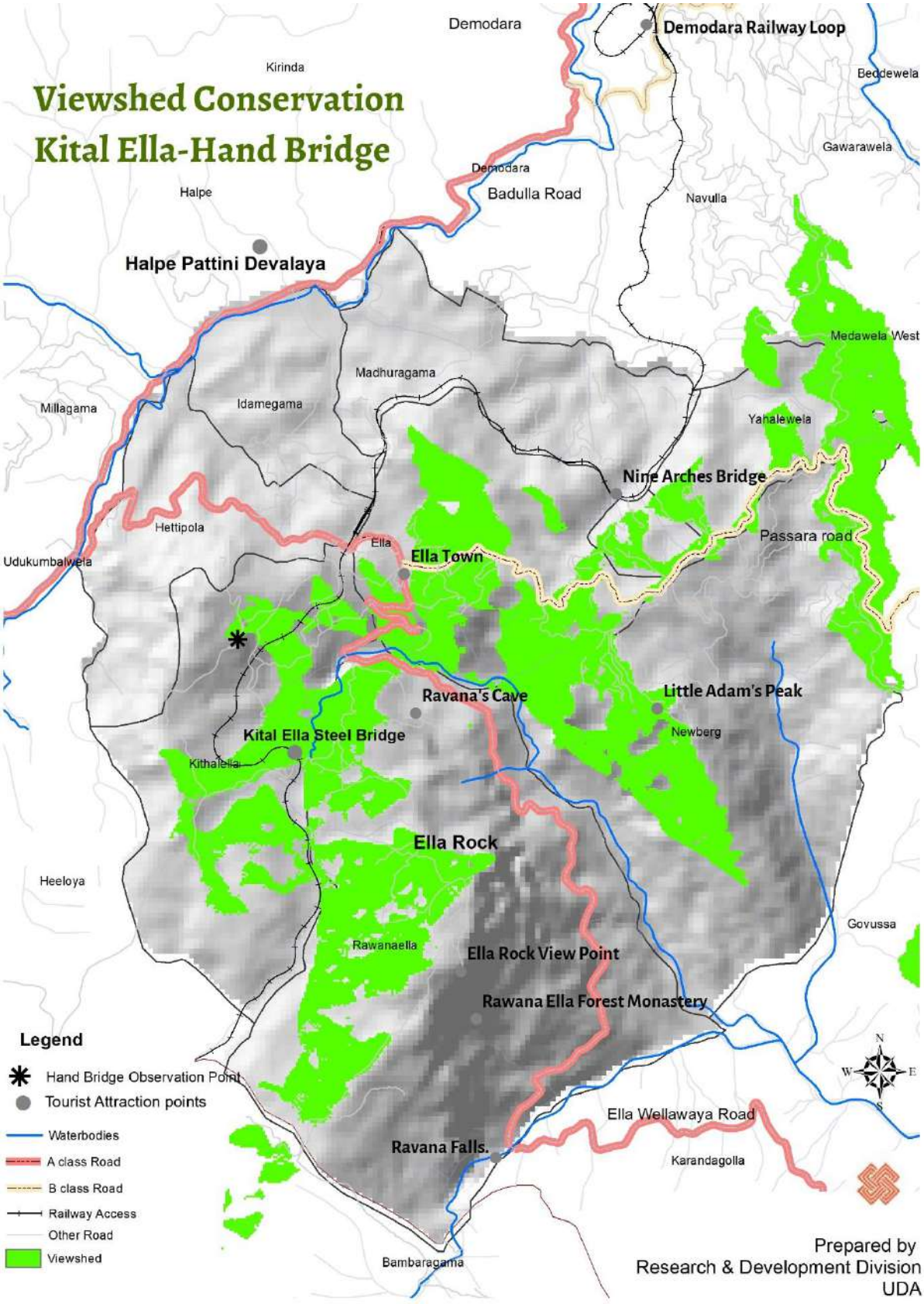
The respective view shed protection areas of these observation decks are shown in the Maps 3.14, 3.15 & 3.16, 3.17 and their regulatory guidelines are given in the Table 3.13.



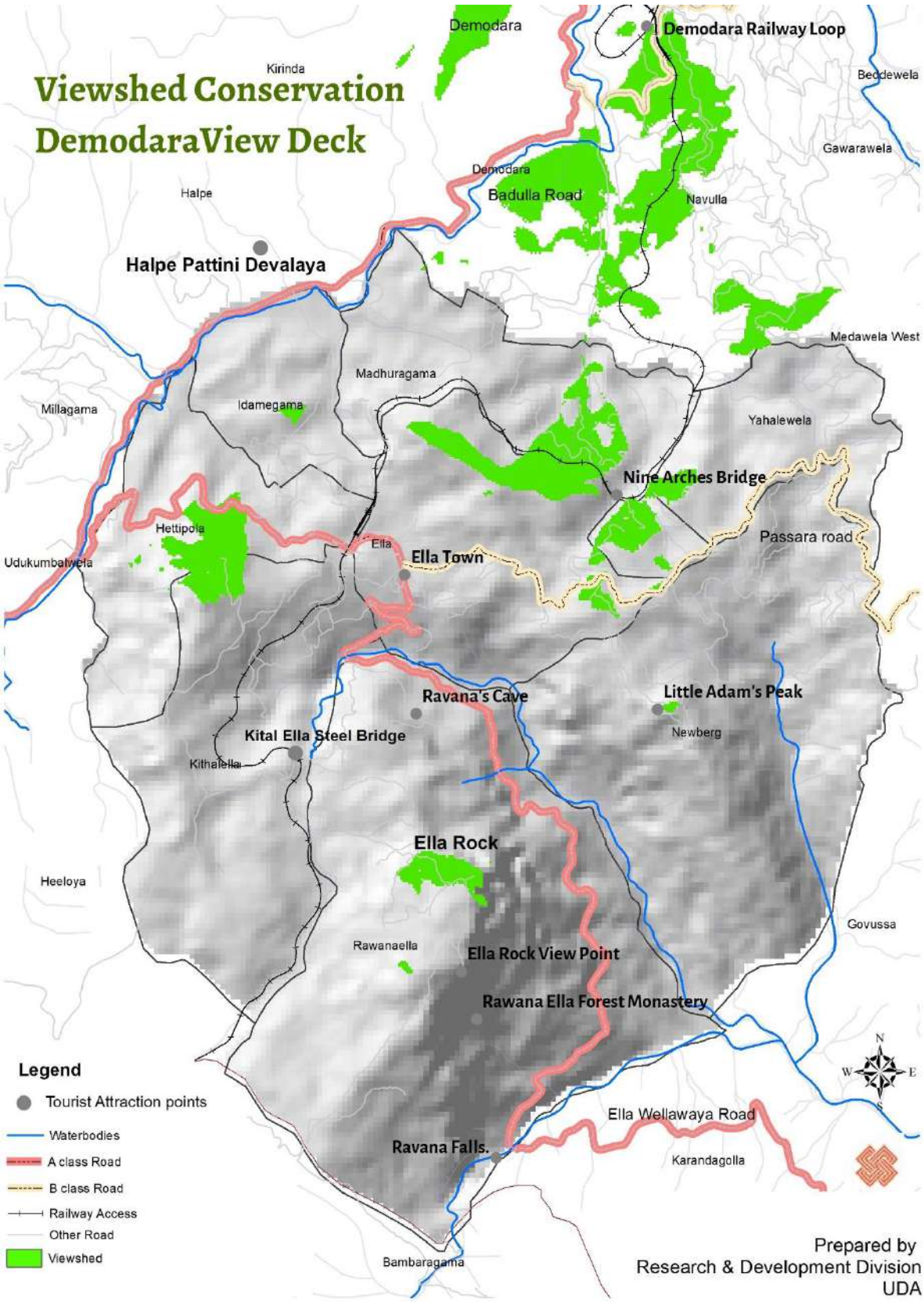
Map 3-14: View shed protection area of the Observation Deck 1 and 2 at the Ella – Wellawaya Road



Map 3-15: View shed protection area of proposed view tour at low dense zone of Rawan city



Map 3-16: View shed protection area of the Observation Deck at the proposed Kithal Ella Hand Bridge



Map 3-17: View shed protection area of the Observation Deck at viewpoint of the Demodara Loop

Regulatory guidelines applicable for existing developments within the view shed protection areas shown in the Maps 3.11, 3.12, 3.13 & 3.14	• Camouflage the existing constructions with native vegetation of Ella • No expansions of the existing development area allowed
Regulatory guidelines applicable for new developments within the view shed protection area shown in the Maps 3.11, 3.12, 3.13 & 3.14	• No new developments are allowed except within the view shed areas falling within the limits of Development Management Zones • The developments within Development Management Zones overlapping the view shed protection areas will be strictly regulated with imposed conditions & guidelines • No Bill boards, digital screens or any type of physical advertisements/ information boards are allowed

Table 3-13: The Regulatory guidelines applicable within the view shed protection areas shown in the Maps 3.11, 3.12, 3.13 and 3.14

***Note**: Refer Viewshed of Ella – Wallawaya road to idenitifed the view shed of two view decks located along the Ella- Wallawaya road*

3.3.2.3 Special Projects proposed to enhance the unique character of Ella (Project Code – DM-2)

(a) Entrance Gate Development Project (Project Code – DM-2-1)

Development of two entrance gateways is one of the key interventions to enhance the character of Ella. The intention of this project is to give the tourists a feeling of arrival at a unique mysterious but proud green valley which cannot be seen elsewhere. One of the entrance gateways is proposed at the existing tunnel entering the Ella town while the other entrance gateway is proposed at the Ravana Ella. The tunnel entrance will be met by the tourists travelling to Ella via Bandarawela and Badulla while the Ravana Ella entrance will be met by those who travel from Wellawaya.

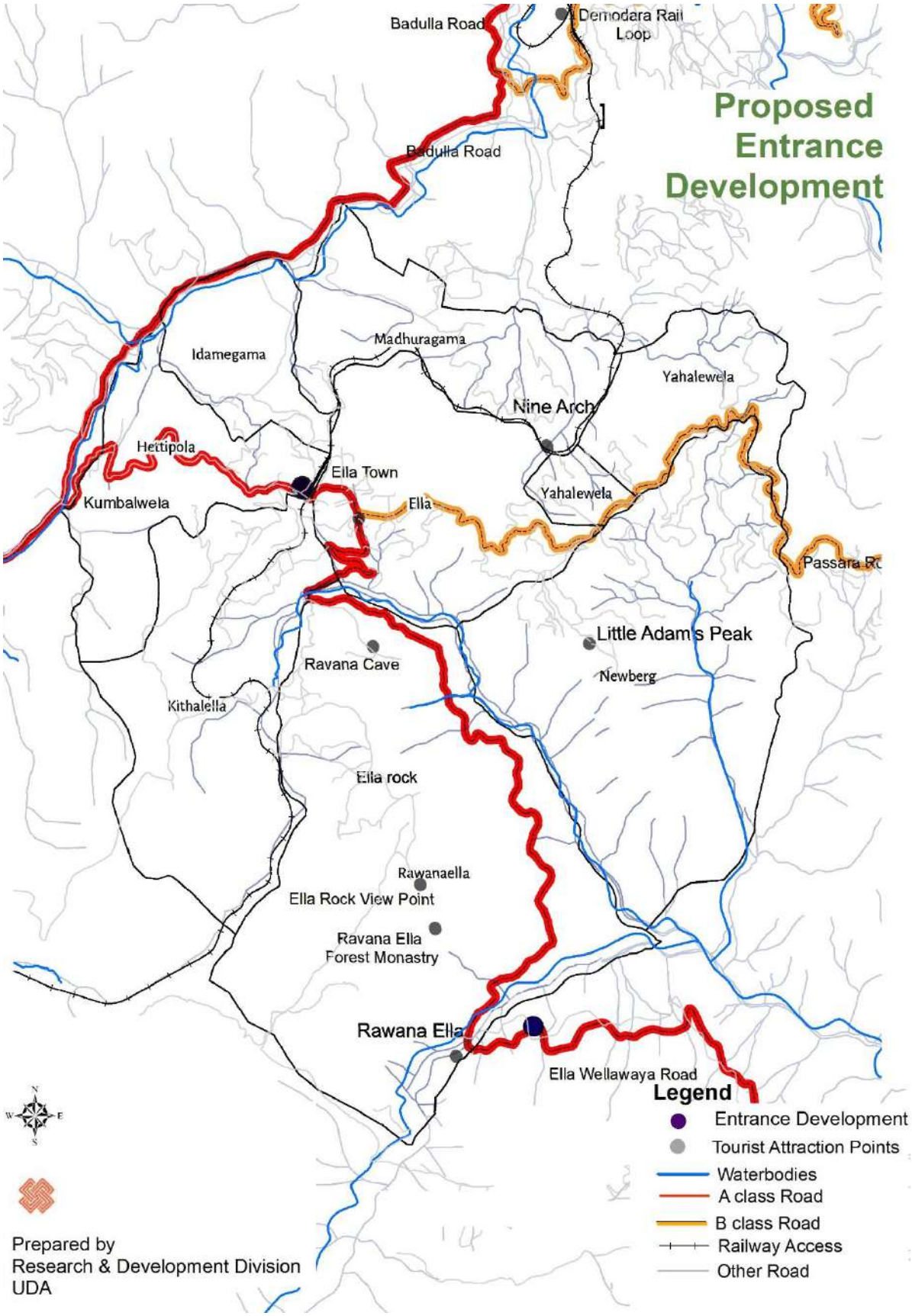
I) The entrance at the existing tunnel (Project Code – DM-2-1-1)

The existing tunnel located on Ella – Wellawaya Road at the entrance to the Ella Town had been constructed during the British period as it has been identified as the entrance gateway to Ella by the tourists entering the city from Bandarawela side. However, currently this tunnel which has a physical width of 3.5m provides only single lane traffic access. This generates a considerable traffic congestion at the entrance to the city and this is mainly due to the high traffic flow along the Ella – Wellawaya Road.

Considering the traffic impact, Ella TDMP proposes to redevelop the existing tunnel as a double lane tunnel. Since, the appearance of the existing tunnel resembles the iconic memory of the Colonial Period, Ella TDMP recommends that the redevelopment should be carried out under the consultation of the Department of Archaeology to conserve the architectural features unique to the existing tunnel and to avoid any alien appearance in the new development. Further, as the existing tunnel goes beneath the Ella Railway Line and the area is already identified as a landslide prone area, the Ella TDMP recommends the direct consultation of the Road Development Authority, Railway Department and the National Building Research Organization throughout the implementation of the project.

II) The entrance at the Ravana Ella (Project Code – DM-2-1-2)

Ella TDMP proposes to construct a new entrance gate at the Ravana Ella. Currently, there is no such monument to represent an entrance gate. The plan proposes to build this new entrance gate featuring the architectural features of the Historical Kingdom era. The intention is to exhibit the pride of the two prosperous eras of Ella.



Map 3-18: Proposed locations of the Entrance Developments in Ella

Figure 3-1: Existing tunnel at Ella

Figure 3-2: Proposed Double Lane Tunnel

Figure 3-3: Existing location near the Ravana Ella selected to construct the Entrance Gate

Figure 3-4: Conceptual image of the proposed Entrance Gate near the Ravana Ella

(b) Signage Project – Introducing a special signage system at Ella (Project Code – DM-2-2)

Signage contributes to enhance the legibility and imageability of a city. Signage are special visual features of a city that can be used to enhance the city identity, visual quality and attractiveness. Therefore, Ella TDMP proposes to introduce a signage system unique to Ella tourism destination. The types of signage covered by this signage system includes two main types; navigation signage and information display signage.

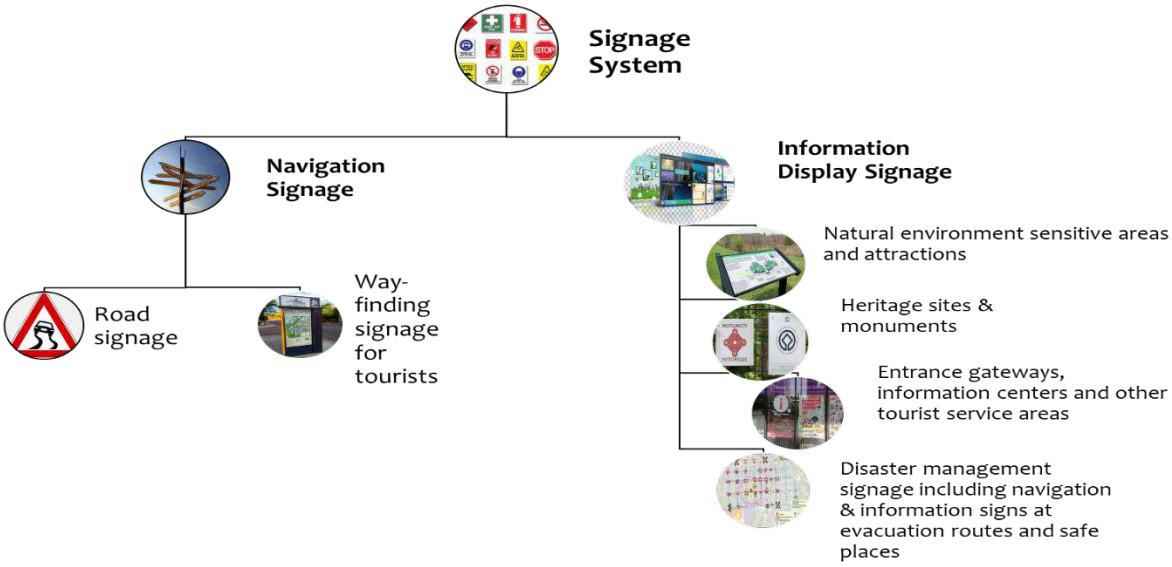
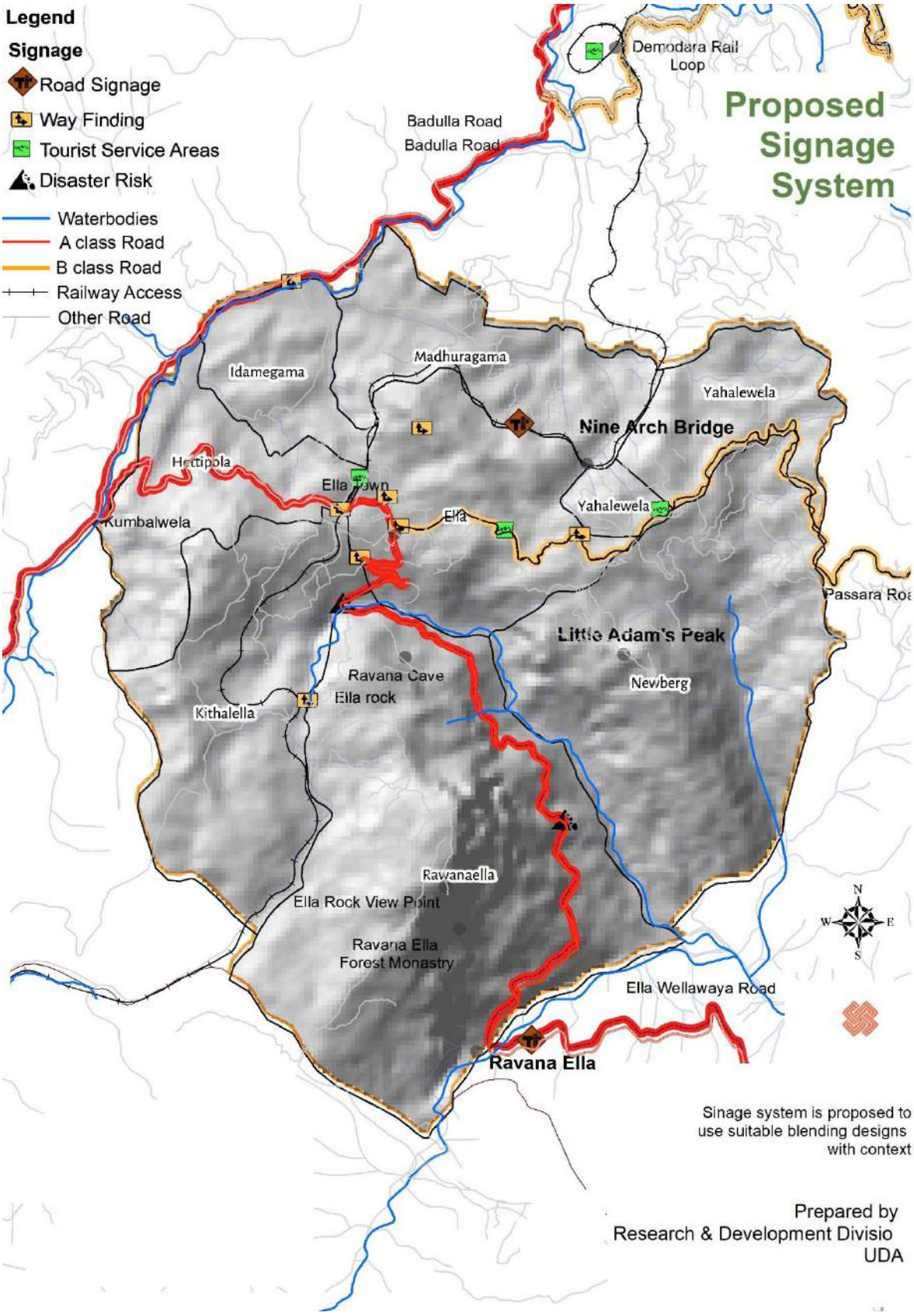


Figure 3-5: The types of signage covered by the proposed signage system in Ella

Ella TDMP recommends to design different types of signs emphasizing the unique characteristics of different attraction sites and proposed zones Ella while adhering to the international and local signage standards. Further, it is recommended to carry out a comprehensive study to identify such unique characters and design the signage system in such way that it would not create extra-terrestrial appearance that would damage the sense of Ella.
Therefore, it is recommended to consider following factors when designing the signage system.

- Concept of the Ella tourism plan (three aisle)
- Environmental aspects
- Historical aspect
- User friendly
- No holdings, bill boards, digital screen or any other advertisement would not cover the scenic view of Ella

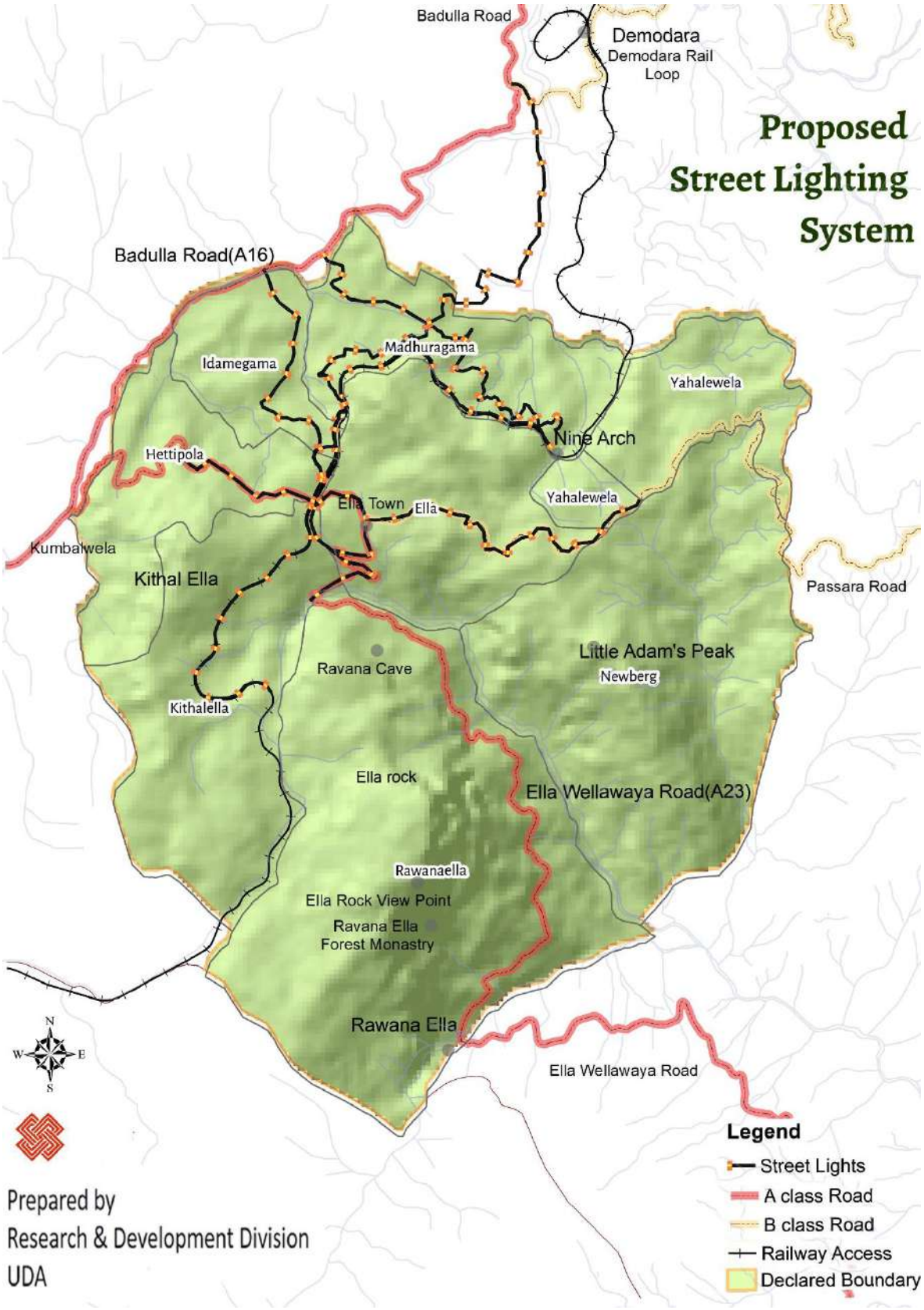


Map 3-19: Proposed locations to install sign boards in Ella

(c) Street Light Project – Introducing a Unique Street Light System in Ella (Project Code – DM-2-3)

It is proposed to plan, design and install a unique Street Light System in Ella. The following considerations are recommended for the proposed project.

- Smart light system
- Suitability with the proposed concept of Ella tourism master plan
- Historic Aspects of Ella
- Different lighting with unique features for,
    - City area
    - Tourism promotion zone I and II
    - Foot path
    - Nature trail
    - Ella garden
    - Nine arch access routs
    - Kithal Ella road
- Light posts should be blended with context



Map 3-20: Routes identified to install street lights in Ella

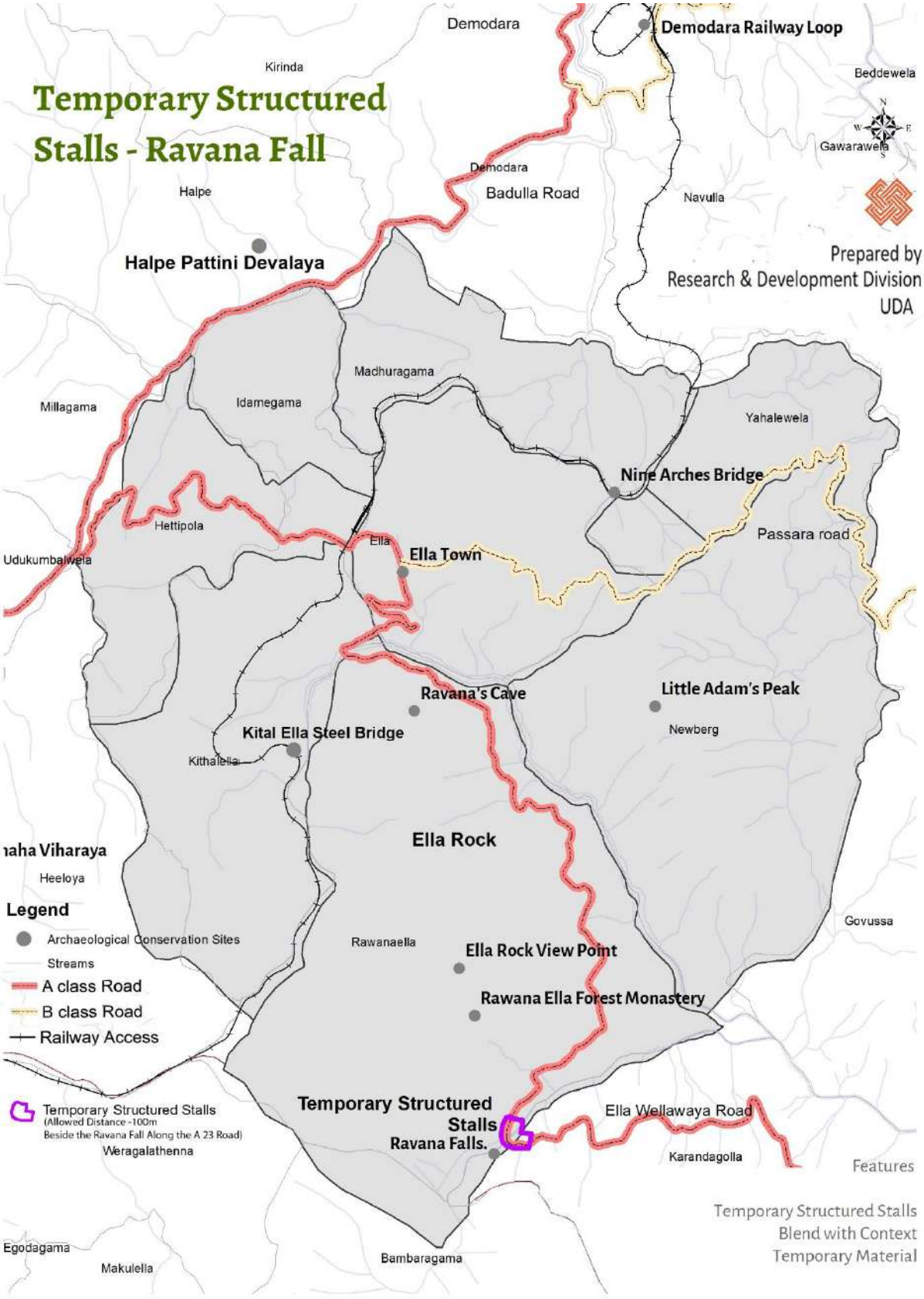
(d) Construction of stalls for local vendors at Ravana Fall (Project Code – DM-2-4)

Ravana waterfall is one of the eminent locations among the tourists due to its unique appearance and green surrounding. There is a high tourist attraction at Ravana waterfall and it has created a good market place for local community to who sell natural instant foods, ornaments, local crafts and jewelry etc. At present, there are few stalls run by the local vendors near the Ravana Fall observation deck.

However, further development of such local stalls at the Ravana Fall and along the Ella – Wellawaya Road may disturb the peaceful atmosphere at the Ravana Fall and downgrade its unique image. Thus, it is important to make a planning intervention to manage such developments while promoting the engagement of local community in the tourism activities.

As per the proposed zoning plan of Ella TDMP, this area falls within the Green Conservation zone thus it does not allow any constructions. Considering the importance of local community's engagement, the Plan proposes to construct a set of stalls for local vendors at the Ravana Fall. However, it is mandatory that these stalls be constructed as temporary establishments using eco-friendly design and materials as to blend with the natural environment. The project proposed to construct these temporary structured design stalls within an area of 10 sqm at the roadside of the Ella – Wellawaya Road. It is also proposed to provide solid waste collection bins and have a sound mechanism to manage solid waste collected within these stalls.

Figure 3-6: A conceptual image of the envisaged chacarter of the temporary structures stalls near Ravana Fall



Map 3-21: The location of temporary structured stalls near Ravana Fall

STRATEGY

Tourism Promotion

04

Unique vegetation character

- 70% green coverage create the Green Spectrum nowhere else to find

Unique climatic condition

- Four seasons of Ella
- Winter –(December-February)
- Spring- (March to May)
- Summer- (June-August)
- Autumn- (September – November)

Unique history

- Pre historic skull (25,000years dated)
- Legendry Ravana
- King Walagamba
- British colonial Period

Unique local character

- Rural life style of people of the Ella Attract the

Nature lovers
Honeymoon couples &
Explorers

Hence this uniqueness is you all to experience
In Unique manner and this approach is to enhance the way you feel the experience of Ella

4. Tourism Promotion Strategy

The focus of the Tourism Promotion Strategy of Ella TDMP is to enhance the tourism experience in Ella. It proposes various projects to promote existing natural attractions and introduce diverse tourism activities in Ella. Further, it focuses on improving tourist facilities within Ella.

The strategy consists of two sub strategies namely;

1) Tourism Activity Diversification Strategies
2) Tourism Facilitation Strategies

4.1 Tourism Activity Diversification Strategies

Tourism Activity Diversification Strategy focuses on further promoting existing attractions and tourism activities in Ella while introducing new tourism activities.

- Existing Attraction Sites and Activities

No.	Attraction Sites	Activities
01	Little Adam's Peak	Hiking, 360^0 view point, scenery capturing, tea-tourism, Ravana zip line
02	Ravana Rock	Hiking, 360^0 view point, scenery capturing, camping
03	Ravana Waterfall	View point, scenery capturing
04	Ravana Cave and Temple	Hiking and exploring, archaeological site
05	Nine Arch Bridge	View Point, Scenery Capturing
06	Kithal Ella Waterfall and Steel Bridge	Trekking, View Point, Scenery Capturing

Table 4-1: The existing tourism sites and attractions in Ella

- Proposed New Attractions

No.	Attraction Sites	Activities
01	Four Camping Sites	Forest camping site at proposed reforestation site
		Recreational camping site at Bora Wawa
		Adventure camping site at Kithal Ella
		Star gazing camping site at Ella Rock
02	Ella Garden	Photography/Relaxing
03	Bungee Jump	Adventure
04	Rail tour from Ella Station to Demodara Station	Scenery Capturing
05	Borawewa Recreation Area	Recreation, Photography
06	A chain of new observation decks	Scenery Capturing
07	Rock Climbing as a sport activity at Little Adam's Peak and Ravana Rock	Rock Climbing

Table 4-2: The proposed new tourism sites and attractions in Ella

4.1.1 Projects to upgrade and enhance the attraction of existing tourism attraction sites (Project Code – TP-1)

The section 2.3.4 of the report proposes to promote the identified archeologically important sites as tourist attractions. Accordingly, Ella TDMP proposes to promote Ravana Ella Ancient Temple & Cave, Demodara Loop and Nine Arch Bridge as main tourism attractions in Ella and proposes following projects to further enhance their tourism attraction.

a) Ravana Ella Ancient Temple & Cave Access Way Improvement (Project Code – TP-1-1)

Ravana Ella Ancient Temple and Cave are protected monument declared by the Department of Archeology as explained in the section 2.3.1 (a) of this report.

Ella TDMP has identified that the tourists face difficulty in accessing Ravana Temple and Cave thus this hinders its attraction. Therefore, the Plan proposes to construct two walking paths parallel to the existing access road enabling the tourists to easily walk towards Ravana Temple & Cave from Ella – Wellawaya Road. The Plan recommends to construct the walking paths as a natural trail without using any artificial paving material. The two walking paths are proposed to be developed from the Ella – Wellawaya Road to the point where the steps start. After following the walking path, the tourists can reach the Ravana Temple and then follow the steps to reach Ravana Cave. The Ella TDMP does not propose any intervention to the existing steps but proposes to remain them as it is.

Further, the Plan proposes to plant two tree lines consisting of area specific native plants at the either sides of the access road.

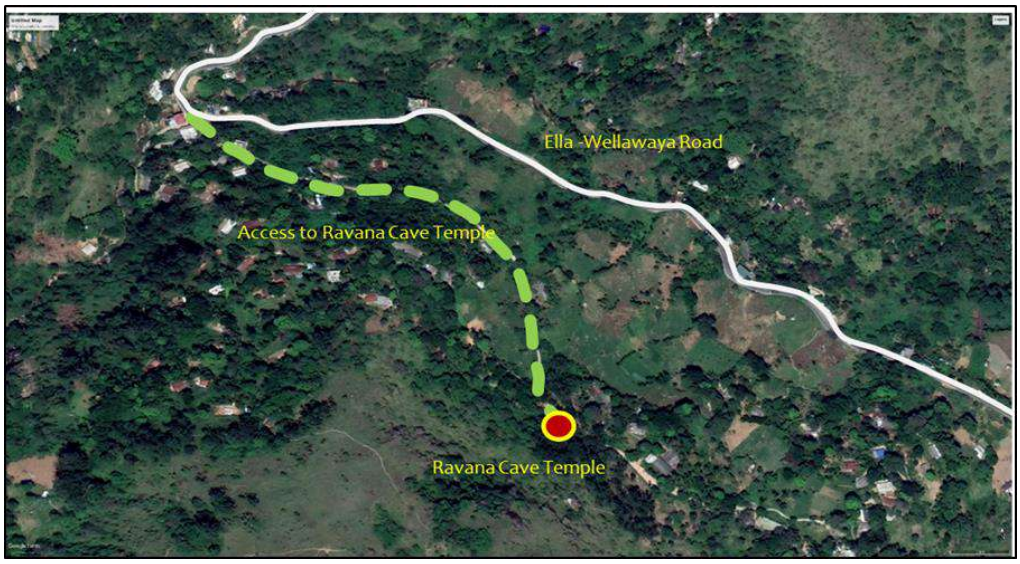


Figure 4-1: The existing access road of the Ravana Ella Ancient Temple and Cave

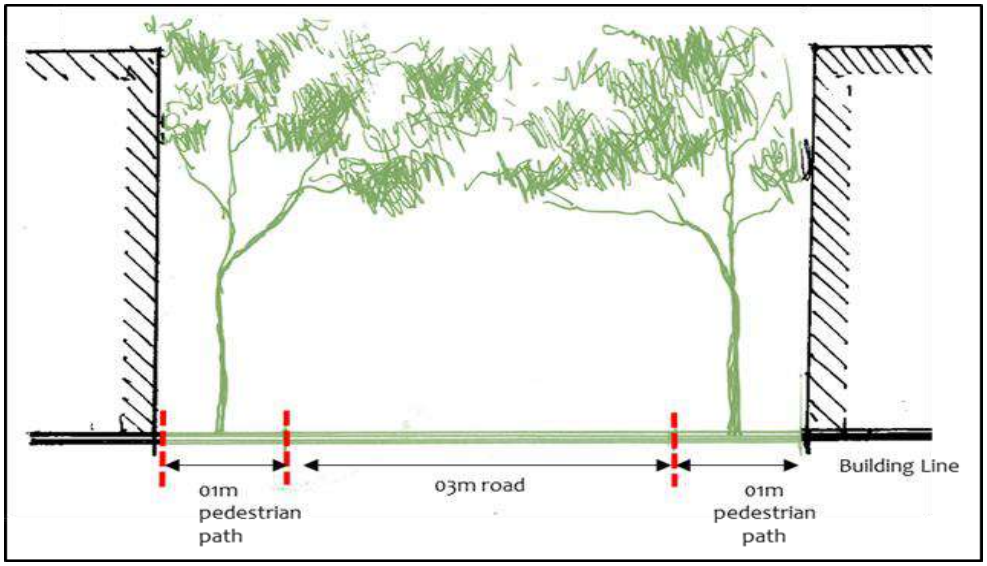


Figure 4-2: A cross section of the Ravana Temple & Cave Access Way showing the proposed walk paths and tree lines

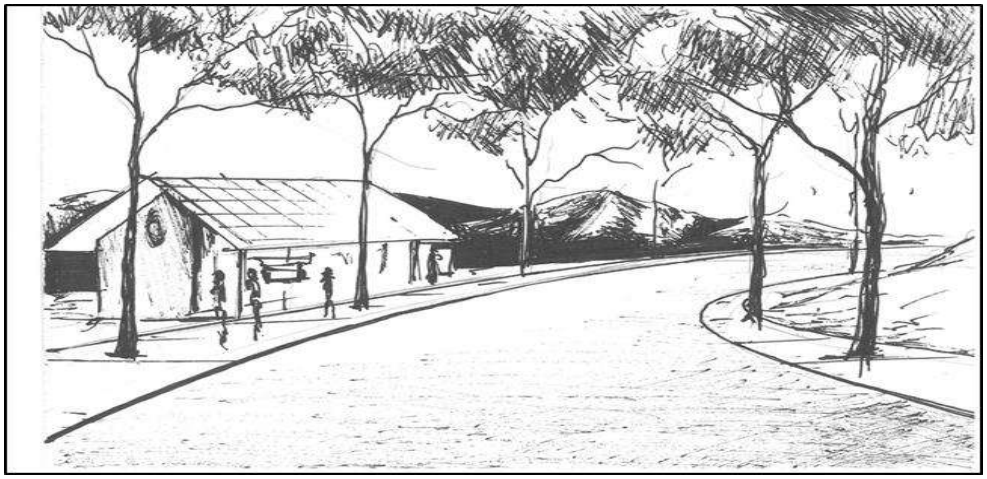


Figure 4-3: A conceptual image showing the anticipated character of the Ravana Temple & Cave Access Road

b) Construction of a Viewing Deck at Demodara Loop (Project Code – TP-1-2)

Although located outside of the Planning boundary of Ella TDMP, Demodara Loop is a famous tourist destination in Ella due to its unique railway design intermingled with the natural setting. Tourists visit Demodara to watch how the train gets a turn through the loop. Currently, there is no specific view deck to capture this amazing event. Therefore, Ella TDMP proposes to construct a viewing deck at the top of the mountain on the marked location as shown in figure 4.4 and 4.5. This viewing deck covers a panoramic view including the train path, Kithal Ella water fall, Demodara dam and nice greenery.

Further, the Ella TDMP proposes a step foot path to access the viewing deck starting from the Demodara Railway Station. It is proposed to provide a parking space at Demodara Station premises. Viewing deck at Demodara Loop is envisaged to be a picturesque point sought by tourists in future Ella.

In addition, the proposed rail tour starting from Ella Railway Station and ending at Demodara Railway Station (Refer section 4.1.2.4 of Tourism Promotion Strategy) would further enhance the accessibility and attraction of Demodara Loop.

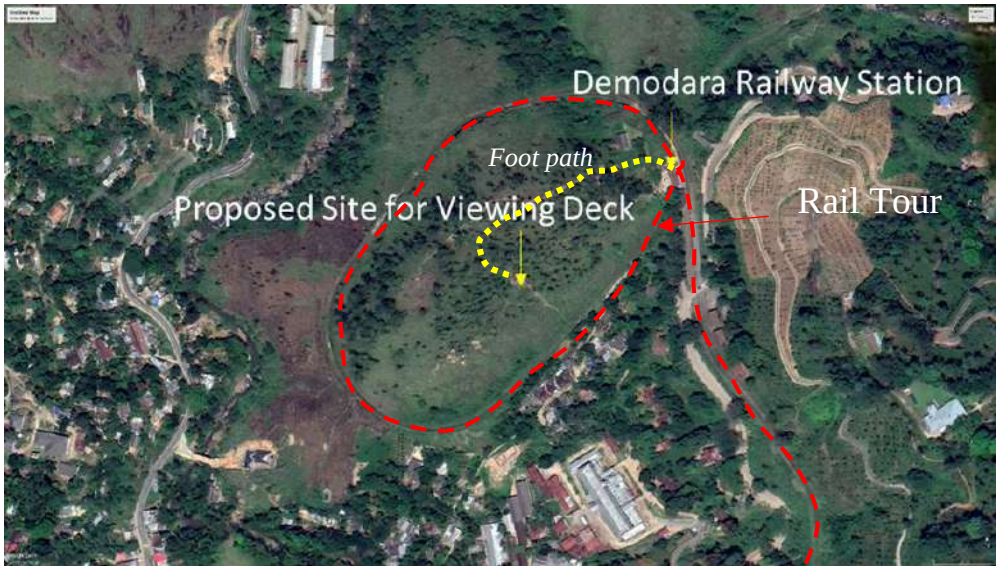


Figure 4-4: Location of the proposed viewing deck and access way at Demodara Loop and the trail of the proposed Rail Tour

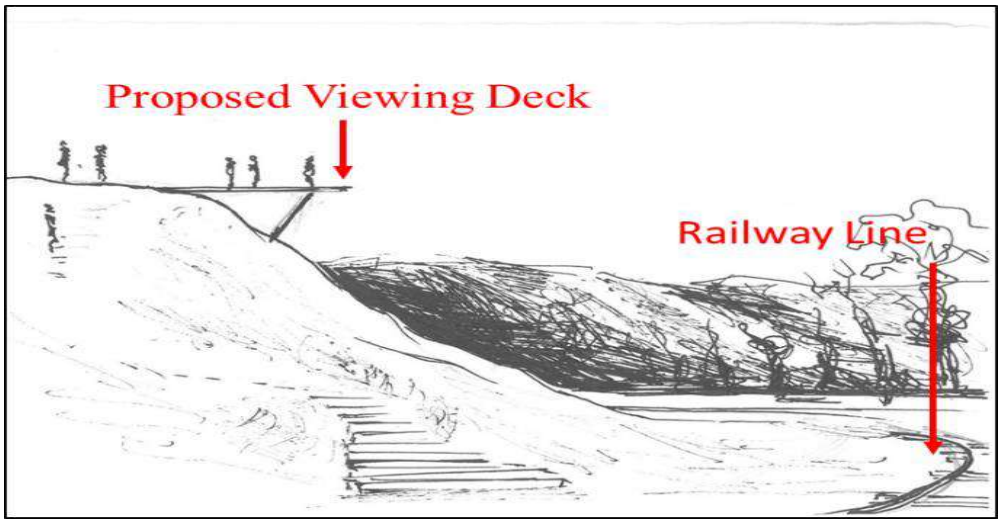


Figure 4-5: A conceptual image of the proposed viewing deck at Demodara Loop

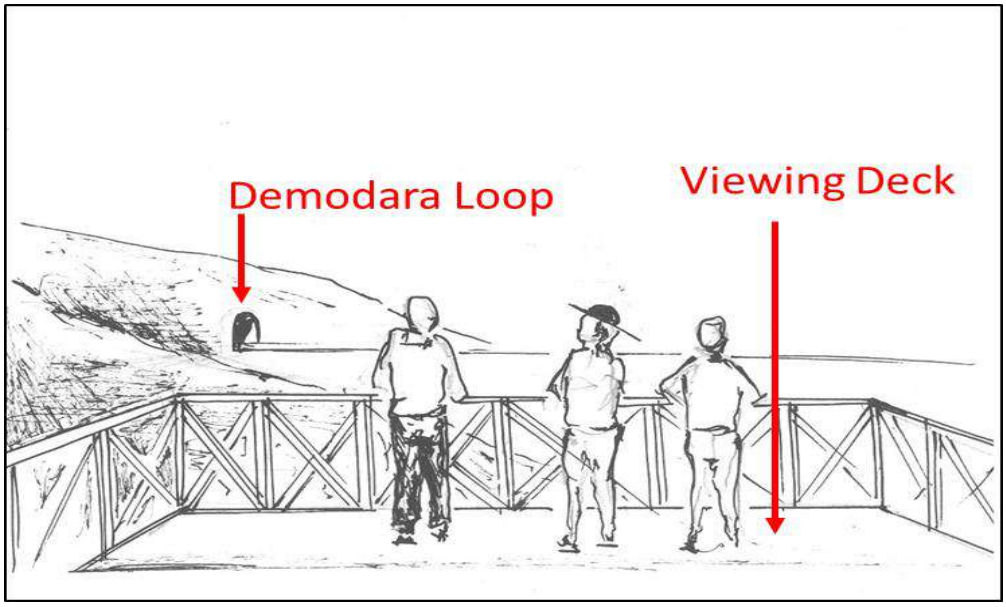


Figure 4-6: A conceptual image showing the view of Demodara Loop from the Viewing Deck

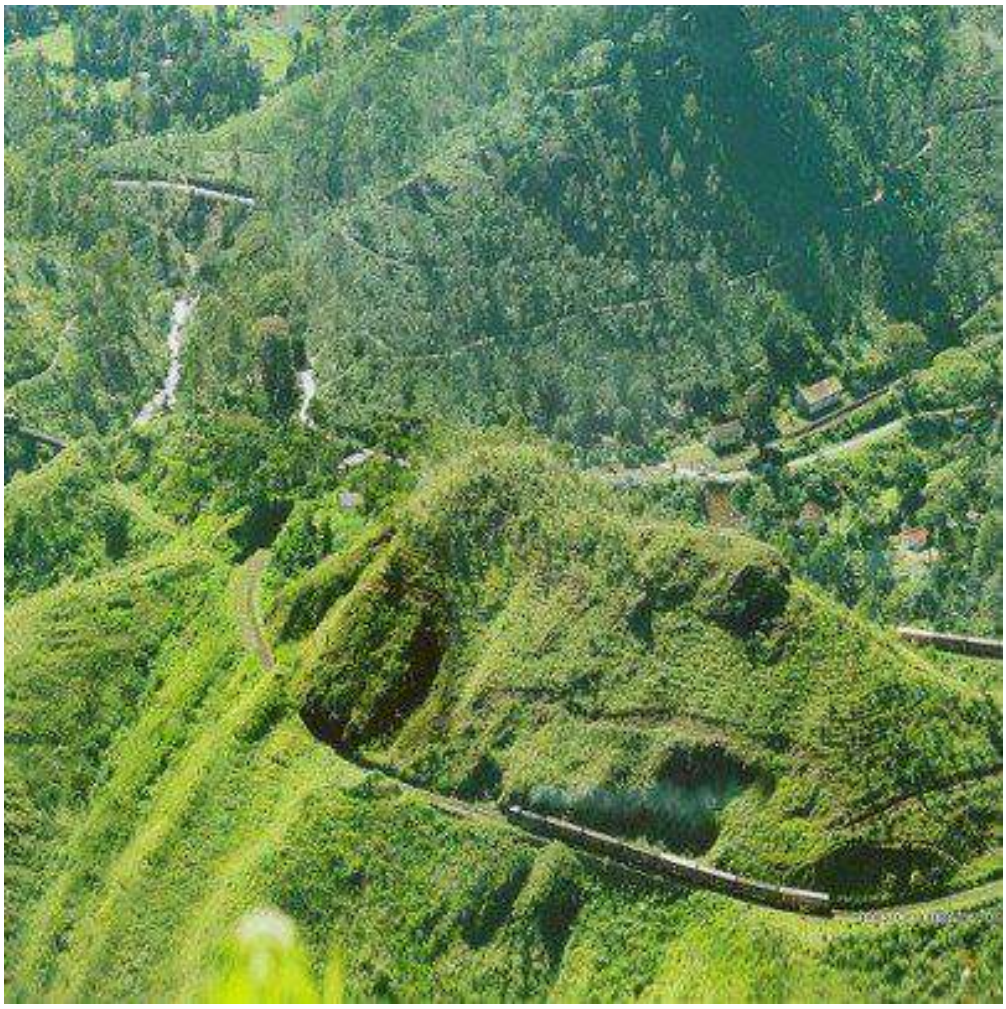


Figure 4-7: The view from the Demodara Loop view deck

c) Nine Arch Bridge Access Development (Project Code – TP-1-3)

Nine Arch Bridge is one of the most sought tourist destinations in Ella which has a worldwide popularity. Tourists consider it as the best picturesque place in Ella. It is located mid of the mountain area which has a rich green coverage including tea plantation and forest reservations. However, today these picturesque views are threatened due to constructions in the surrounding mountain area. Therefore, tourists viewing the surrounding environment from top of the Nine Arch Bridge, wouldn't be able to enjoy the unique natural views which it had earlier. However, this unique attraction still has the potential to conserve its unique views with special guidance. Hence, Ella TDMP proposes to control the developments within this special view shed by declaring this area as Nine Arch Bridge Special Regulation Area I & II and enforcing special regulations to these zones.

Further, two major actions projects are proposed to enhance the accessibility and the level of attraction of Nine Arch Bridge site. These two projects are; development of four major access roads to Nine Arch Bridge and development of service area at the Nine Arch Bridge site.

Development of four major access roads to Nine Arch Bridge

The Ella TDMP proposes to enhance the accessibility of Nine Arch Bridge by developing four major access roads.

No.	The access way to Nine Arch Bridge	Description	Project Code & Reference
01	The pathway starts from the Ella railway station	According to the proposal, 1.5m (05 feet) gravel pathway is proposed to develop along the railway line (from forest cover side). The distance of the total route is 02km. This path is more suitable for tourists who prefer long walk. Tourists who take this path can park their vehicles at the parking area at the Ella Railway Station.	Transport Development Strategy
02	Proposed new nature trail through the Pinus Forest	This path is planned through the existing Pines forest and it is more suitable for the tourists who like to experience the forest environment. It starts from the proposed Ella Garden at the town center. Total distance of this path is 02km.	Tourism Promotion Strategy

03	Pathway in front of Sapumalthenna road at Passara road	The distance of this route is 01 km and it starts from Passara road. This path also runs parallel to the edge of the existing Pinus forest. The Plan does not propose any special improvements but anticipates to maintain the existing character of that path.	TP-1-3-1
04	Improve the Borawewa access way	This route is the shortest path to Nine Arch Bridge and it is only about 700m long. It starts at the Borawewa which is located next to the Passara road. It is proposed to change the existing concrete paving of the road to granite paving in order to suit with the natural setting.	TP-1-3-2

Table 4-3: The proposed four access ways to Nine Arch Bridge

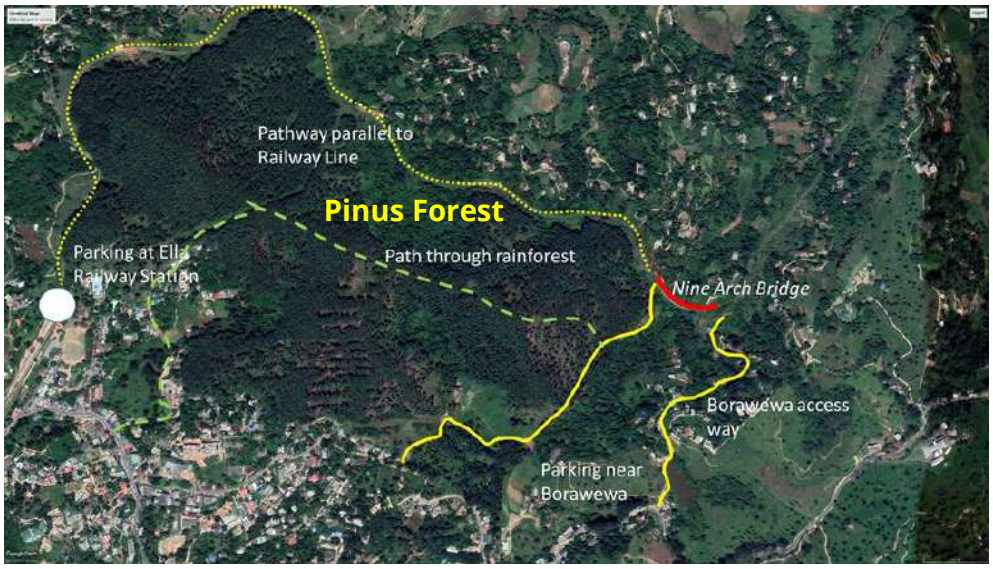


Figure 4-8: The proposed four access ways to Nine Arch Bridge

d) Development of Nine Arch Bridge Tourist Service Centre (Project Code – TP-1-4)

Tourists have to walk more than 01 km distance by foot to reach the Nine Arch Bridge area. Further they stay at Nine Arch Bridge for one hour to one and half hours waiting to capture the view of the moving train. Because of that, it is required to provide a service centre in order to facilitate such tourists who are willing spend few hours at this site. Considering this requirement, Ella TDMP proposes to build a service center at one side of the Nine Arch Bridge. The Plan

recommends to build the service centre close to the Nine Arch Bridge as a temporary structured designed establishment as to suit with the natural environment of the area.

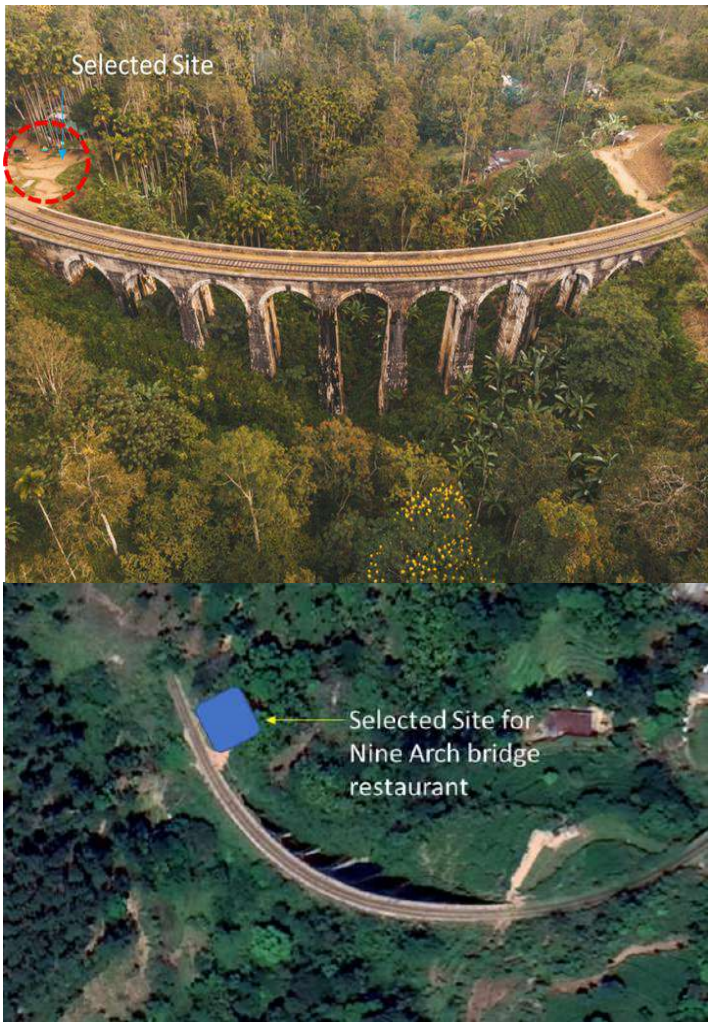


Figure 4-9: The proposed location of the Nine Arch Bridge Tourist Service Centre

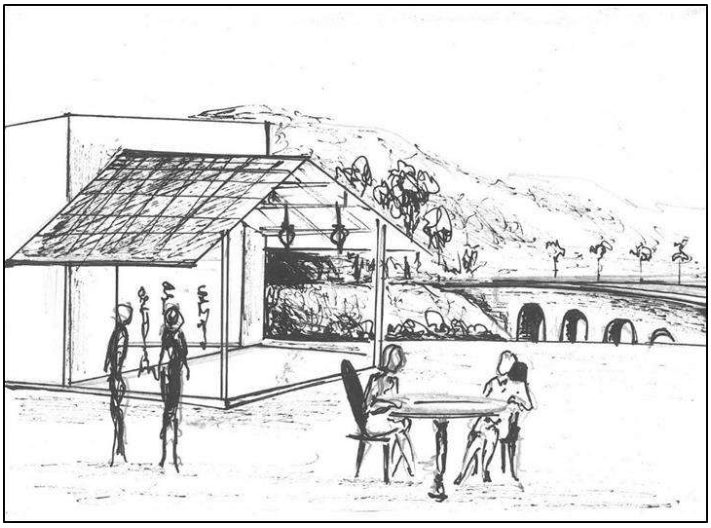


Figure 4-10: A conceptual image of the proposed Nine Arch Bridge Tourist Service Centre

4.1.2 Proposals to promote new tourism attraction sites and activities (Project Code – TP-2)

The Ella TDMP envisages Ella to be a picturesque mountain gallery. Thus, it is important to enhance accessibility and expose more picturesque views and photo capturing locations. Also, it is important to introduce new tourism activities to enhance the overall attraction of Ella.

Another intention of this strategy is to create opportunities for local economy improvement. Therefore, it aims at introducing diverse tourism activities and increase the staying period and thereby the average tourists' expenditure at Ella.

4.1.2.1 Introducing Four Types of Camping Experiences at Ella (Project Code – TP-2-1)

Ella TDMP proposed four camping sites with four different experiences.

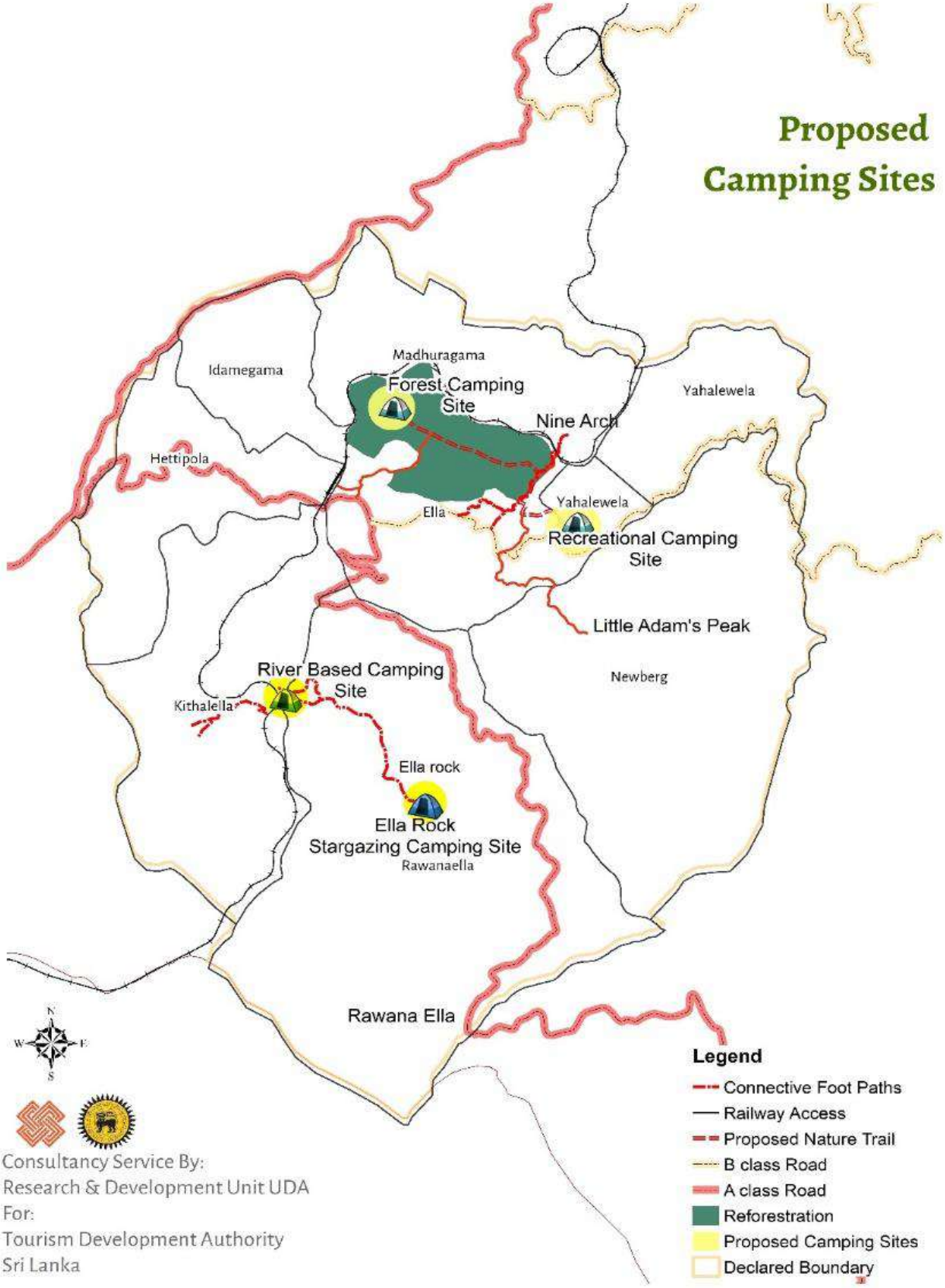
No.	Camping Site	Project Code
01	Forest camping site at the existing Pine Forest	TP-2-1-1
02	Recreational camping site at Bora Wawa	TP-2-1-2
03	Adventure camping site at Kithal Ella	TP-2-1-3
04	Star gazing camping site at Ella Rock	TP-2-1-4

Table 4-4: The proposed four types of camping sites in Ella

Further it is proposed to connect all four camping sites with a continuous foot path as mentioned in the below table.

No.	Connecting Camping Sites		Type of Path	Project Code & Reference
	From	To		
01	Recreational camping site at Bora Wawa	Forest camping site at the existing Pine Forest	Nature Trail	TD -2-5
02	Forest camping site at the existing Pine Forest	Adventure camping site at Kithal Ella	Rail Foot Path	TD-2-2
03	Adventure camping site at Kithal Ella	Star gazing camping site at Ella Rock	Mountain Foot Path	TD-2-3

Table 4-5: The proposed path connecting the four camping sites



Map 4-1: The proposed four camping sites and the continuous path connecting them

Figure 4-11: The envisaged character of the Forest camping site at the existing Pine Forest

Figure 4-12: The envisaged character of the Recreational camping site at Bora Wawa

Figure 4-13: The envisaged character of the Adventure camping site at Kithal Ella

Figure 4-14: The envisaged character of the Star gazing camping site at Ella Rock

The constructions and activities at these four camping sites are guided by common regulations are presented in presented in the Volume II –Part A of the Ella TDMP.


CAMPING
RULES
sit around
the campfire
eat
s'mores
EXPLORE
go fishing
SWIM
Star
Gaze
make memories
WITH
FAMILY
AND FRIENDS

a) Proposed Forest Camping Site at the existing Pine Forest (Project Code – TP-2-1-1)

The forest camping site is proposed at the current Pine forest which is located in Ella town area. The Ella TDMP proposes to regrow the existing Pine Forest. The current Pine forest has been planted by the Timber Corporation for the purpose of obtaining timber. However, the Pines forest gets deserted during the timber cutting season and it downgrades the image of Ella. Therefore, Ella TDMP proposes to regrow it as a Pine Forest and remain it as it is without cutting for timber.

The area of the Pine Forest is approximately 72 ha. The Plan proposes to develop a forest camping site within this forest with required facilities. Further, it is proposed to introduce several adventure games within the site.

The Plan recommends to carry out the camping activities in a well-planned manner with proper waste management mechanisms and adopting eco-friendly concepts.

Special Regulations applicable to Forest Camping Site

<table>
<tr><th>Description</th><th>Specifications</th></tr>
<tr><td>Maximum Land area</td><td>Shall allocate maximum 4000sqm area</td></tr>
<tr><td>No. of Units allowed</td><td>6-10</td></tr>
<tr><td>Plot Coverage</td><td>40%</td></tr>
<tr><td>Structures</td><td>Refer the Annexure II</td></tr>
<tr><td>Kitchen</td><td>Refer the Annexure II</td></tr>
<tr><td>Toilet facilities</td><td>Refer the Annexure II</td></tr>
<tr><td>Garbage/Waste Disposal</td><td>Refer the Annexure II</td></tr>
<tr><td>Storage</td><td>Refer the Annexure II</td></tr>
<tr><td>Other</td><td>Only Temporary and semi-permanent structures shall allowed
Tent Colour shall follow the recommended colour palette given below.
<table>
<tr><th>Colour</th><th>Hex*</th><th>RGB</th></tr>
<tr><td></td><td>#85613d</td><td>(133,97,61)</td></tr>
<tr><td></td><td>#5e492f</td><td>(94,73,47)</td></tr>
<tr><td></td><td>#7a542e</td><td>(122,84,46)</td></tr>
<tr><td></td><td>#673d26</td><td>(103,61,38)</td></tr>
<tr><td></td><td>#8b5436</td><td>(139,84,54)</td></tr>
<tr><td></td><td>#e39a31</td><td>(227,154,49)</td></tr>
<tr><td></td><td>#a5590e</td><td>(165,89,14)</td></tr>
<tr><td></td><td>#762b0a</td><td>(118,43,10)</td></tr>
<tr><td></td><td>#2f0000</td><td>(47,0,0)</td></tr>
</table>
</td></tr>
</table>

	*Recommended colour palette for tents (*Earthy tones Color Palette & Chestnut-Coloured Woodpecker Colour Palette) *Source – Color Hex.com* Minimum 3 trees with canopy height not less than 2m shall maintain among every 2 units

Table 4-6: Guidelines proposed for Forest Camping Site

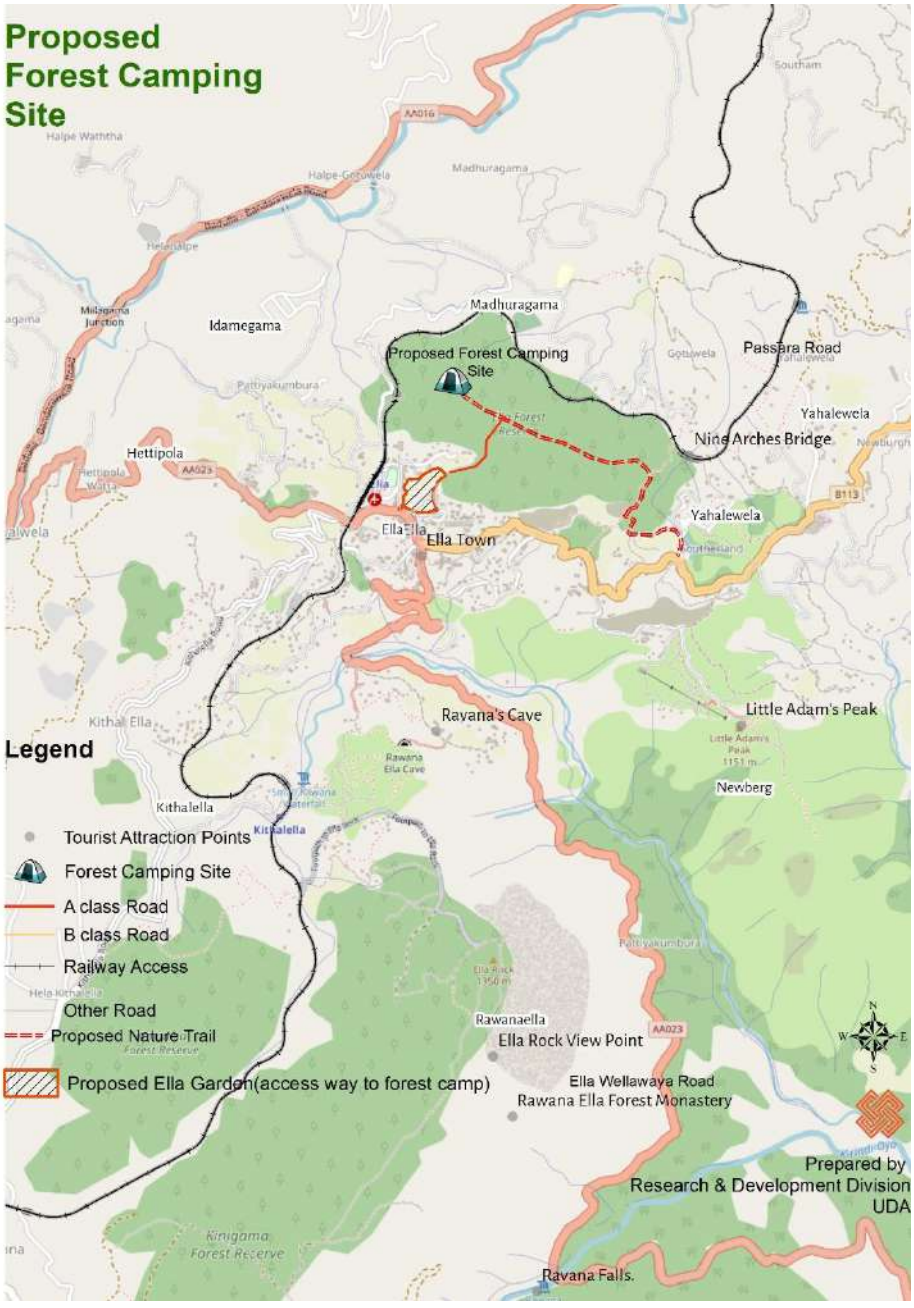


Figure 4-15: The location of the proposed Forest Camping Sites

Figure 4-16: The existing situation of the proposed Forest Camping Site

Figure 4-17: The proposed forest camping features and activities

b) Proposed Recreational Camping Site at Bora Wawa (Project Code – TP-2-1-2)

A 3000 m^2 Recreational Camping Site is proposed at a 2 acre of recreational area near the Bora Wawa.

This camping site will be promoted as a place of relaxation where the tourists can enjoy a camp fire at the evening by the waterfront.

The Plan recommends to carry out the camping activities in a well-planned manner with proper waste management mechanisms and adopting eco-friendly concepts.

The Special Regulations applicable to Bora Wawa Camping Site

Description	Specifications
Maximum Land area	Shall allocate maximum 3000sqm area
No. of Units allowed	6-10
Plot Coverage	40%
Structures	Refer the Annexure II
Kitchen	Refer the Annexure II
Toilet facilities	Refer the Annexure II
Garbage/Waste Disposal	Refer the Annexure II
Storage	Refer the Annexure II
Other	- Only temporary structures shall be allowed - Tent Colour shall follow the recommended colour palette given below. **Colour** / **Hex*** / **RGB** #223b05 (34,59,5) #1e3504 (30,53,4) #384e1d (56,78,29) #4e341d (78,52,29) #351b04 (53,27,4) *Recommended colour palette for tents* *Source – Color Hex.com* -

Table 4-7: Guidelines proposed for Bora weva Camping Site

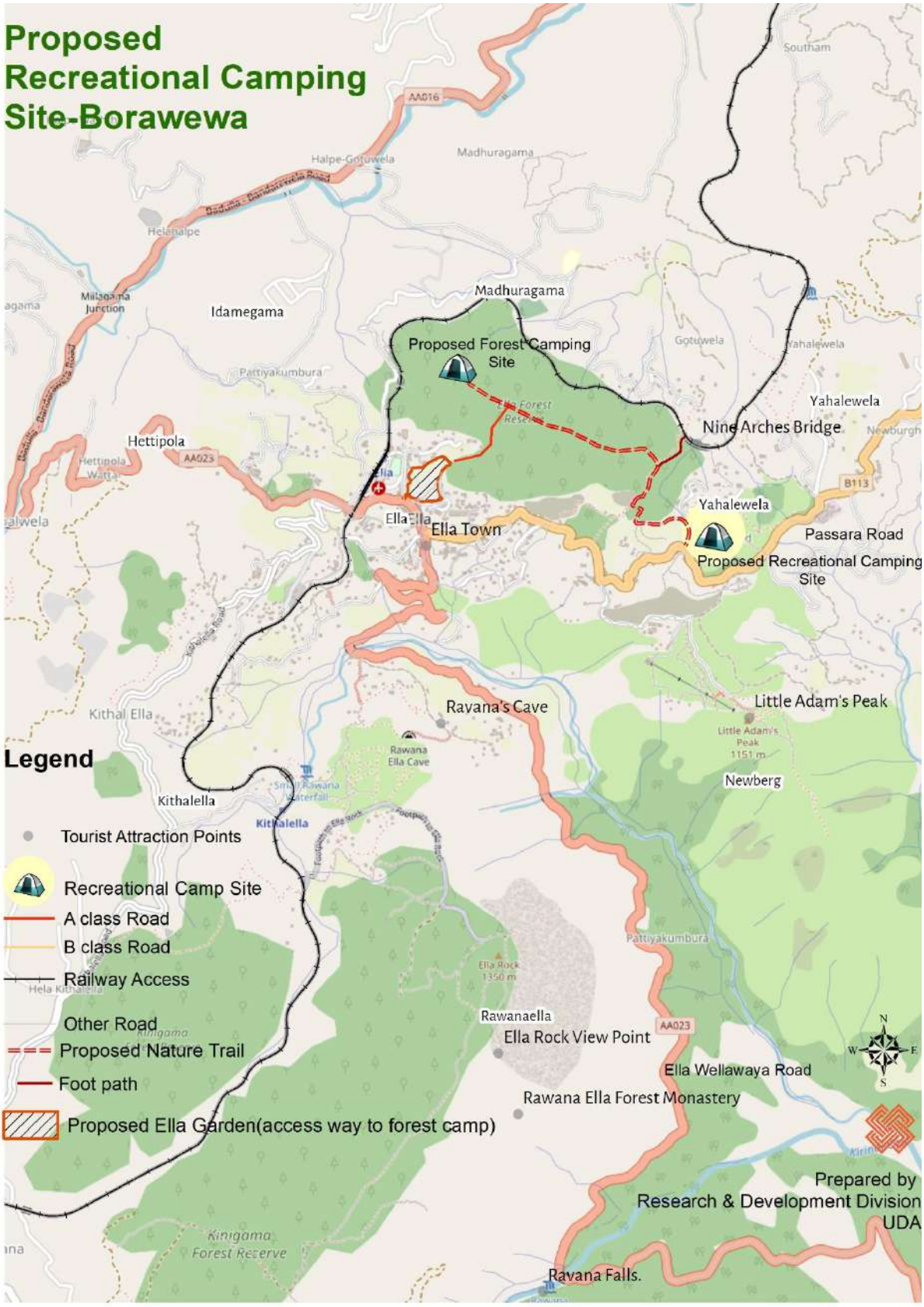


Figure 4-18: The location of the proposed Recreational Camping Site at Borawewa

Figure 4-20: The existing situation of the proposed camping site at Borawewa

Figure 4-19: The envisaged character of the proposed Recreational Camping Site

Figure 4-21: Layout of Bora Wawa Camping Site

c) Proposed Adventure Camping Site at Kithal Ella (Project Code – TP-2-1-3)

An adventure camping site is proposed at the area of Kithal Ella water fall where tourist can enjoy the natural view with calm environment. The total maximum extend of camping site is 1200sqm.

The Plan recommends to carry out the camping activities in a well-planned manner with proper waste management mechanisms and adopting eco-friendly concepts.

Figure 4-23: The proposed Adventure Camping Site at Kithal Ella

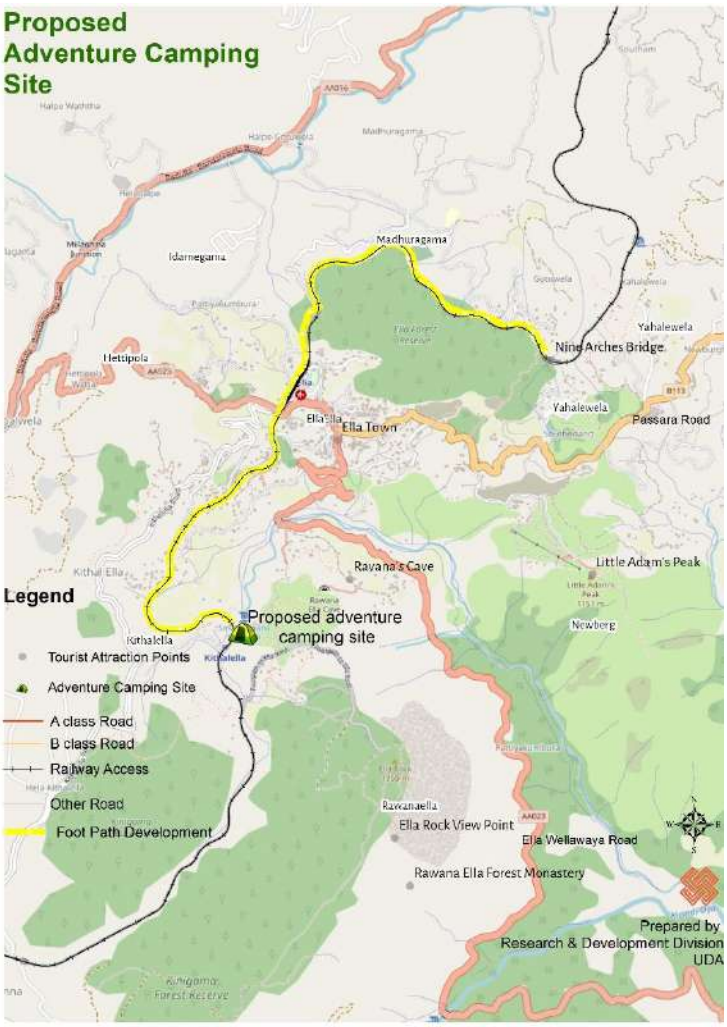


Figure 4-22: The location of the Proposed Adventure Camping Site at Kithal Ella

d) Proposed Stargazing Camping Site (Project Code – TP-2-1-4)

A stargazing camping site is proposed on the top of Ella rock. It is envisaged to be a place where the tourist can enjoy astrophotography. Along with the camping facilities it is proposed to setup the necessary telescope and relevant astrophotography equipment.

Figure 4-24: The envisaged character of the proposed Adventure Camping Site and Stargazing Camping Site

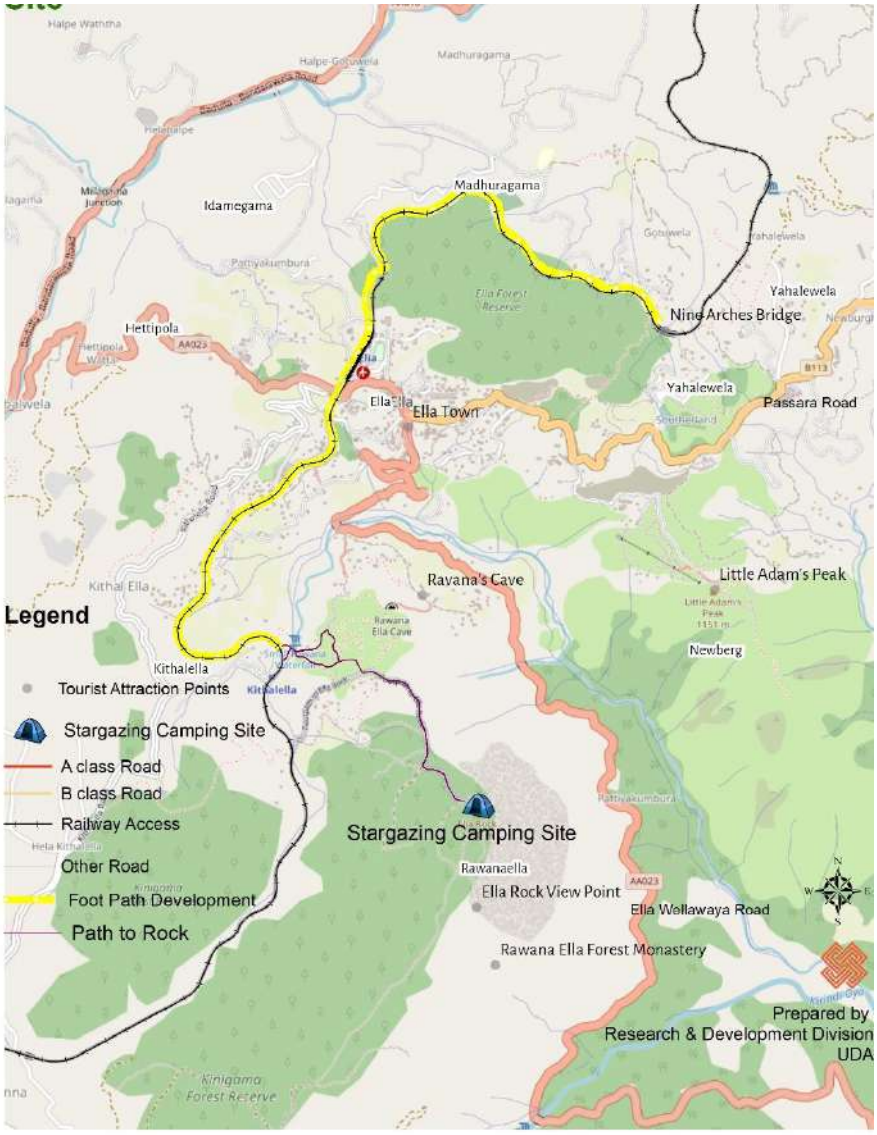


Figure 4-25: The location of the proposed Stargazing Camping Site at Ella Rock

Special Regulations applicable to Adventure Camping Site and Stargazing Camping Site

<table>
<tr><th>Description</th><th>Specifications</th></tr>
<tr><td>Maximum Land area</td><td>1200sqm area</td></tr>
<tr><td>No. of Units allowed</td><td>6</td></tr>
<tr><td>Plot Coverage</td><td>40%</td></tr>
<tr><td>Structures</td><td>Refer the Annexure II</td></tr>
<tr><td>Kitchen</td><td>Refer the Annexure II</td></tr>
<tr><td>Toilet facilities</td><td>Refer the Annexure II</td></tr>
<tr><td>Garbage/Waste Disposal</td><td>Refer the Annexure II</td></tr>
<tr><td>Storage</td><td>Refer the Annexure II</td></tr>
<tr><td>Other</td><td>Only mobile temporary huts shall allow excluding containers
- Tent Colour shall follow the recommended colour palette given below.
<table>
<tr><th>Colour</th><th>Hex*</th><th>RGB</th></tr>
<tr><td></td><td>#223b05</td><td>(34,59,5)</td></tr>
<tr><td></td><td>#1e3504</td><td>(30,53,4)</td></tr>
<tr><td></td><td>#384e1d</td><td>(56,78,29)</td></tr>
<tr><td></td><td>#4e341d</td><td>(78,52,29)</td></tr>
<tr><td></td><td>#351b04</td><td>(53,27,4)</td></tr>
</table>
Recommended colour palette for tents
Source – Color Hex.com
- Only Moderate Level Music (80 or below dB) shall be allowed and sounds shall not disturb the natural, cultural and social surrounding of the camp site.</td></tr>
</table>

Table 4-8: Guidelines proposed for Adventure Camping Site and Stargazing Camping Site

Further to the construction and activity guiding regulations introduced by the Ella TDMP, the Plan recommends to follow the below mentioned SLTDA Regulations for Camping Sites when developing all four proposed camping sites. These regulations are given in the Volume II – Part A of the Ella TDMP.

4.1.2.2 Development of Ella Garden beneath the existing Pine Forest– (Project Code – TP-2-2)

A theme Garden named Ella Garden is proposed beneath the existing Pine Forest at the Ella town. The objective of having the Ella Garden is to enhance the city image of Ella. According to the concept, Ella town is identified as the focal point of Ella tourism destination. Therefore, tourism promotion strategy focuses to create a nice small town which is hidden

among the green mountains. Ella Garden is one such project designed to serve this aspect of the concept. Further to that, this project also serves the future vision of Ella; the #Mountain_Gallery as it is envisaged to be one of the unique picturesque locations in Ella.

Identified location for the project is 6 acres land which is currently owned by a private owner beneath pines forest. Ella Garden will be developed as a theme Flower Park with small cafeteria and public toilets. Ella TDMP recommends to carry out a comprehensive study prior to the implementation of the project in order to select right type of flower plants which are sensitive and related with different human emotions.

Figure 4-26: Proposed envisage image of Ella Garden

Figure 4-27: Layout of Proposed Ella Garden

4.1.2.3 Introducing Bungee Jump as an Adventurous Sport at the proposed Hand Bridge in Kithal Ella (Project Code – TP-2-3)

"There is no magnificence in falling, but it is too much excitement in jumping from the bungee bridge. Try it at Ella"

*_Quotes Gram_*

Figure 4-28: The images showing the proposed Bungee Jump sport activity

Ella TDMP proposes to introduce a new adventurous sport activity which is Bungee Jump. At present, this activity is not offered anywhere in Sri Lanka, thus the Plan expects that it will contribute to increase the tourism attraction in Ella. The location proposed for the Bungee Jump Activity is near the proposed Hand Bridge at Kithal Ella. However, the Ella TDMP recommends to carry out a comprehensive feasibility study to identify the

exact location suitable for the activity. In case, the current proposed location is not suitable for the activity, the Ella TDMP provides the provisions for the relevant implementing party to introduce the activity at the most suitable location given that it does not disturb the natural views and conforms with the other proposals and planning & building regulations of the Plan. However, it is compulsory that any sort of construction that is required for the activity needs to be built up according to the international standards and safety measures yet should be designed in such a way not to be visual disturbances to the natural setting. Further, the implementing agency should be fully responsible for ensuring the safety of those who take part in the activity.

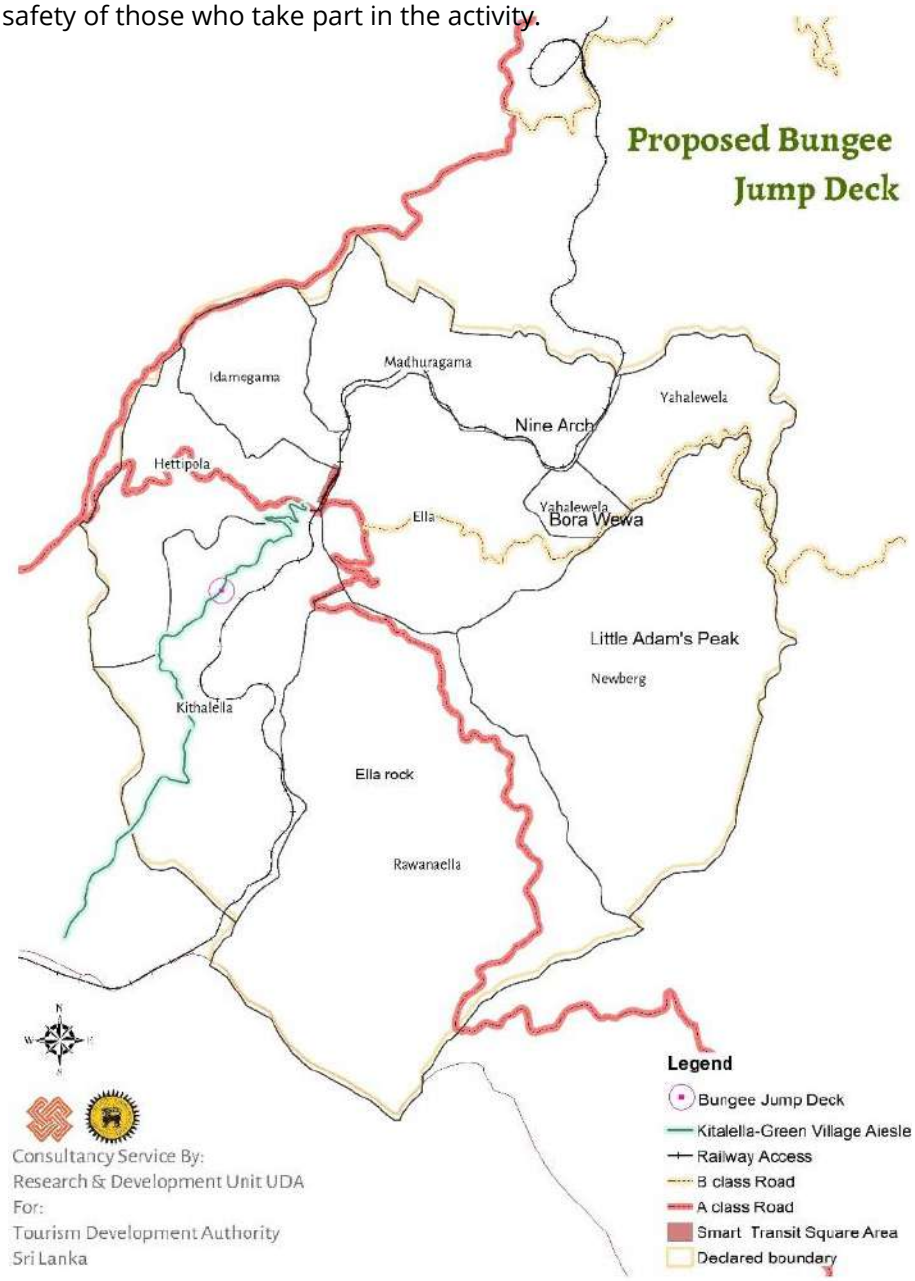


Figure 4-29: The location proposed for the Bungee Jump Sport Activity

4.1.2.4 Introducing a Rail Tour from Ella Station to Demodara Station (Project Code – TP-2-4)

Rail journey from Nanu Oya to Ella is world famous as it offers the best misty mountainous sceneries. With the expectation of promoting this unique rail trail, the Ella TDMP proposes a short rail journey with a new mode of rail transport from Ella Station to Demodara Station (6.5km).

The Plan proposes to introduce a modified version of the typical 'Dakkuwa' transport mode in Sri Lanka as a luxury transport vehicle which can carry a small group of passengers safely. In case, the modified 'Dakkuwa' cannot be used for this purpose, the Plan recommends to adopt a similar type of transport such as a tram car or any alternative type of vehicle which can run on rail.

The overall purpose of this project is to promote the Rail Isle proposed in the Concept Plan of the Ella TDMP and to provide more opportunities for tourists to experience this unique rail journey.

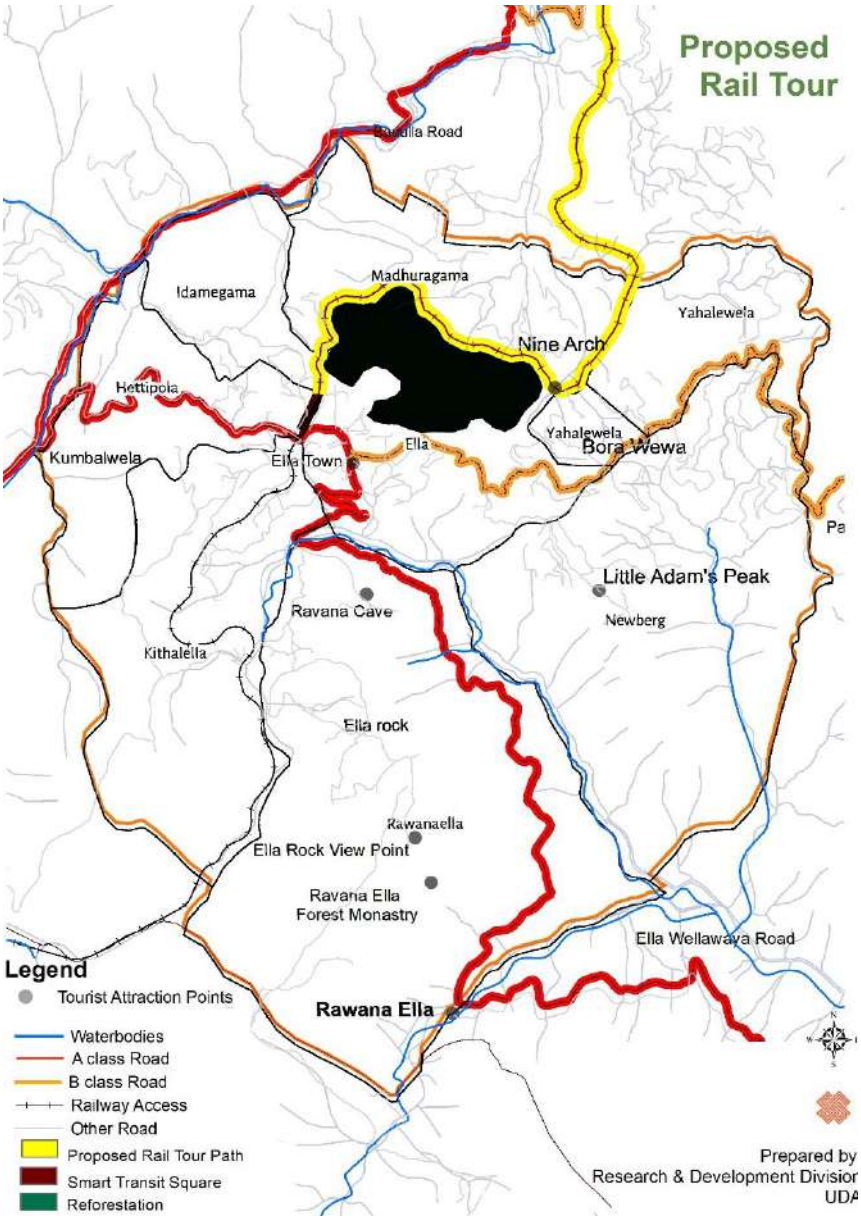


Figure 4-30: The proposed Short Rail Journey trail from Ella Station to Demodara Station

Figure 4-31: The images of similar rail transport modes suitable for the proposed for Short Rail Journey

4.1.2.5 Designing Borawewa site as a Recreational Area (Project Code – TP-2-5)

The Plan proposes to carry out a landscaping program at the 2-ha land of Borawewa site to enhance its spatial experience. The intention of this project is to promote the site as a recreational site as well as to design a good setting for the Borawewa Camping Site.

Refer figure 4.18, section 4.1.2.1 of Tourism Promotion Startegy.

4.1.2.6 Construction of Observation Decks at special viewpoints in Ella (Project Code – TP-2-6)

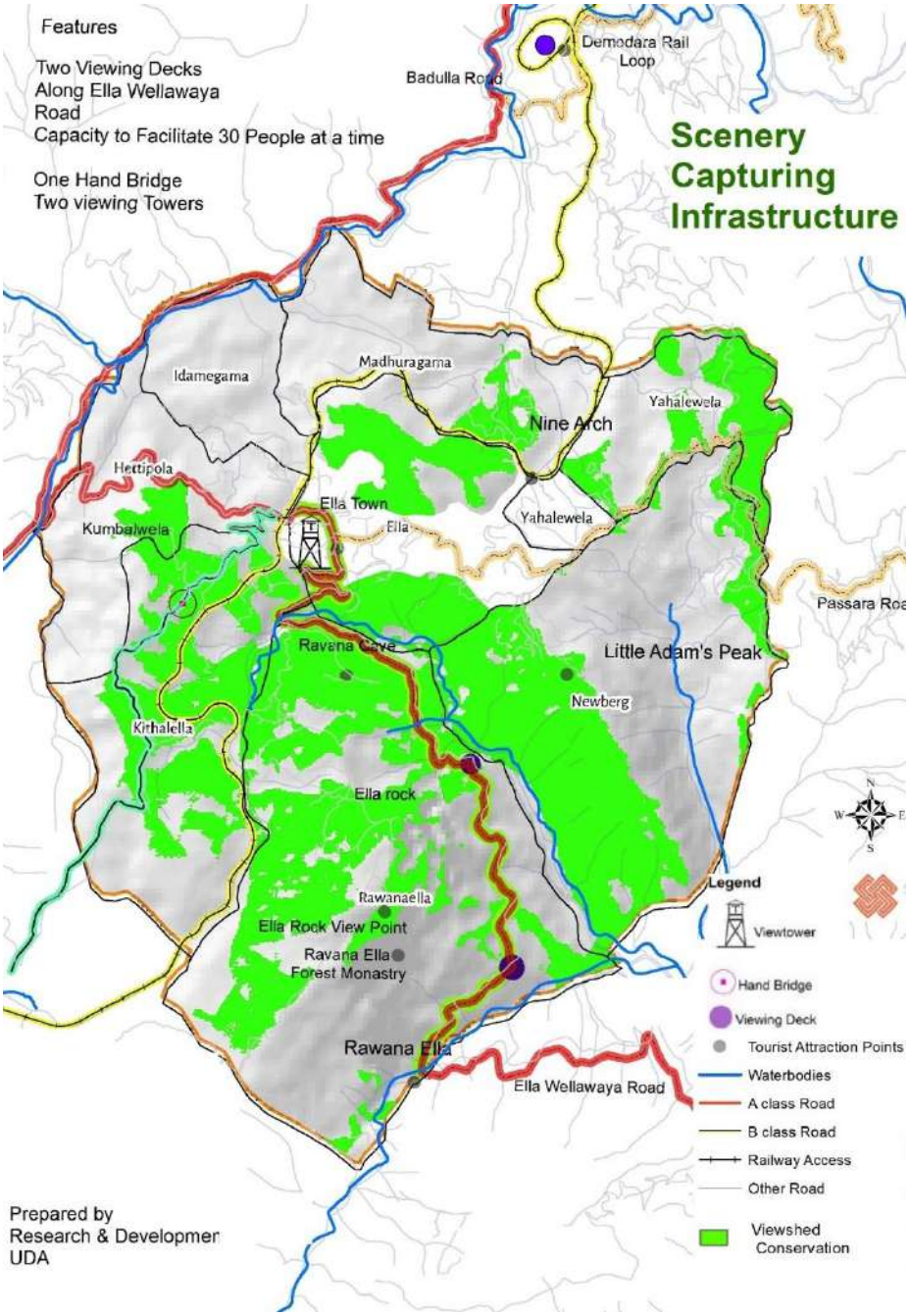


Figure 4-32: The locations of proposed View Decks in Ella

As explained in the Vision and Concpet Plan, the origin of Ella as a toruism destination happned during the post Tsunami period when the toruists behgan to explore new destinations beyond the coastal zone. One of such newly explored destinations was Ella and its fame soon grew throughout the world as a beautiful scenary capturing destination. The popularity of Ella was boosted with the chain of photos shared by the tourists through

several social media platforms. Therefore, Ella's unique reputation as a world famous scenery capturing destination is perceived as its best potential and the Ella TDMP envisages to strengthen this potential and harness it well by branding it as the #Mountain_Gallery.

In support of this envisaged vision and concept, the Ella TDMP proposes several measures to further promote scenary capturing in Ella and one such projects is to construct several view/ observation decks at idnetified best viewpoints.

The proposed five new observation decks are given in the below table.

No.	View Deck	Viewshed	Proejct Code
01	View Deck 1 at Ella-Wellawaya Road	Ella Gap	TP-2-6-1
02	View Deck 2 at Ella-Wellawaya Road	Ella Gap	TP-2-6-2
03	View Deck at the Kithal Ella Hand Bridge	Ella Rock, Kithal Ella waterfall, Kithal Ella Steel Bridge, Ella Gap and Kithal Ella Gap	TP-2-6-3
04	View Deck at the Demodara Loop	The train taking a turn through the Demodara Loop	TP-1-2
05	View Tower at the Ella Town	The view of vibrant city center with proposed Railway square, Proposed Ella garden, proposed foot rail tour and foot path , Kithal Ella water fall, Part of Ella Rock and unique mountain setting around the city	TP-2-6-4

Table 4-9: The proposed View Decks in Ella

a) Construction of two View Decks at identified two locations along the Ella- Wallawaya road (Project Code – TP-2-6-1 & TP-2-6-2)

The two view decks will be developed with two different characters as the first deck is proposed to develop with siting and relaxing facilities as a typical observation deck while the second deck is proposed to develop with modern observation facilities and equipment. The total capcity of each deck will be 30 people at a time.

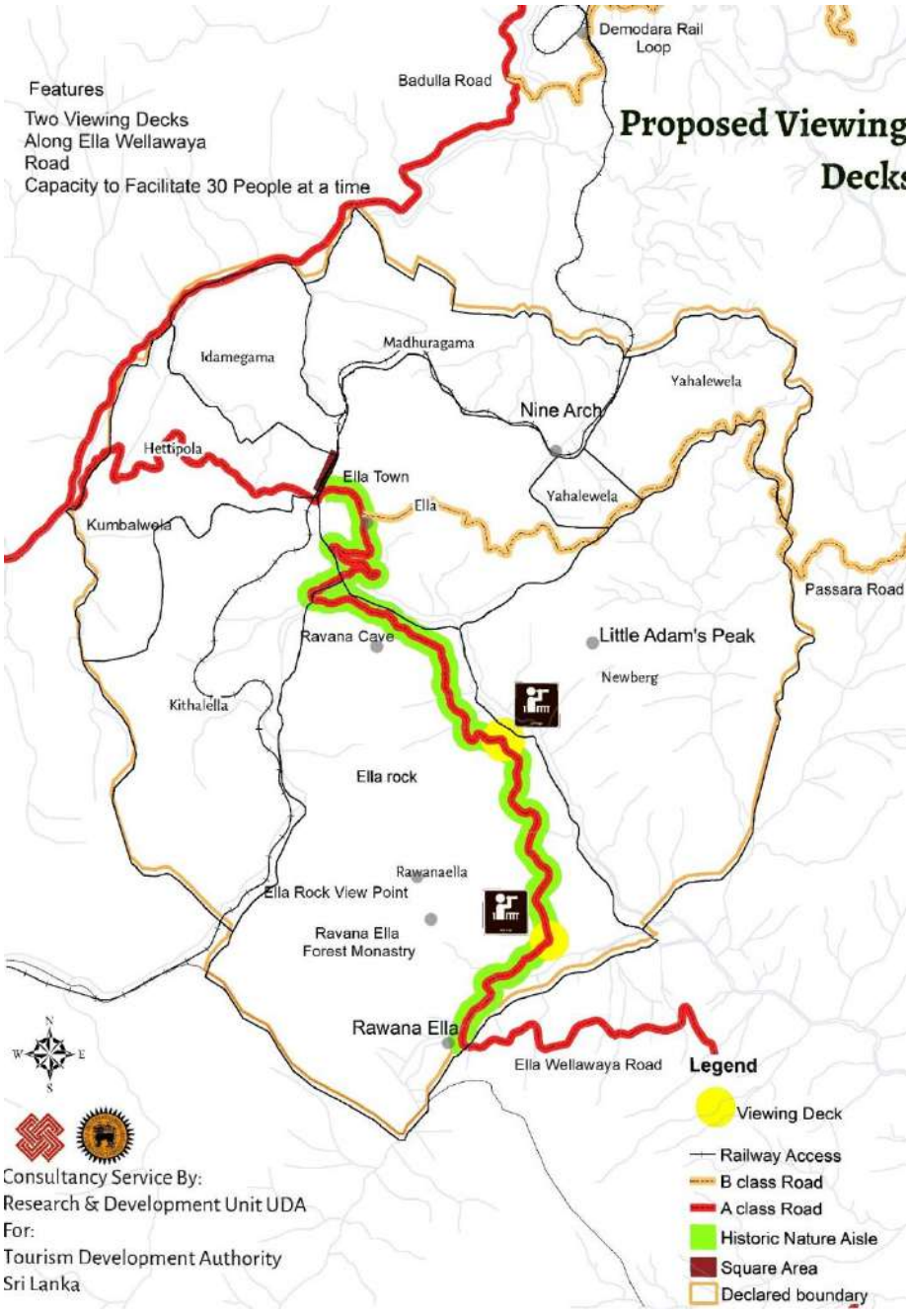


Figure 4-33: The proposed two View Decks along the Ella-Wellawaya Road

It is compulsory that the two decks should not damage the view of Ella and construction materials should blend with environmental setting of the area.

Figure 4-34: The location of the View Deck 1 at Ella-Wellawaya Road

Figure 4-37: The proposed character of the View Deck 1 at Ella-Wellawaya Road

Figure 4-35: The location of the View Deck 2 at Ella-Wellawaya Road

Figure 4-36: The proposed character of the View Deck 12at Ella-Wellawaya Road

b) Construction of a view deck near the proposed Kithal Ella Hand Bridge (Project Code – TP-2-6-3)

Kithal Ella Hand Bridge is designed to capture the Kithal Ella fall and steel bridge which was constructed during the British period. Intention of proposed hand bridge is to enable the tourists to capture the beautiful sceneries from a landmark point. The Hand Bridge is envisaged to be a significant landmark in Ella.

The following recommendation need to be considered during design and construction of the hand bridge.

- Design shall be done in such a way not to bring out an artificial alien appearance
- The bridge shall blend with the natural setting after construction
- Luminous colors shall not be used to paint the bridge
- The bridge shall have an identical design

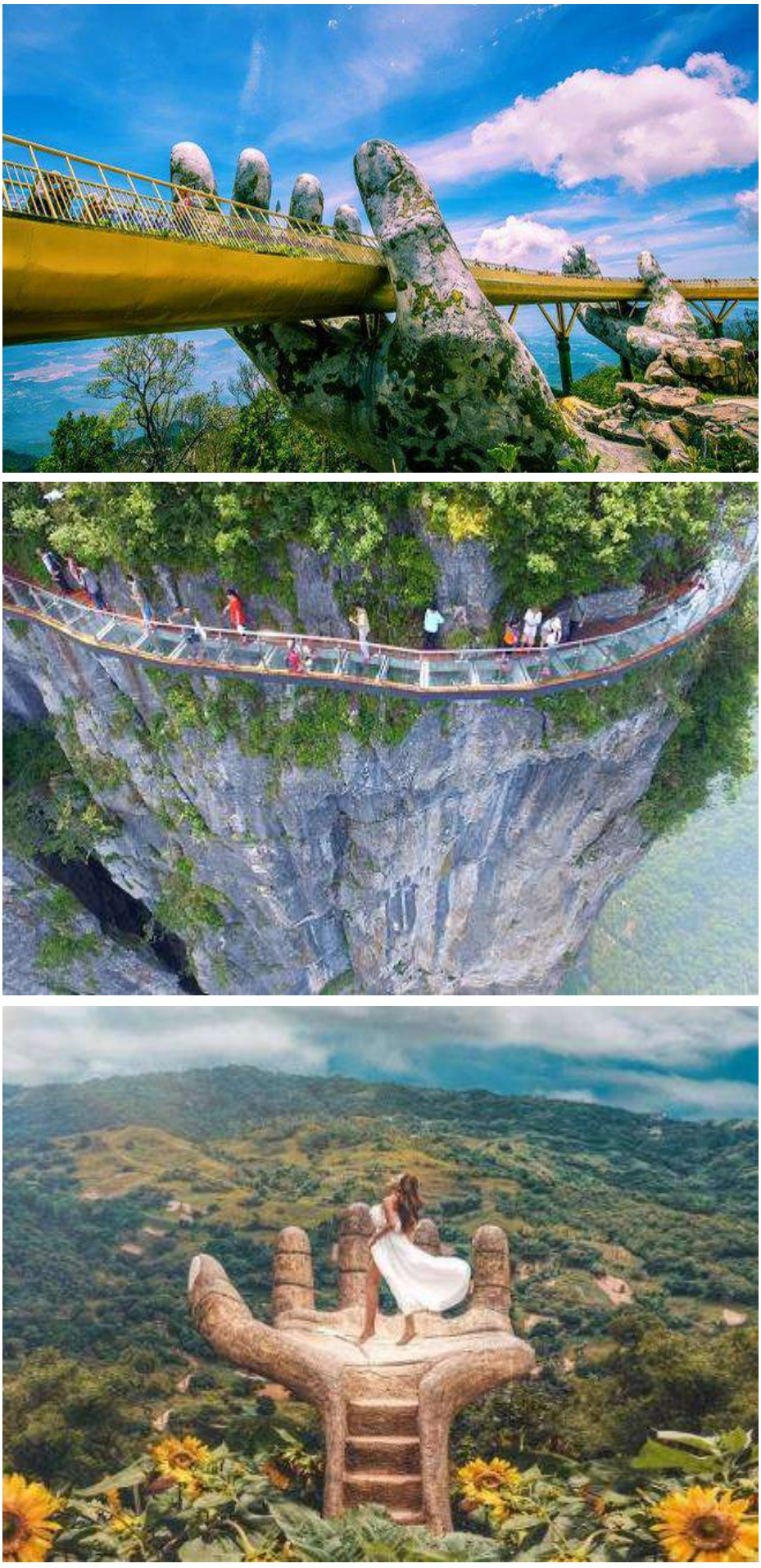


Figure 4-38: Design examples for hand bridges

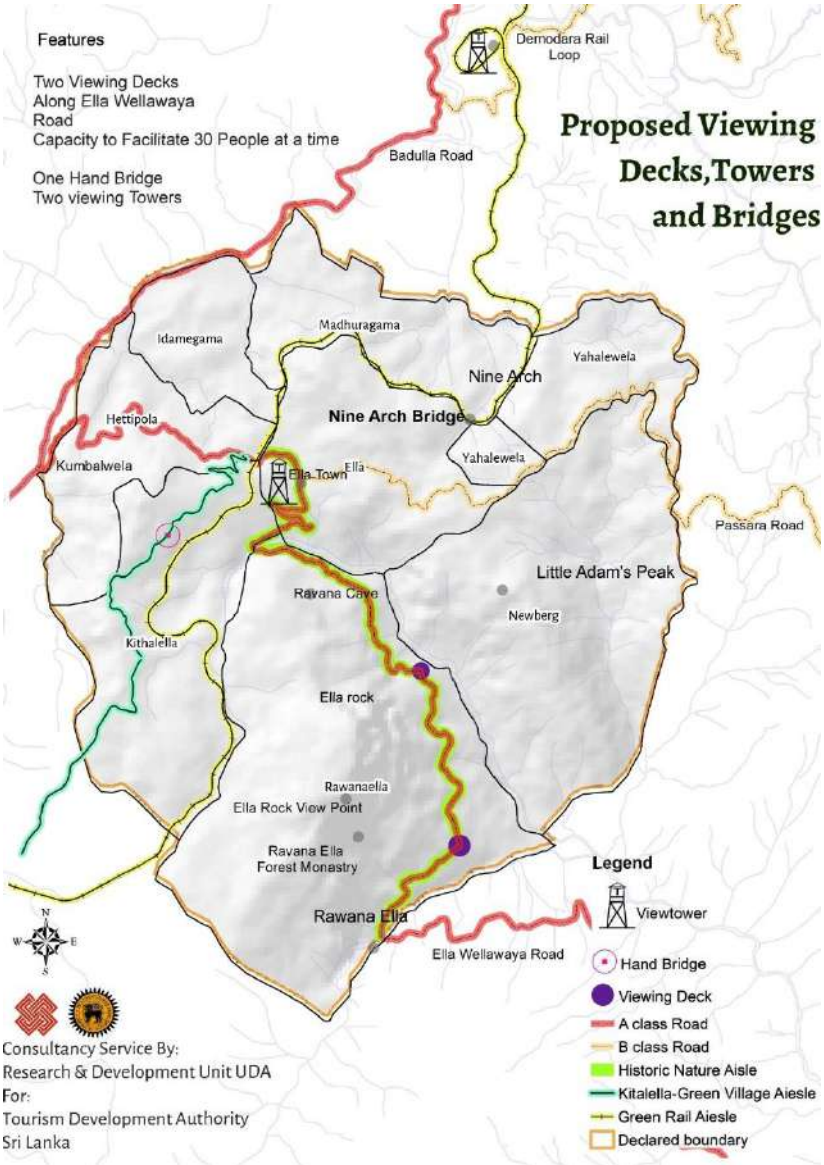


Figure 4-39: The location of the proposed Hand Bridge View Deck

Figure 4-40: The view from the Hand Bridge

c) Construction of a view deck at the Demodara Loop (Project Code – TP-1-2)

This project is explained in the section 4.1.1 (b) of this report.

d) Construction of a View Tower at the Ella Town (Project Code – TP-2-6-4)

Ella TDMP proposes to build a view tower having 10m height at the top of the mountain located within the Ella town. This location falls within the boundary of Ravan City Low Dense Commercial Special Regulation Area. The Plan recommends to build this structure as not appear as an alien feature within the city but in a way that it blends with the unique natural setting of Ella. The intention of this View Tower is enabling the tourists to capture a panoramic city view including Railway square, Proposed Ella garden, proposed foot rail tour and foot path , Kithal Ella water fall, Part of Ella Rock and unique mountain setting around the city.

Figure 4-41: The envisaged design of the proposed View Tower at Ella Town

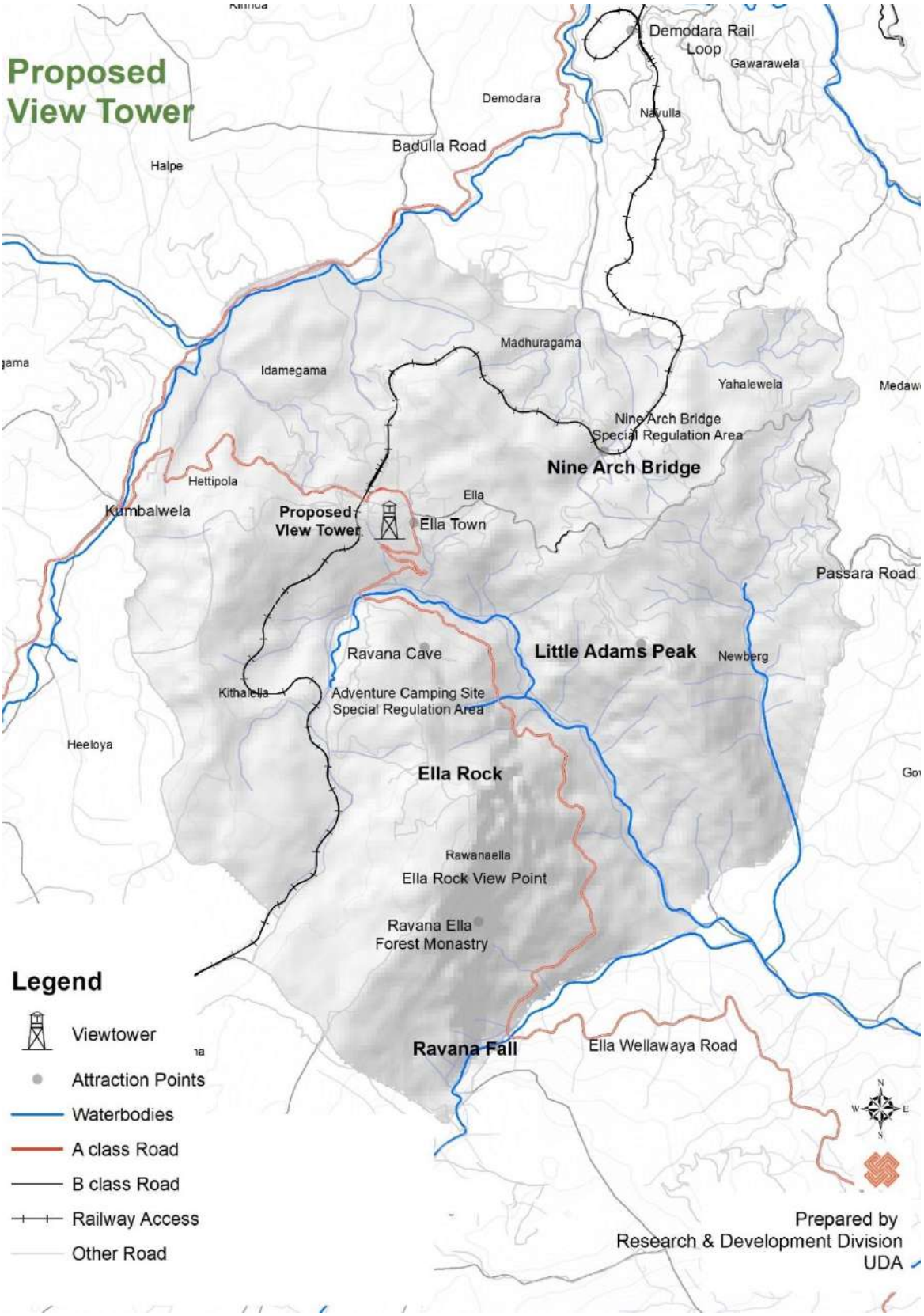


Figure 4-42: : The location of the proposed View Tower at Ella Town

4.1.2.7 Promoting Rock Climbing as a sport activity at Little Adam's Peak and Ravana Rock (Project Code – TP-2-7)

Both Little Adam's Peak and Ravana Rock have the potential to promote rock climbing. The Ella TDMP introduces Rock Climbing as a sport activity both at Little Adam's Peak and Ravana Rock. The Plan recommends to carryout necessary feasibility studies and identify the best locations to carry out the activity at both the locations. The Plan also recommends to identify a suitable qualified party who can run the activity and also to carryout it with extreme safety precautions.

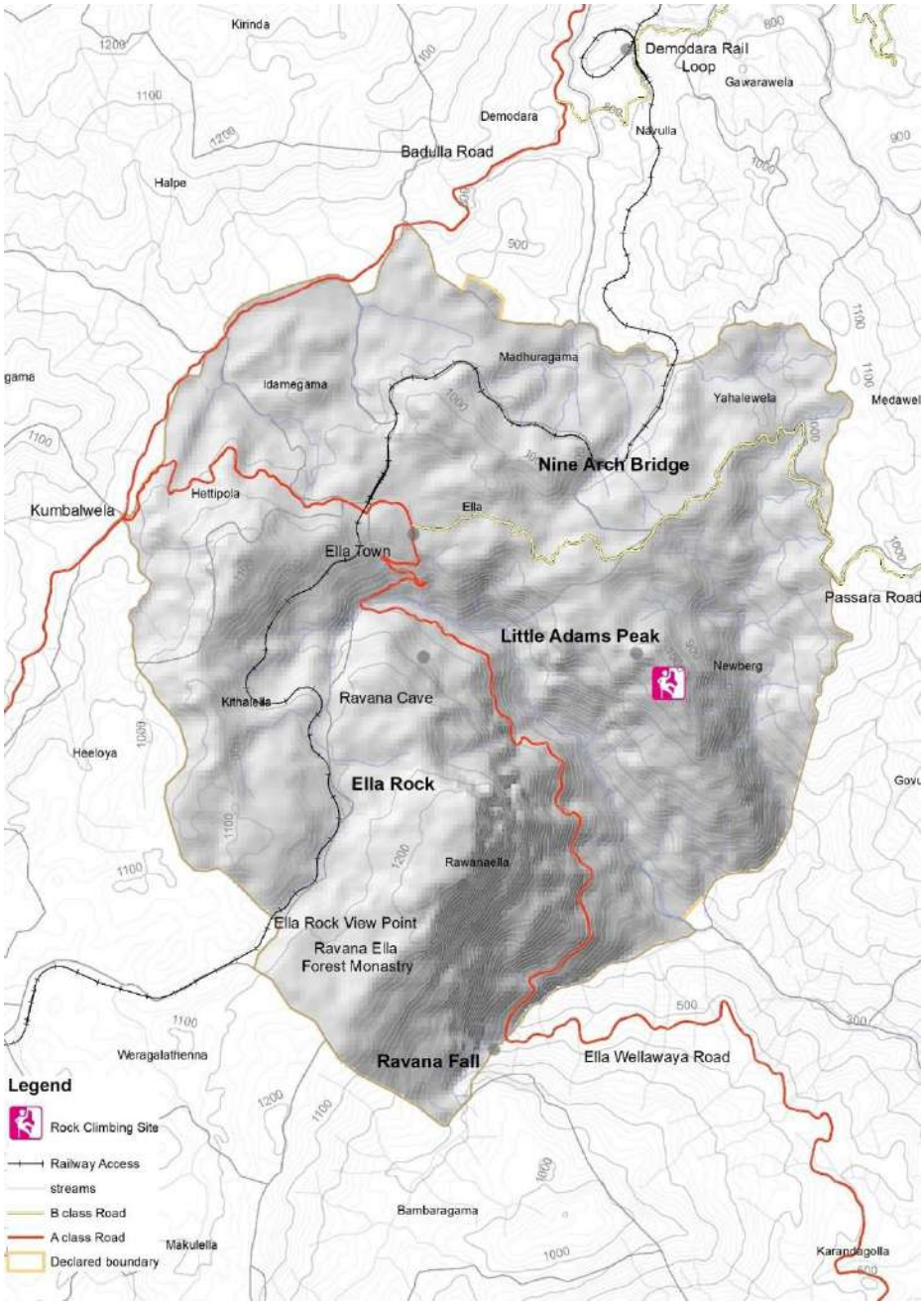


Figure 4-43: The locations proposed for Rock Climbing

Figure 4-44: An image showing rock climbing sport Activity

4.2 Tourism Facilitation Strategies (Project Code - TP-3)

A good tourism destination needs to offer tourists with standard facilities to make their stay a comfortable one. Thus, this strategy focuses on providing facilities to accommodate tourists visiting Ella.

The situation analysis revealed that Ella does not have adequate toilet facilities, common spaces for relaxing, tourists' information centres, accommodation & taxi booking options and space for parking of tourists' vehicles etc. Therefore, this strategy proposes number of projects to introduce and improve such standard tourist facilities within Ella. However, these facilities are provided only within proposed Development Management Zones where developments are allowed.

4.2.1 Construction of a Tourist Service Centre at Ella Town (Project Code – TP-3-1)

268 perch land owned by the Urban Development Authority is selected to build the proposed Tourist Service Centre at the Ella Town. This land is located facing the Passara Road. Since this location is in close proximity to number of tourist attractions and important places such as Ella Garde, Forest Camping Site, wlaking path along the canal, Ella view tower, smart railway square, eidetic place

19 acre land which belongs to road development authority is proposed to construct service facilitated area for the Ella as this located immediate after the Proposed Ravan city along the passara road. And many of new proposed toruism promtion activities such as Ella garden, forest camping, canal water path, Ella view tower, smart railway square, eidetic place, Borawawa recreational camping site, Mini Admas Peak are located within 1km radius from this location, it is ideal to locate the proposed Toruist Service Centre there.

The service fcilitated area comprises with following components.

- Tourist Police
- Parking
- Relaxing Place
- Food Court
- Toilet Facilities

Figure 4-45: The location of the proposed Tourist Service Centre

Figure 4-46: The layout of proposed Tourist Service Centre

Figure 4-47: The features of the proposed Tourist Service Centre

4.2.2 Providing Sanitary Facilities at identified locations within Ella (Project Code – TP-3-2)

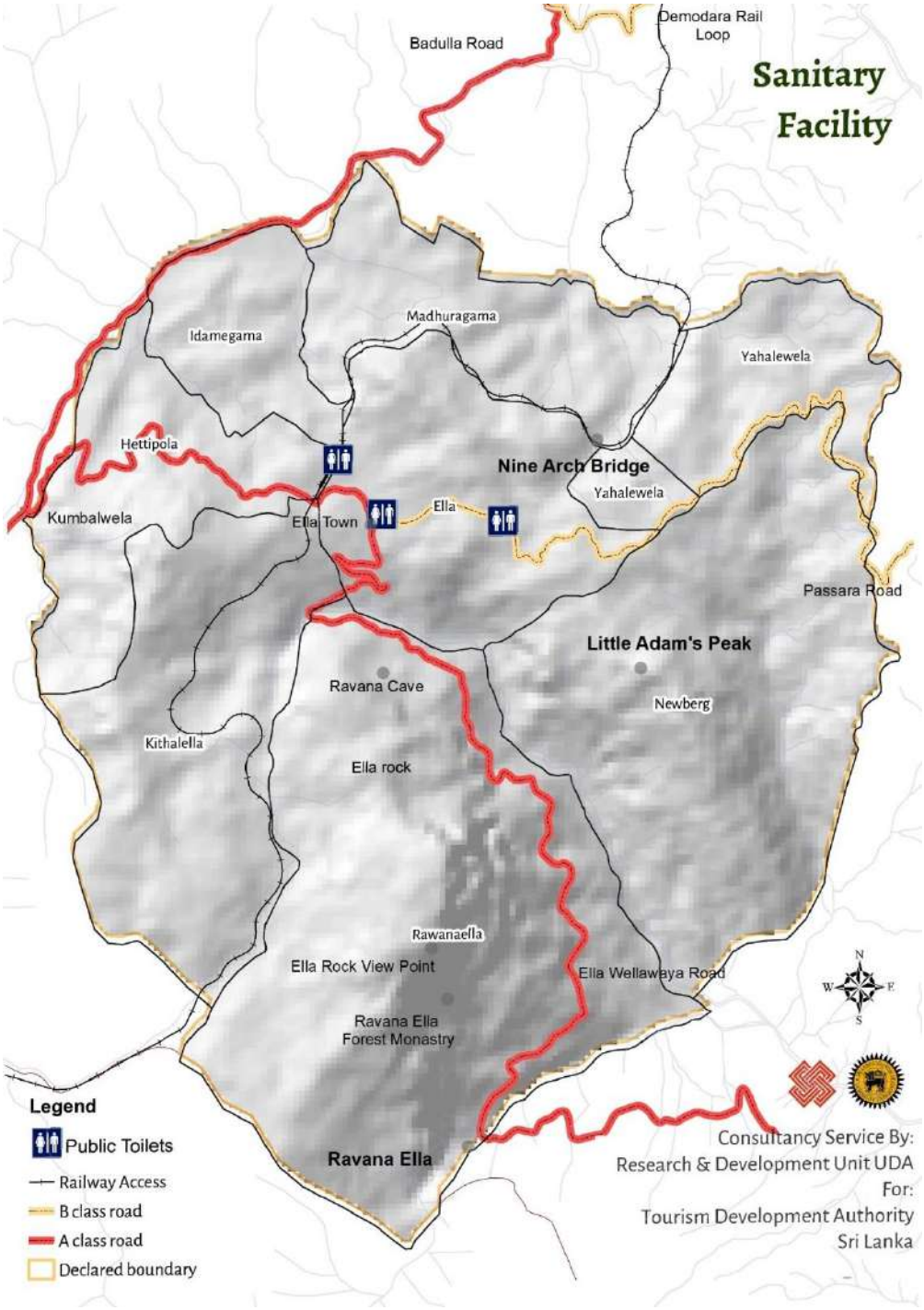


Figure 4-48: The locations of the proposed Sanitary Facilities

Another identified major issue of Ella is the lack of the sanitary facilities. There is only one common toilet facility is currently available at Ella town centre and it is located at the railway station premises. But it is one of essential requirement that should be fulfilled. Therefore, the Ella TDMP proposes to locate sanitary facilities at three locations in Ella.

- At Smart Railway Square (Project Code – TD-4-1)
- At Tourist Service Centre (Project Code – TP-3-1)
- At the Parking Area proposed in close proximity to the Mini Adams Peak (Project Code – TD-4-2)

Fallowing factors are recommended to be considered when building sanitary facilities in Ella.

- Sanitary facility buildings should be blend with the surrounding environmental setting
- Sanitary facility should have separate facilities for differently abled persons
- Sanitary facility should have infant cleaning area and children toilet facilities
- Sanitary facilities should have a sound maintenance mechanism

Figure 4-49: The features of the proposed sanitary facilities

4.2.3 Building an Information Center at Ella and promote it with the branding 'Eidetic Palace' (Project Code – TP-3-3)

Figure 4-50: The location of the proposed Information Centre (Eidetic Palace)

The proposed information center is not just a conventional information center that can be found anywhere. It is proposed to be developed as a model of the vision proposed for Ella - “Mountain Gallery”.

The uniqueness of this information centre is that it would be designed as a gallery. This information has a special feature, where the tourists can upload the pictures captured at different places in Ella and let them be exhibited publicly. This will be an entertaining event as well as a promotional event to promote the future vision of Ella.

It is because of this special feature, that this unique Information Centre is to be called as the ‘Eidetic Palace’. The meaning of “Eidetic” is the place where the memories are stored.

Further, it is proposed to upload the historical images and stories of the legendary history of Ella also to the same digital gallery making it a timeless gallery which presents both past and present memories created in Ella.

The information centre or the ‘Eidetic Palace’ is proposed to be located at the proposed Tourist Service Centre

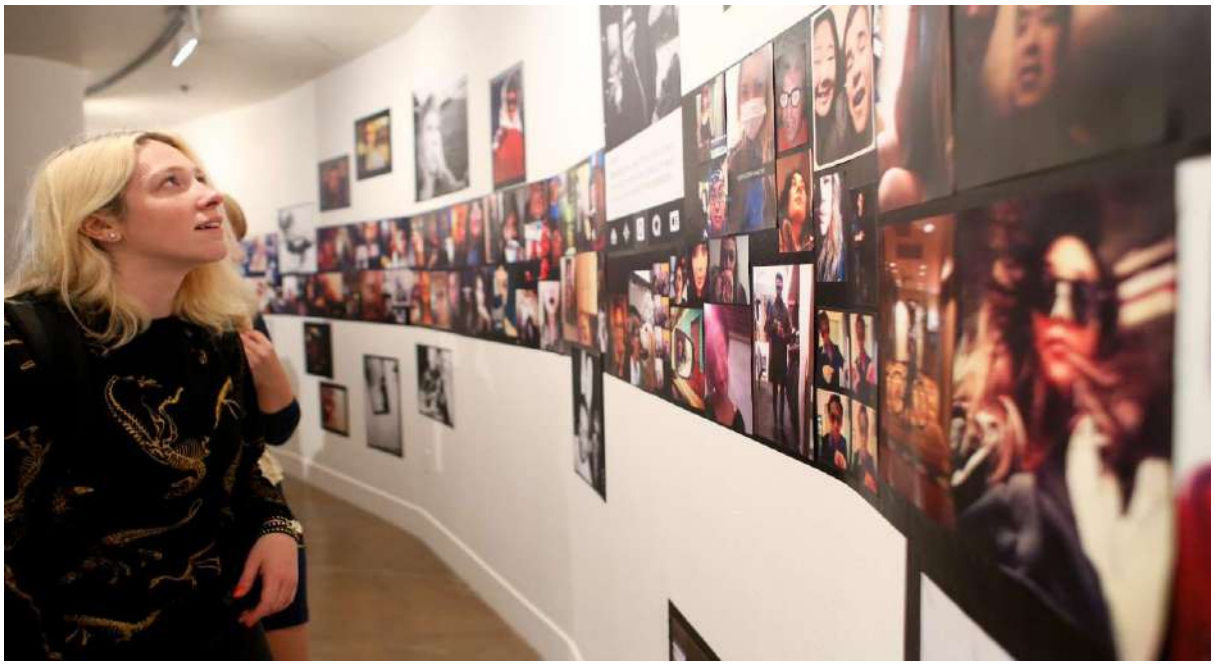


Figure 4-51: The features of the proposed Information Centre (Eidetic Palace)

STRATEGY

Transport Development

05

5. Transport Development Strategy

The key focus of the transportation development strategy is to improve the accessibility within Ella and to expose the proposed new tourism attraction sites and activities. The plan also focuses on reducing the existing traffic congestion at the city centre as well as to promote carbon free green transportation modes. Further, this strategy also focuses on providing necessary transport related facilities to enable convenient transportation within Ella.

The three sub strategies of Transport Development Strategy are as follows.

1) Road transport and walkability improvement strategy
2) Transport modes diversification strategy
3) Transport facilities improvement strategy

5.1 Road transport and walkability improvement strategy

Physical development of road network will enhance the smooth connectivity and efficiency of the tourism related functions and also will lead to attract new tourism investments. Improved accessibility within Ella would enable the tourists to enjoy each and every attraction in Ella while smoothly travelling from one attraction to the next.

5.1.1 Road Improvements (Project Code – TD-1)

5.1.1.1 Improvement of the Ella-Wellawaya Road (Project Code – TD-1-1)

a) The section falling within the limits of Ravan City (Project Code – TD-1-1-1)

Ella-Wellawaya Road running through the Ella town or the Ravan City carries significantly a large volume of traffic and it conflicts with the existing landuse pattern and the functions at the either sides of the road. Not having physically demarcated pavement area, lack of shade and limited physical width of the road make it inconvenient and dangerous for the pedestrians to walk through the Ella-Wellawaya road. Considering the above limitation, the Ella TDMP proposes to improve the particular road section of Ella – Wellawaya road falling within the limits of Ravan City as per the cross section shown in the Figure 5.1

- Starting point of the road section – Tunnel at the north boundary of the Ravan City
- Ending point of the road section – Point at the existing Dewalaya on Ella – Wellawaya Road
- Length – 500m
- Proposed physical width – 8.4m – 9.5m

The proposed improvements for the above road section are as follows.

- Paving of the pedestrian way
- Maintaining a 0.5m width flower bed at the right side of the road when directing towards Wellawaya
- Maintaining 6.4m – 7.0m wide carriage way
- Installation of street lights

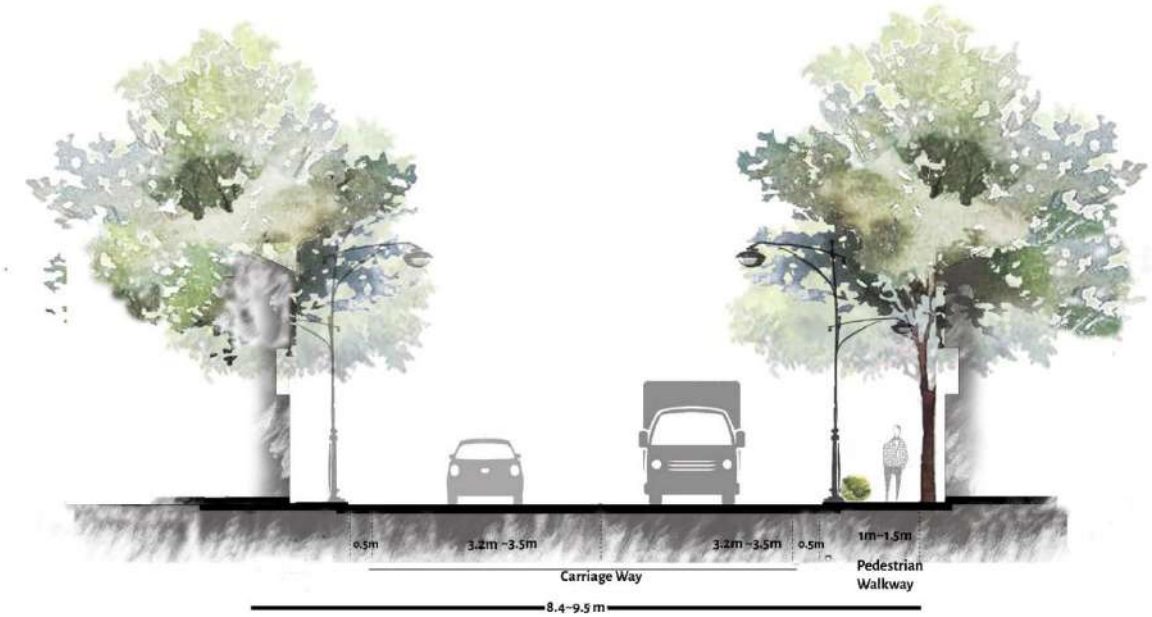


Figure 5-1: The proposed cross-section for the road stretch of Ella – Wellawaya road falling within the limits of Ravan City

b) The road sections beyond the limits of the Ravan City (Project Code – TD-1-1-2)

The Ella TDMP proposes following improvements for the Ella – Wellawaya road fallen outside the boundary limits of the Ravan City. These improvements are applicable to the following road stretches.

- The stretch of Ella – Wellawaya road starting from the north boundary of the Planning Area and ending at the Tunnel (North entrance to the city) – (2.5.km length)
- The stretch of Ella – Wellawaya road starting from the Dewalaya (south boundary of the Ravan City) and ending at the south boundary of the Planning Area – (5km length)

The proposed improvements to the road stretches are;

- 7 wide physical width with 3.2m-3.5m wide carriage way
- 1 wide pedestrian path
- Installation of street light

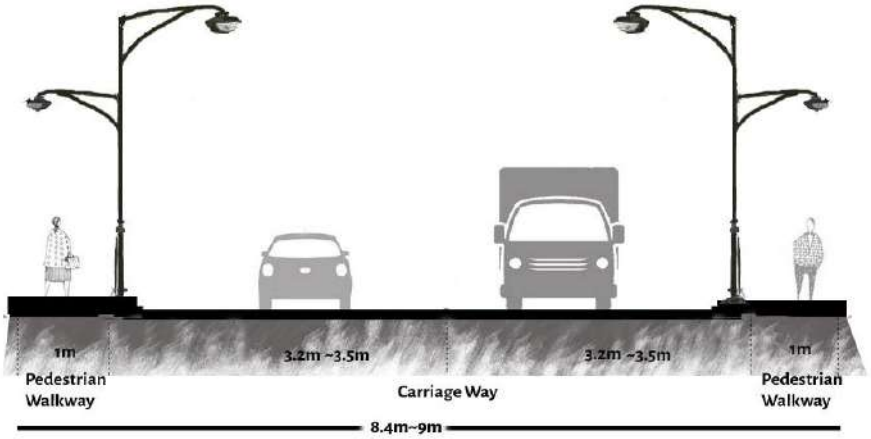


Figure 5-2: The proposed cross-section for the road stretch of Ella – Wellawaya road falling outside the limits of Ravan City

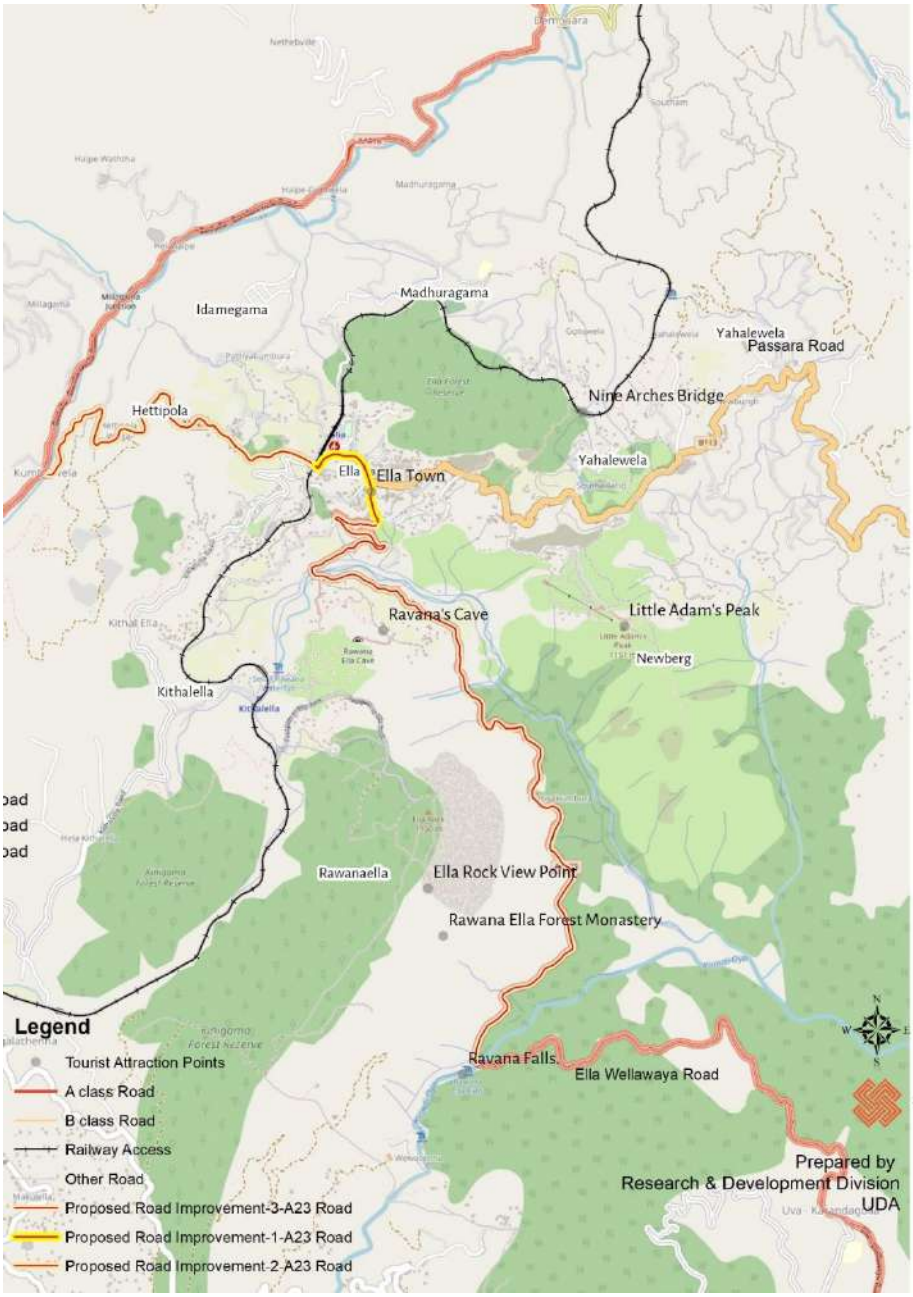


Figure 5-3: The road sections of the Ella – Wellawaya road proposed for improvement

5.1.1.2 Improvement of Passara Road (Project Code – TD-1-2)

Considering the environmental sensitivity, land slide vulnerability and the sensitivity of water catchments of the existing town area of Ella, the Plan proposes to promote development along the Passara road as an alternative to the existing development trend along the Ella-Wallawaya road. Development of Passara Road is a strategic intervention to activate it as the main tourism service area as proposed by the Development Management Strategy. Currently, there is an ongoing project to widen the Passara Road by the …… The Ella TDMP incorporates this ongoing project and further proposes to improve the walkability of the road from the City Centre to Borawewa Recreational Site.

The length of the road stretch proposed for improvement is approximately 1.5km and the proposed width is 8.4m – 9.5m. The proposed cross section is given in the Figure 5.5.

The proposed improvements to the road are;

- Maintaining two lane carriage way having the width of 7m
- Maintaining a 1-1.5m wide pedestrian path
- Maintaining a tree line along the road (at appropriate stretches)
- Introducing and maintaining utility ducts
- Introducing street lights

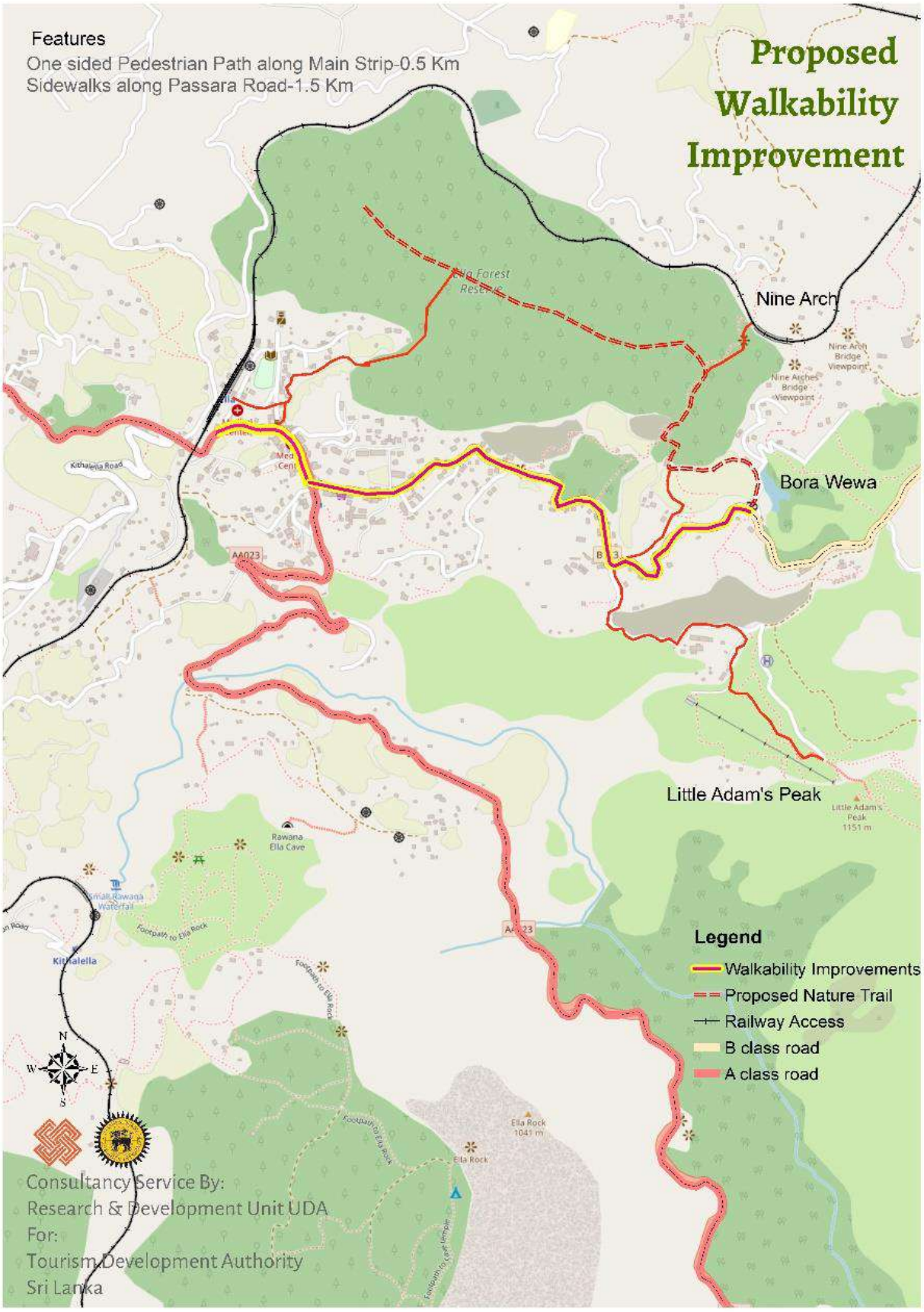


Figure 5-4: The stretch of the Passara Road proposed for improvement

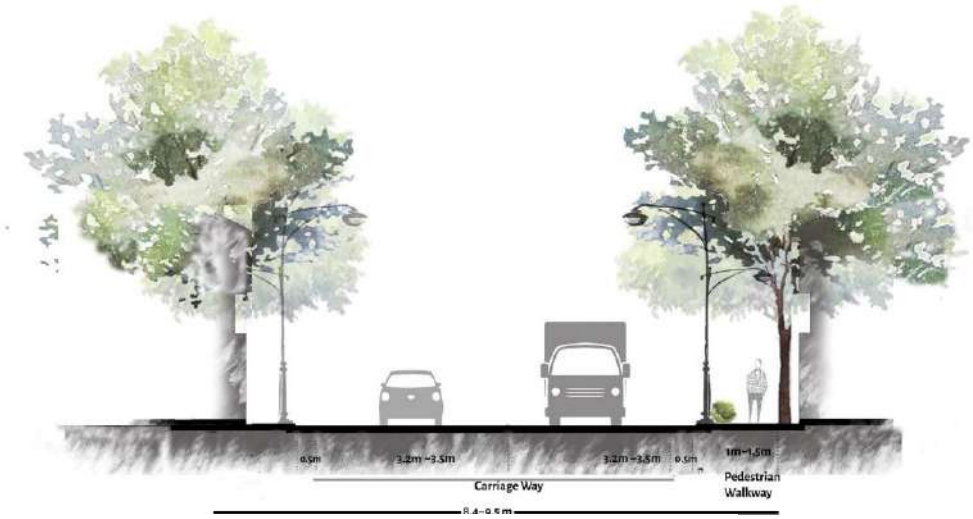


Figure 5-5: The proposed cross-section for Passara road

5.1.1.3 Improvement of Kithal Ella Road (Project Code – TD-1-3)

The purpose of improving Kithal Ella road is to make it convenient for the tourists to follow this road to reach the attractions in Kithal Ella. The improvements are proposed for 6km length. The proposed width of the road is 8.4m – 9 m

The proposed improvements for the Kithal Ella road are as follows.

- 1m Pedestrian path
- 0.5m Drainage system
- Installation of lighting system

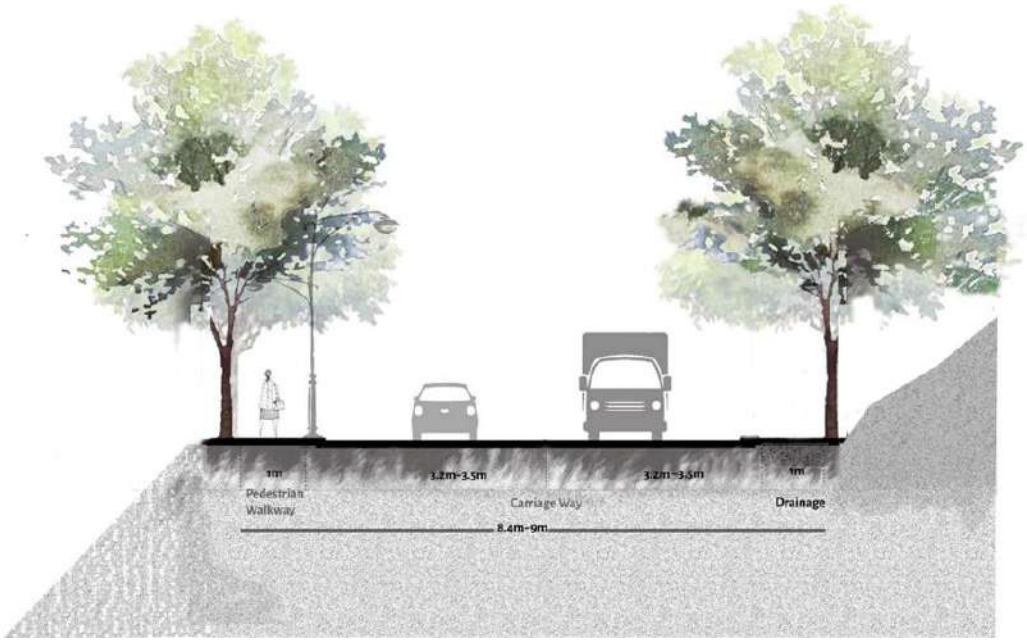


Figure 5-6: The section of Kithal Ella road proposed for improvement

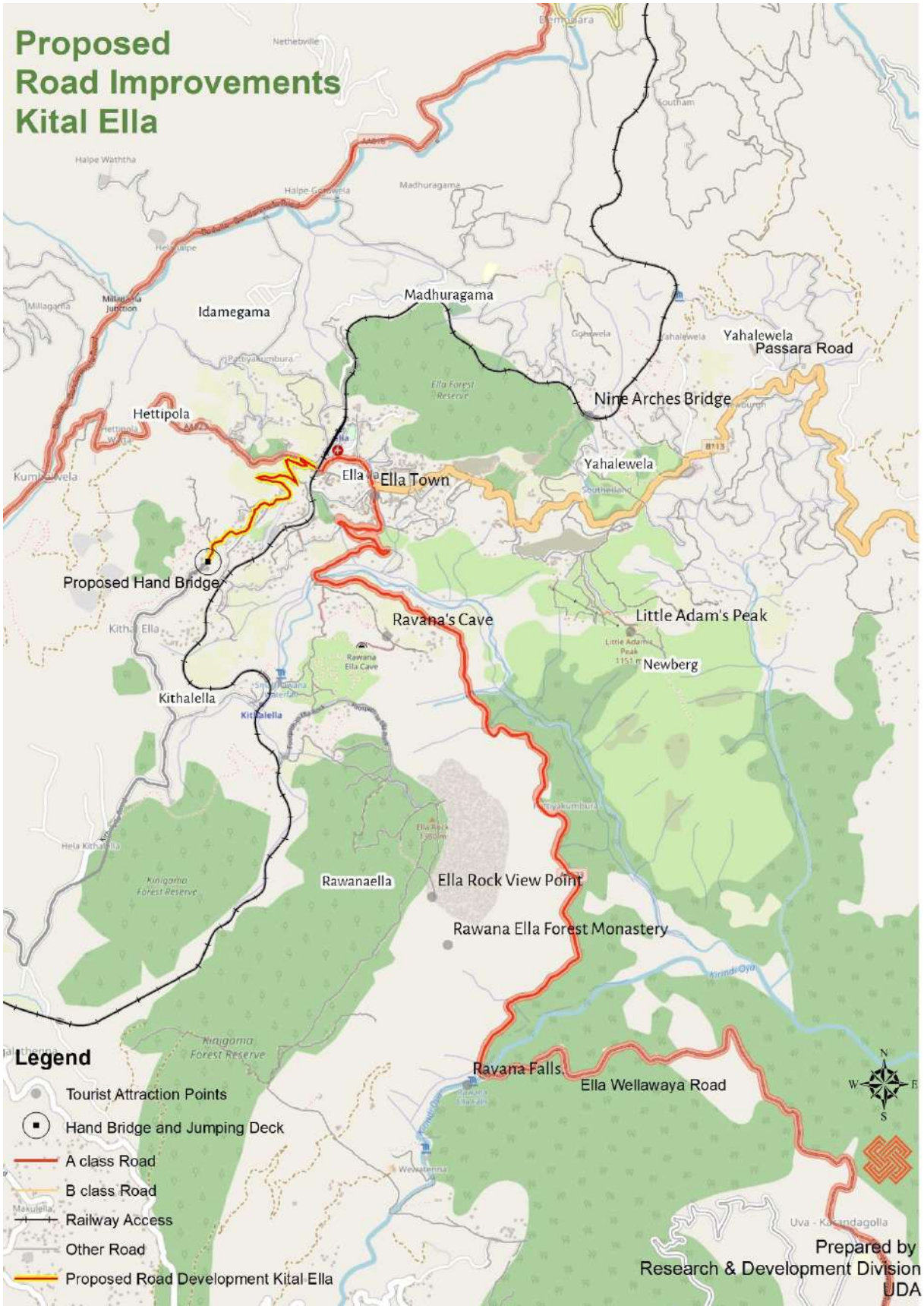


Figure 5-7: The proposed road section for Kithal Ella road

5.1.1.4 Improvement of Halpe – Badulla Road (Project Code – TD-1-4)

The purpose of widening and improving the Halpe – Badulla Road is to serve the green tourism accommodation zone for its proposed tourism activities as well as residential activities. Halpe – Badulla road is the main access to Idamegama and Madhuregama areas. This road directly connects with the Ella town and Badulla road. It falls within the low landslide risk and locates on a relatively flat terrain having higher potential for development.

Based on physical feasibility, this road is the only road which can be practically widened. It is expected that development of this road will be a catalyst to attract more investments and tourism activities as envisaged in the proposed Development Management Strategy.

1 km length of road starting from railway station and ending at Badulla road is proposed to be widened up to 4.5m and improved. The proposed improvements for this road stretch are;

- Maintaining 4.5m wide carriage way
- Maintaining 1m Pedestrian path at each side of the road
- Bicycle lane
- Maintaining a tree line along the road (at appropriate stretches)
- Introducing and maintaining utility ducts
- Installing street lights

Figure 5-8: The existing situation of the Halpe - Badulla road

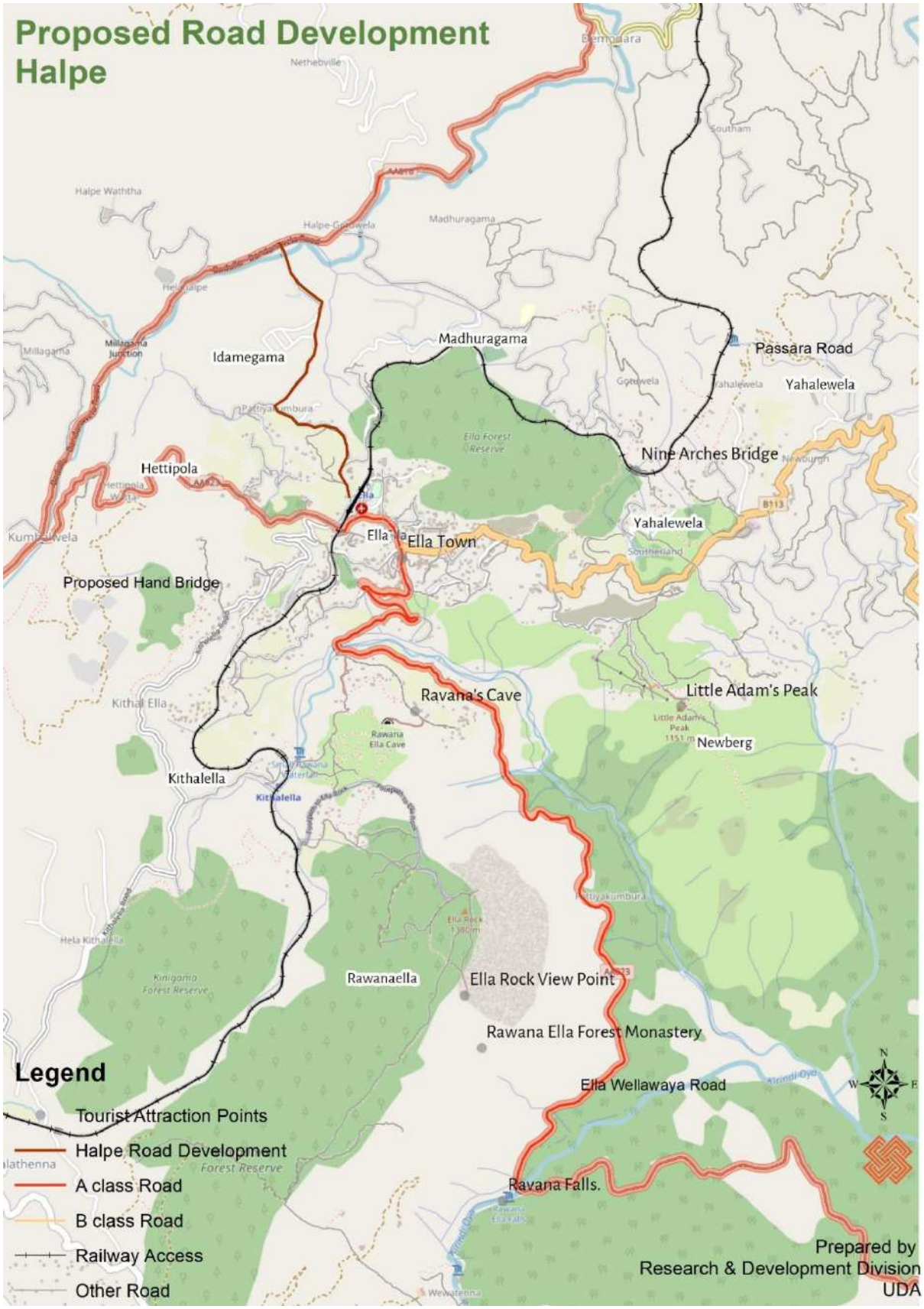


Figure 5-9: The Halpe-Badulla Road proposed for Development

Figure 5-10: The proposed cross section for the Halpe - Badulla road

5.1.1.5 Improvement of existing Madhuragama road (Project Code – TD-1-5)

The Madhuragama road connects to key attraction points in Ella such as Nine Arch, Demodara and also the Badulla road. However, the physical setting of the existing road does not also large-scale road development with widening. Therefore, the Ella TDMP proposes to improve the existing road which is now in a dilapidated status.

Improvement of this road will ensure smooth connectivity among the said attraction points and the Ella town and will also act as a catalyst to attract tourism investments and developments as promoted by the Development Management Strategy.

3km stretch of Maduragama road starting from the city center to Demodara and thereby to the intersection at the Badulla road is proposed to be improved while maintaining a physical width of 4.5m.

The specific lengths of proposed road improvement are as follows.

- Ella Town to Badulla Road 3km
- Maduragama to Nine Arch 2km
- Maduragama to Demodara 2 Km

The proposed improvements to the Madhuragama road are;

- Maintaining 4.5m wide carriage way
- Maintaining 2.5m Pedestrian path at each side of the road
- Bicycle lane
- Maintaining a tree line along the road (at appropriate stretches)
- Introducing and maintaining utility ducts
- Installing street lights

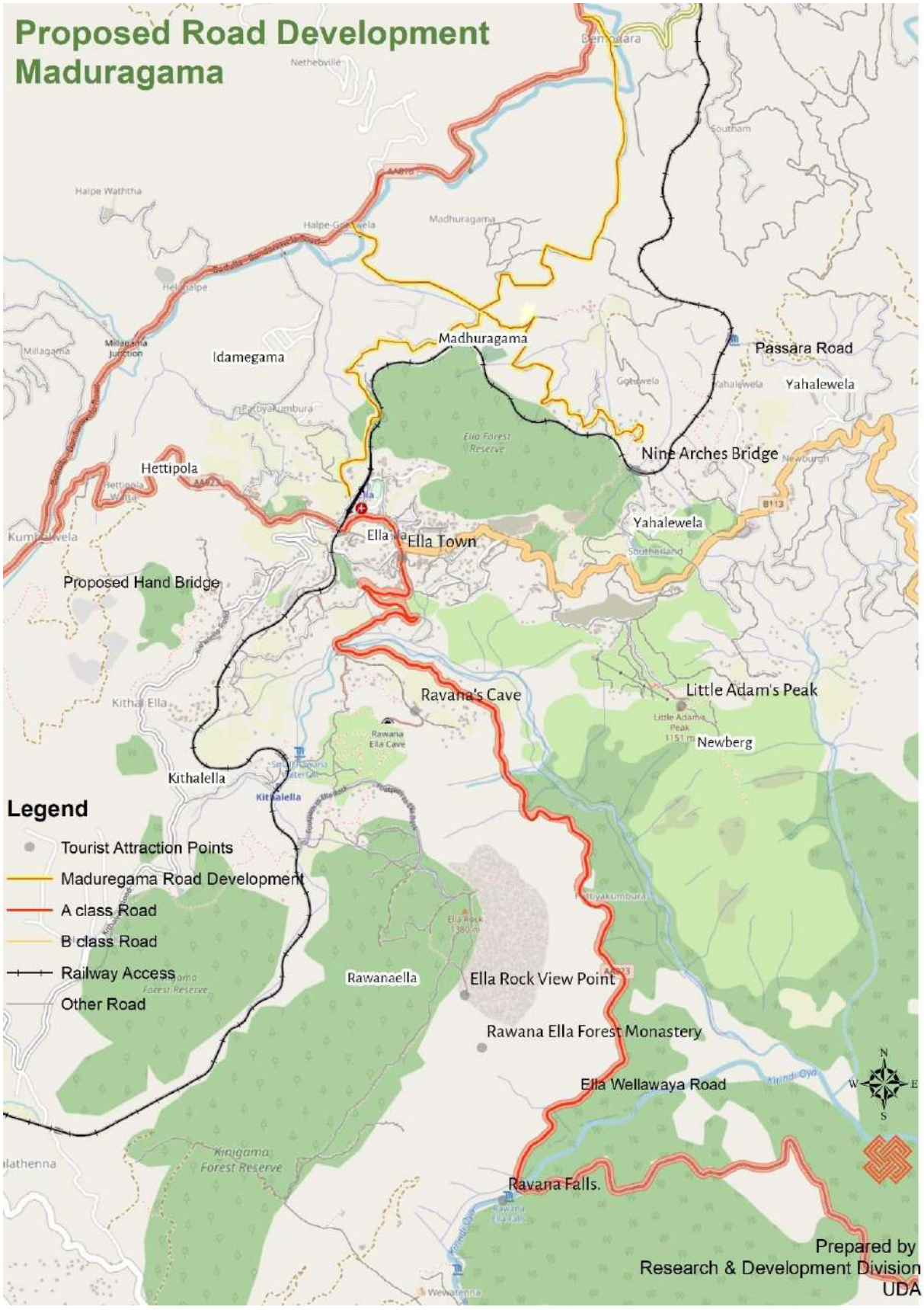


Figure 5-11: The Maduragama Road proposed for Development

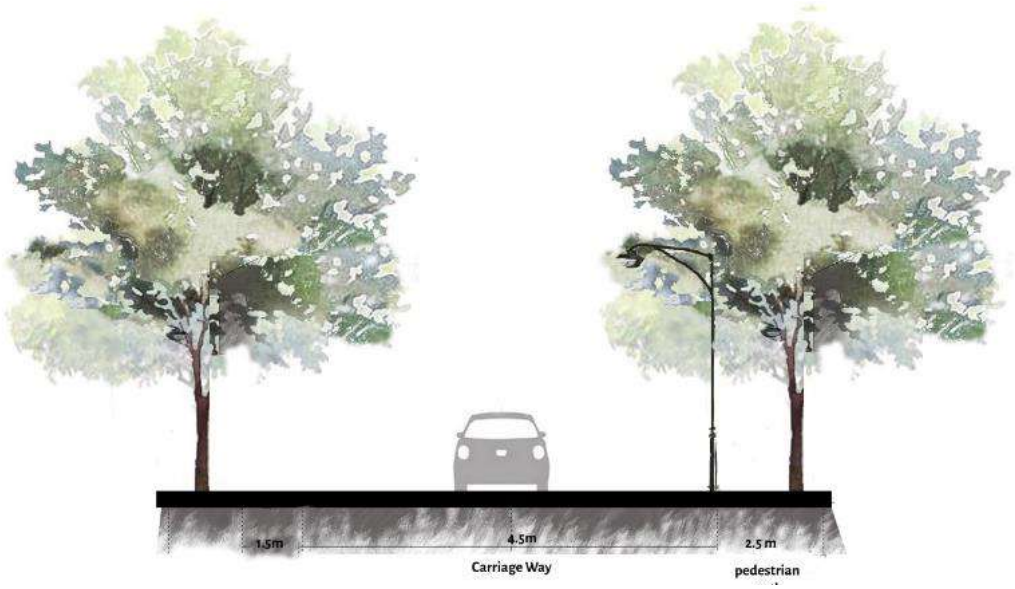


Figure 5-12: The proposed cross section for the Madhuragama road

5.1.2 Walkability Improvements (Project Code – TD-2)

5.1.2.1 Construction of a footpath as an alternative route to by-pass the town centre (Project Code – TD-2)

A 7m wide and 500m long footpath is proposed from tunnel entry to end of Rawan City in southern boundary parallel to the railway track. The purpose of this footpath is to provide an alternative route for the tourists to access Rawana Ella from Ella Railway station. by-passing the busy town area. This proposal would provide a much safer route for tourists to freely wander without worrying about the traffic and accidents.

This new footpath will also act as the west boundary of the Rawan City.

Figure 5-13: The existing situation of the one of the locations where the proposed footpath is crossing

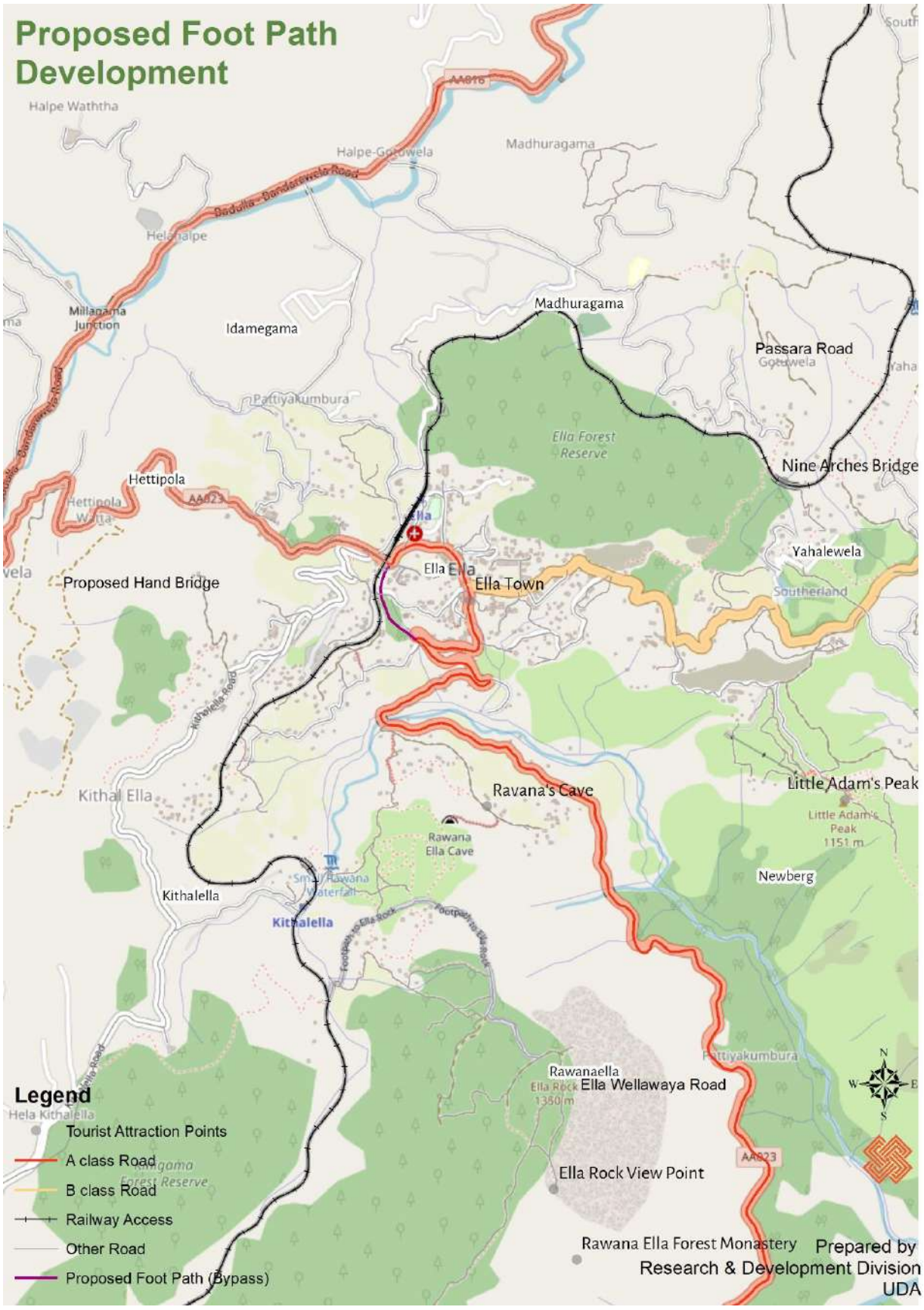


Figure 5-14: The trace of the proposed by-pass road

Figure 5-15: Cross-section of the proposed by-pass road

5.1.2.2 Construction of a chain of foot path connecting different attraction sites in Ella (Project Code – TD-2

No.	Footpath link	Connecting points		Distance	Project Code & Reference
		From	To		
01	Railway Footpath – Link 1	Railway Square	Nine Arch Bridge	2.2km	TD-2-1
02	Railway Footpath – Link 2	Railway Square	Kithal Ella Steel Bride	2.5km	TD-2-2
03	Mountain Footpath	Kithal Ella Steel Bride	Kithal Ella Adventure Camping Site	300m	TD-2-3
03	Ella Rock Footpath	Kithal Ella Steel Bride	Ella Rock	300m	TD-2-4
04	Nature Trail through Pine Forest	Borawewa Recreational Area	Forest Camping Site	1km	TD-2-5
05	Nine Arch Access from Borawewa	Borawewa Recreational Area	Nine Arch	700m	TD-2-6

Table 5-1: Proposed chain of footpaths in Ella

a) Footpath connecting Nine Arch Bridge, Kithal Ella Steel Bridge and Ella Rock (Project Codes – TD-2-1, TD-2-2 & TD-2-3)

Rail Footpath Development

- Smart Transit Square to Nine Arch 2.7km
- Smart Transit Square to Kithal Ella Steel Bridge 2.2km

Mountain Footpath Development

- Steel bridge to Ella Rock via Kithal Ella Adventure Camping Site 300m

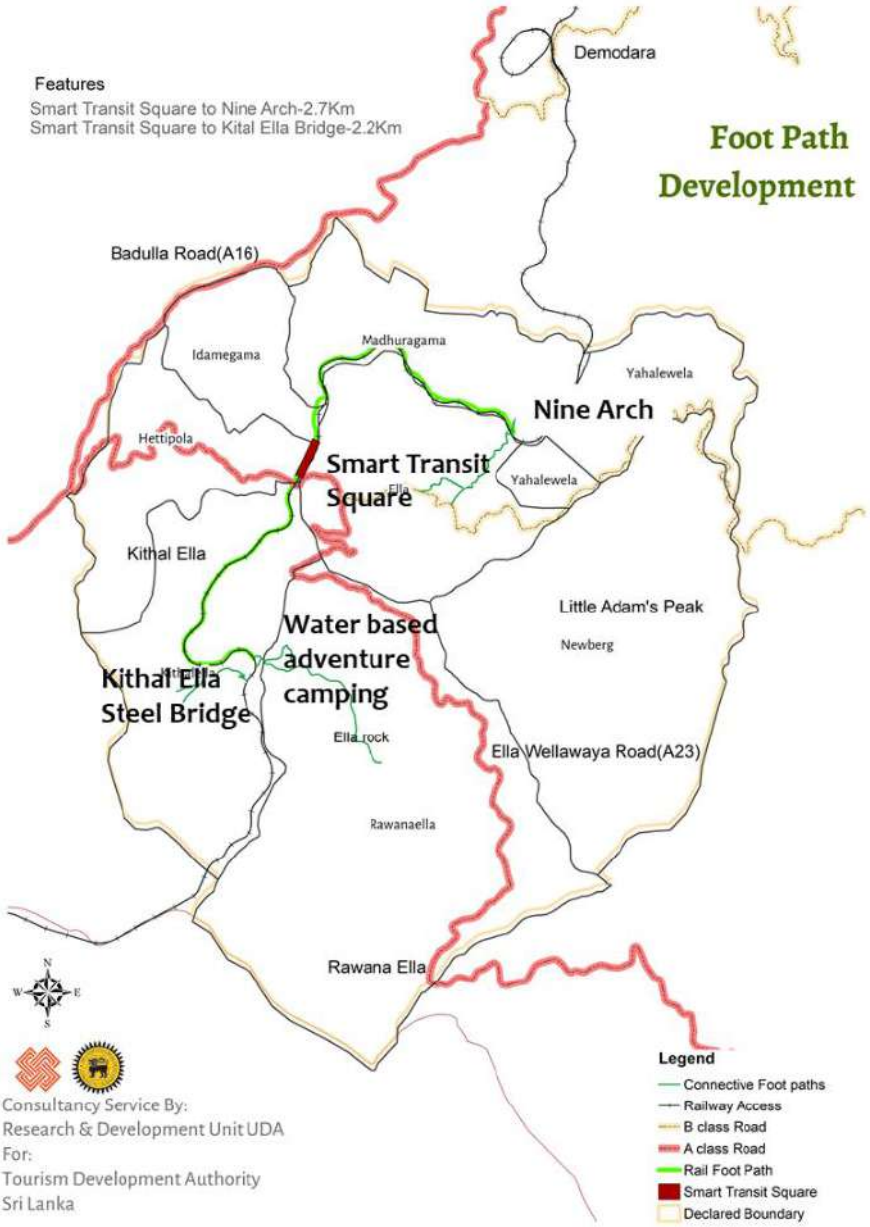


Figure 5-16: The trace of the proposed footpath connecting Nine Arch, Railway Square, Kithal Ella Steel Bridge & Kithal Ella Adventure Camping Site

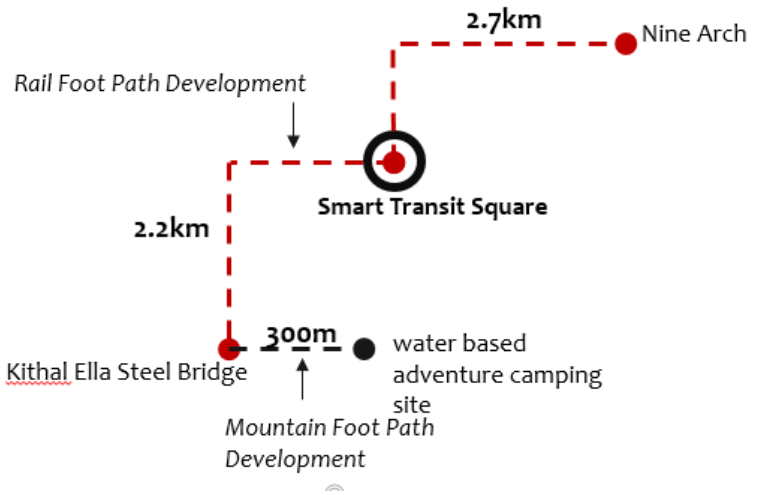


Figure 5-17: Proposed footpath links connecting Nine Arch, Railway Square, Kithal Ella Steel Bridge & Kithal Ella Adventure Camping Site

b) Ella Rock Footpath (Project Code – TD-2-4)

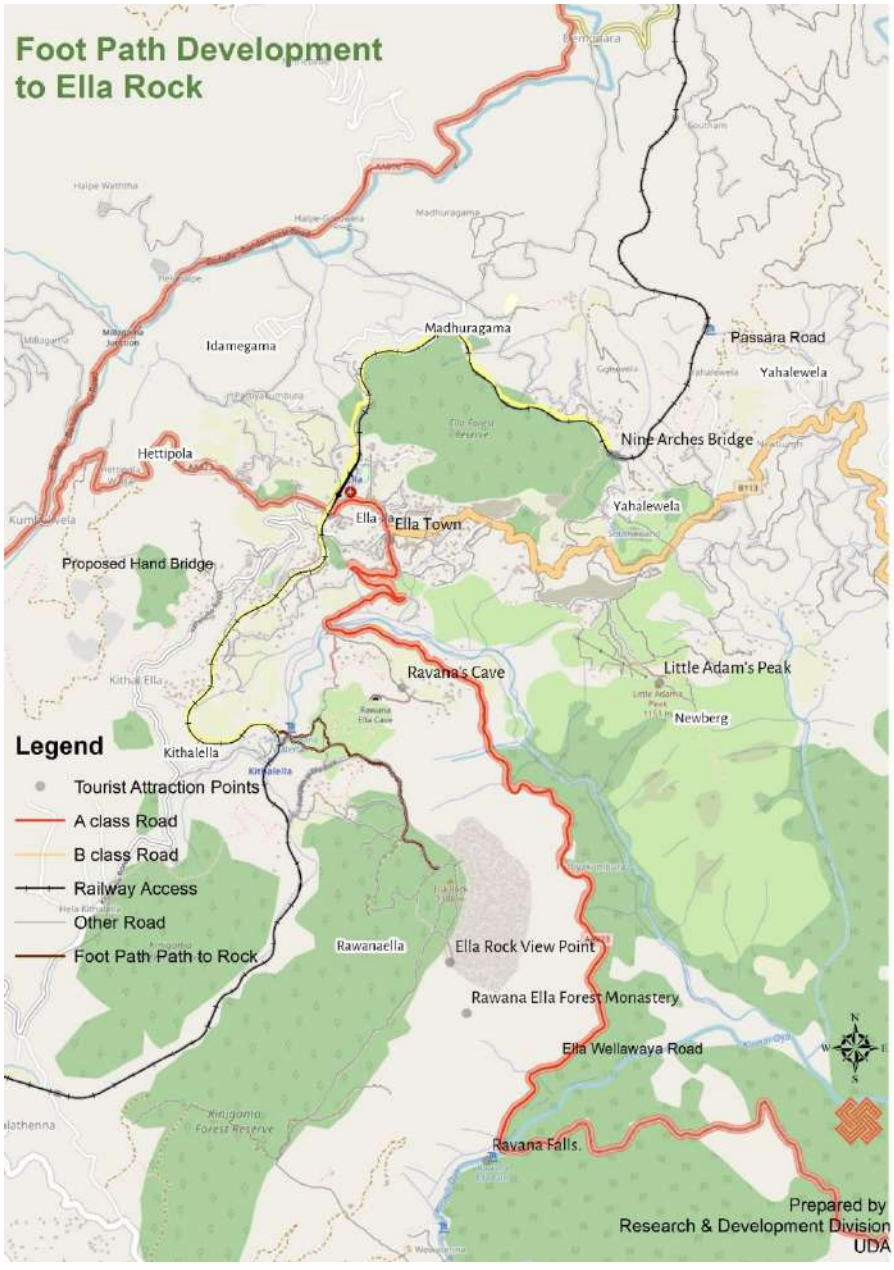


Figure 5-18: The trace of the proposed Ella Rock Footpath

Design Guidelines

- Foot path runs through mountainous forests
- 1m wide foot path
- Recommended paving materials – wood or natural earth
- Where it is difficult to construct a 1m footpath at elevations, it is recommended to use innovative bridges or hanging structures maintaining the same width as the foot path and giving an adventurous feeling. Any of such construction should be done using timber and no artificial construction materials should be used.
- The path should be maintained as to suit with the natural setting without making any alien appearance

c) Nature Trail through Pine Forest (Project Code – TD-2-5)

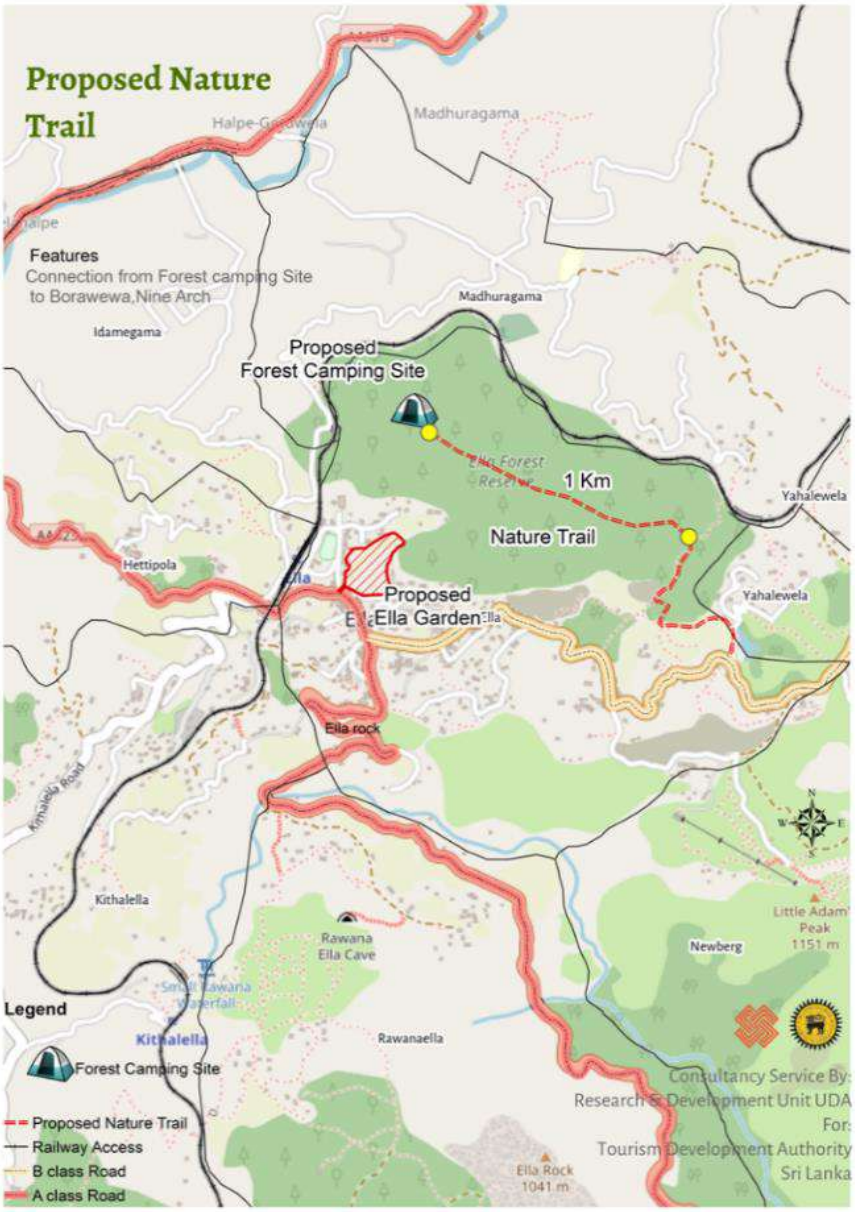


Figure 5-19: The trace of the proposed Nature Trail

Figure 5-20: The anticipated character of the proposed Nature Trail

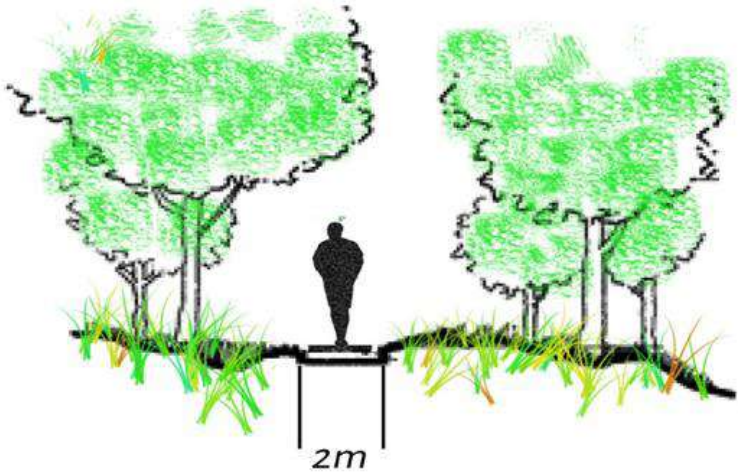


Figure 5-21: The cross section of the proposed Nature Trail

Design Guidelines

- Foot path runs through the existing Pine forest
- 2m wide foot path
- Recommended paving materials – timber, gravel or compressed soil
- Recommended to use timber when the path is constructed as steps
- The path should be maintained as to suit with the natural setting without making any alien appearance

d) Nine Arch Access from Borawewa (Project Code – TD-2-6)

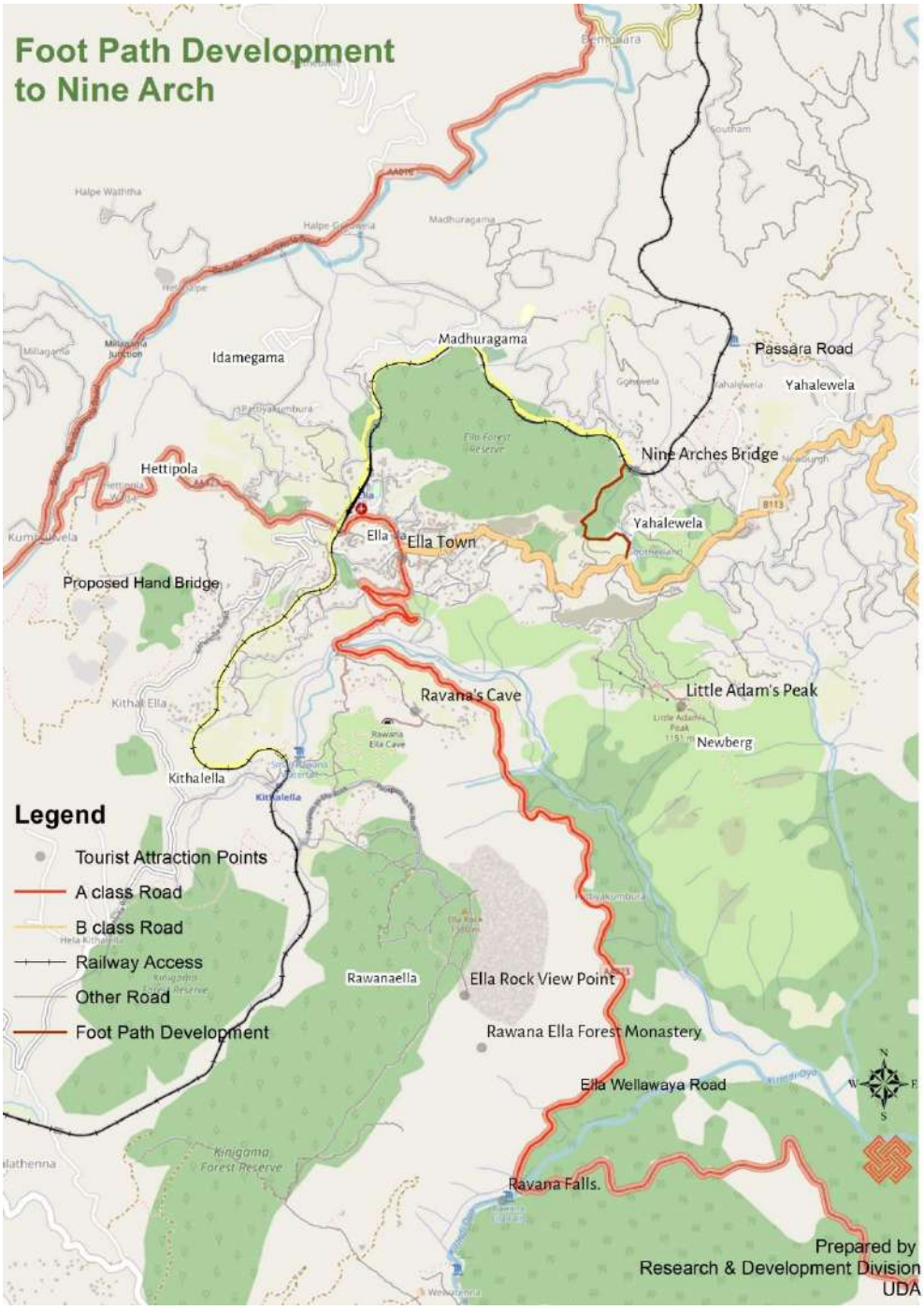


Figure 5-22: The trace of the proposed Nine Arch Access from Borawewa

Design Guidelines

- Footpath to access the Nine Arch Bridge from the Borawewa to Nine Arch Access Road
- The path descending along the slope to be maintained naturally as it is now

5.2 Transport Modes Diversification Strategy

The Ella TDMP proposes to introduce different transport mode options for travelling within Ella. Currently, the main travel mode options available to access different attraction sites within Ella are private cars, public buses, train, Cycles or Motorcycles or by foot. However, the transport analysis revealed that there is potential to introduce more types of transport modes and that it will further facilitate the tourists to access different attraction sites.

Accordingly, following two transport modes are introduced.

- Electrical taxi service
- Rail Tour

The main intention of introducing above transport modes is to ecofriendly transport modes to protect the air quality while facilitating the smooth functionality of tourist travels.

In addition, the Ella TDMP also proposes an additional train compartment to the Colombo – Badulla Train as it will enhance the accessibility to Ella.

5.2.1 New transport modes within Ella (Project Code – TD-3)

5.2.1.1 Electrical Taxi Service (Project Code – TD-3-1)

Electrical taxi service is proposed to serve the all the attraction points as well as to serve the proposed tourism promotional areas with the intention of reducing use of private vehicles and protecting the ambient air quality in Ella.

The Ella TDMP proposes to convert the previous solid waste dumping site at Kithal Ella as a parking area and the terminal of the electrical taxis. The Plan proposes to develop this parking site with required facilities such as toilets, sitting areas, resting areas and small food outlets for taxi drivers as well as tourists.

The Plan has recommended taxi routes based on the attraction of each site and travel patterns. In addition to these routes, the tourists are free to use the taxis to reach any place in Ella as per their preference.

Figure 5-23: Recommended Routes for Electrical Taxi Service in Ella

5.2.1.2 Introducing a Rail Tour from Ella Station to Demodara Station (Project Code – TP-2-4)

The Ella TDMP proposes to introduce a modified version of the typical 'Dakkuwa' transport mode in Sri Lanka as a luxury transport vehicle which can carry a small group of passengers safely. The Plan proposed this special rail transport from the Ella Station to Demodara Station.

This project has been elaborated in the section 4.1.2.4 of this report.

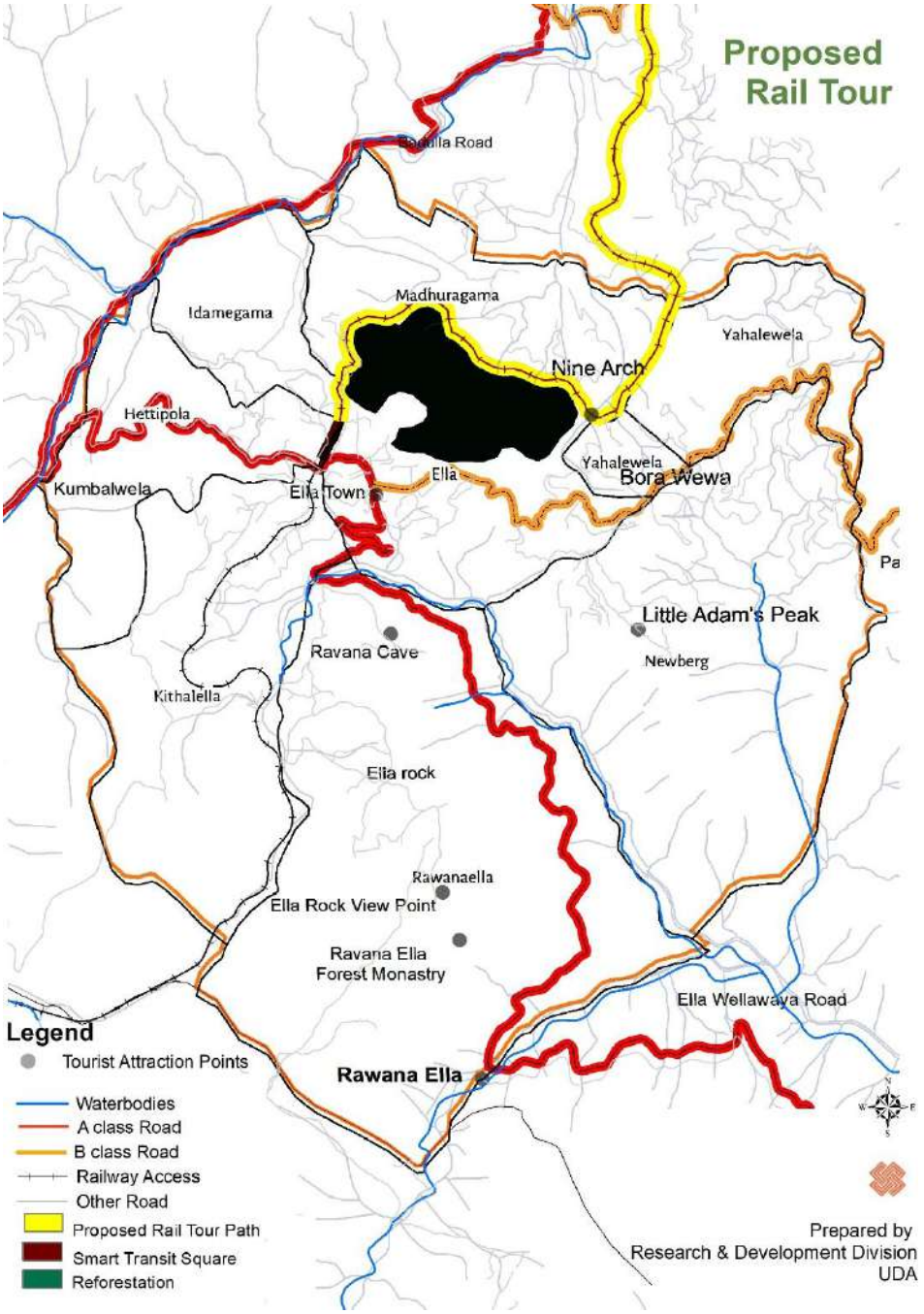


Figure 5-24: The trace of the proposed Rail Tour from Ella Station to Demodara Station

5.2.2 Introducing an additional train compartment to the Colombo – Badulla Train (Project Code – TD-3-2)

The Ella TDMP proposes to introduce an additional luxury observation train compartment to the Colombo – Badulla Train. The intention of this proposal is to encourage the tourists to visit Ella using public transport. It is expected that a luxuriously built observation train compartment would encourage high end tourists also to visit Ella. Further, it is expected that this proposal will contribute to reduce the number of private vehicles entering to Ella and thereby to protect the ambient air quality of Ella.

Figure 5-25: The anticipated interior of the proposed luxurious train compartment

5.3 Transport Facilities Improvement Strategy (Project Code – TD-4)

The transport facilities improvement strategy comprises of two proposals;

- Smart Transit Square Development
- Provision of Parking Spaces

5.3.1 Smart Transit Square Development (Project Code – TD-4-1)

Ella TDMP proposes to develop a Smart Transit Square at the existing Ella Railway Station site. The purpose of the Smart Transit Square is to provide the facilities mainly for tourists who will be arriving at Ella by train. This is one of the strategies to promote the use of public transport in Ella.

Further, the Smart Transit Square will act as one of the main nodes in Ella as it connects many footpaths directing to different tourism attractions. It is envisaged this will also be a public square as well as a service area where many tourists would depend on and regularly visit seeking for services and for the purpose of transit and interaction.

The Plan proposes to locate the following facilities within the proposed Smart Transit Square.

- Smart banking facilities
- Money exchange centers
- Cafeterias
- Electric taxi charging points
- Smart and interactive digital map navigation displays
- Smart booking for hotels, rail tickets, taxi services
- Public toilets
- Landscape development

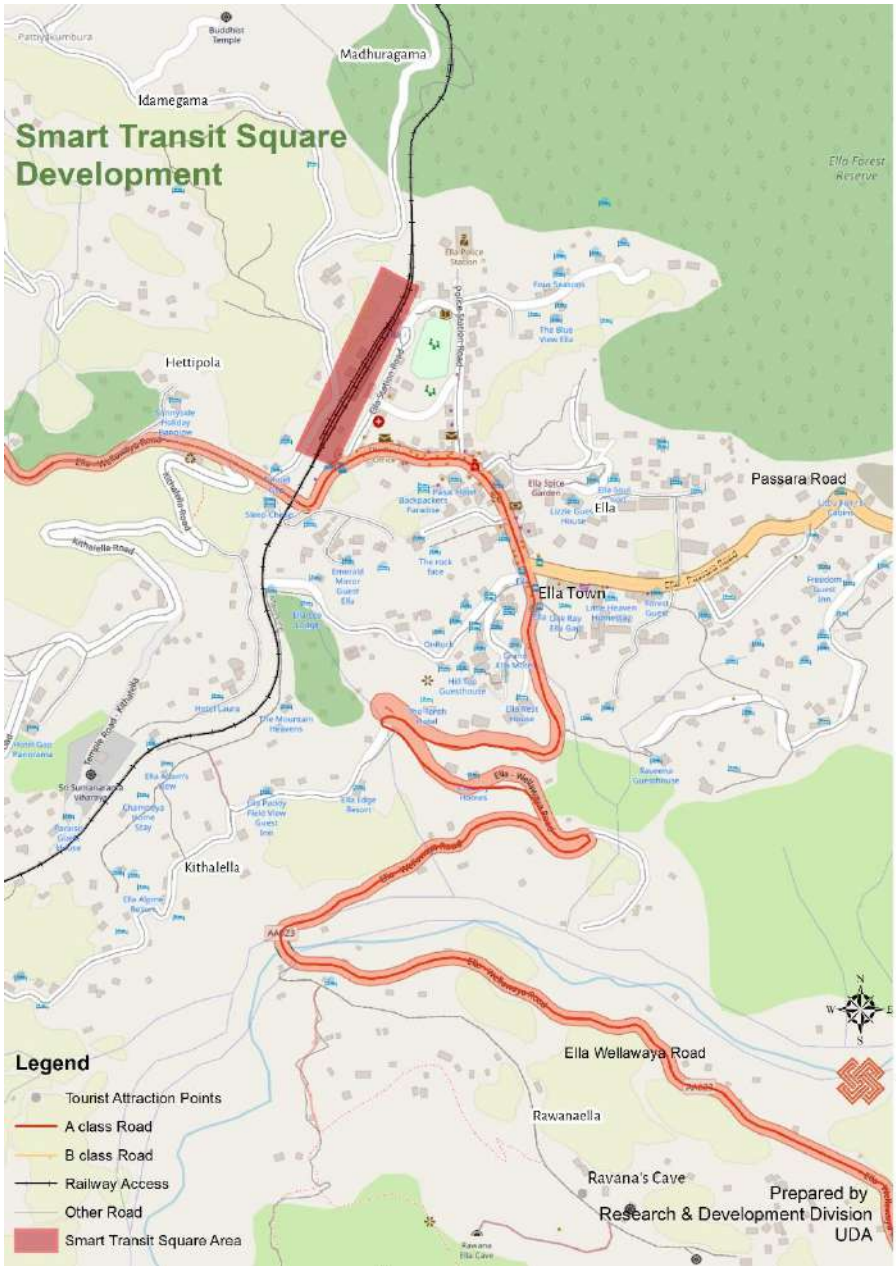


Figure 5-26: The location of the proposed Smart Transit Square in Ella

5.3.2 Providing parking facilities at the identified locations in Ella (Project Code – TD-4-2)

The Ella TDMP proposes to locate parking facilities at identified three locations in Ella as given the below table.

Project Location	Area	Car units	Land ownership	Components
Ella city center	1acre	200	RDA	• Parking facilities • Toilet facilities • Relaxing area • Drinking water facilities
Smart rail transit square	10 perch	20	Department of railway	
Passara road	1 acre	100	Forest department	

Table 5-2: Details on the proposed three parking facilities in Ella

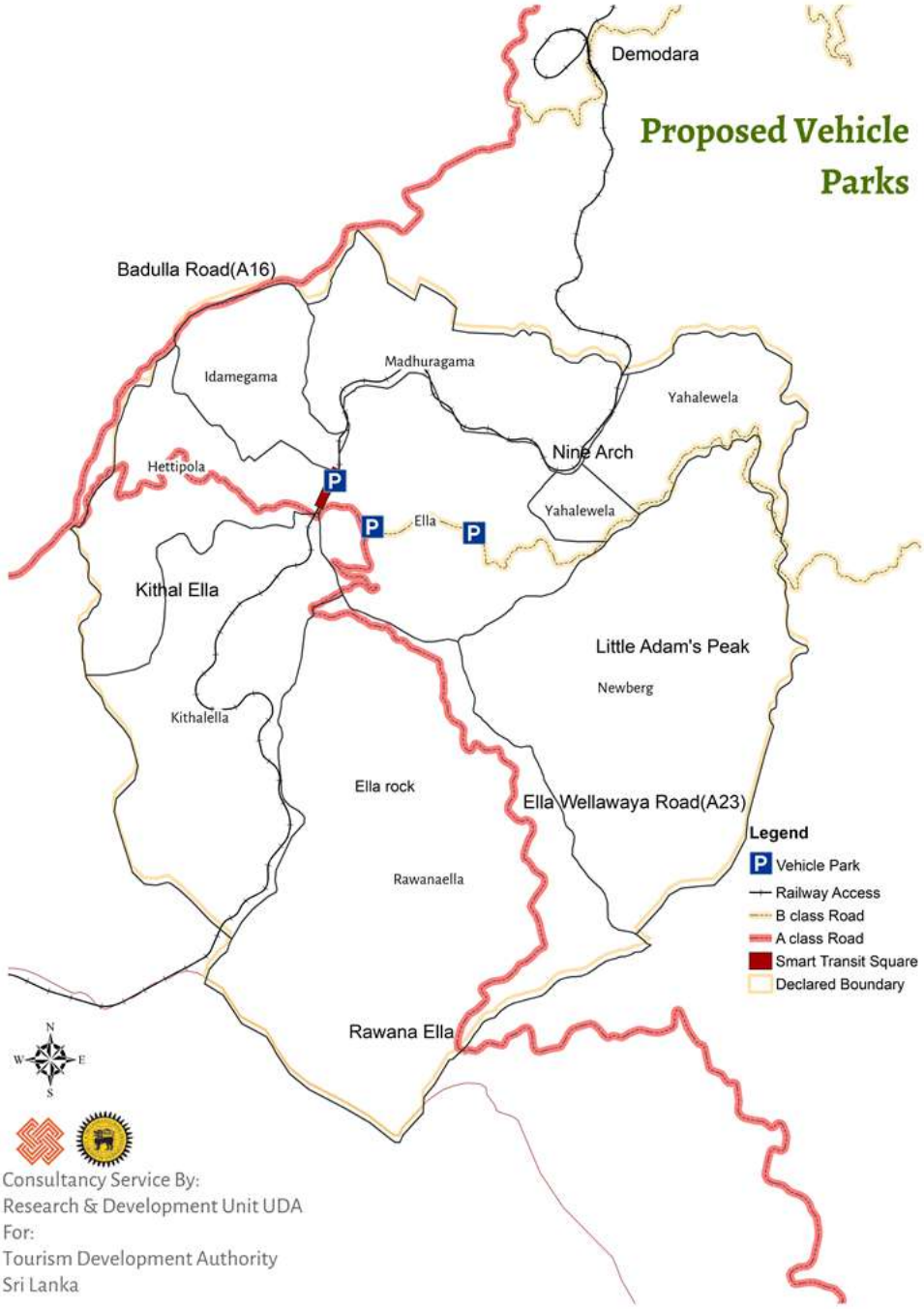


Figure 5-27: The locations of the proposed three parking facilities in Ella

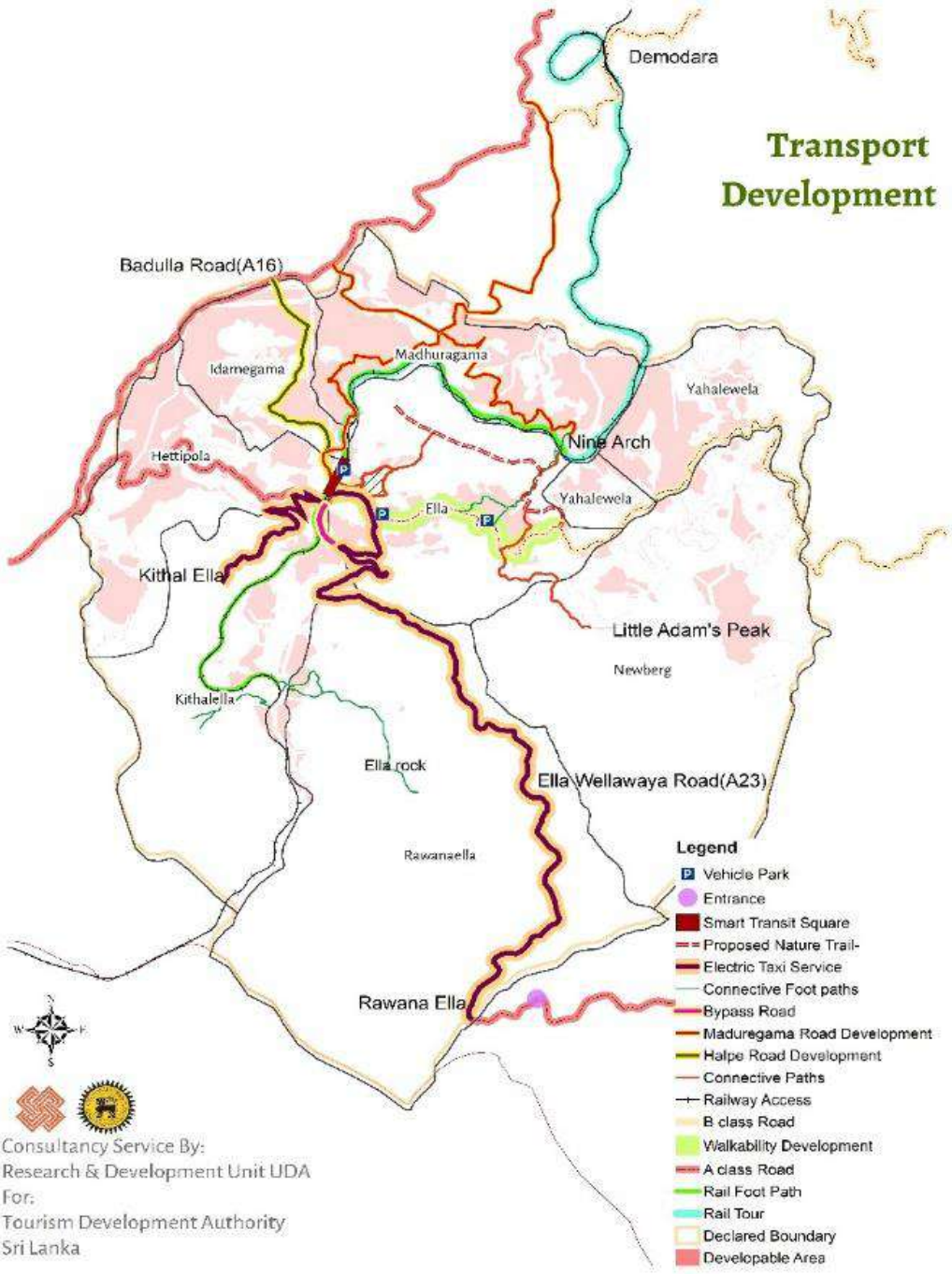


Figure 5-28: The composite map indicating all proposals of Transport Development Strategy of Ella TDMP

A summary of the proposed Road Improvements in Ella Development Area

Name of the Road	Grade	Agency in charge	Existing width (meters)	Proposed width (meters)	Current length(km)
Badulla Haliela Road	A	Road Development Authority	8	12	5.3
Ella Wallawaya Road(Starting from Ella tunnel of Rawan City to Existing Dewalaya on Ella – Wallawaya Road)	A	Road Development Authority	8	8.4-9.5	2.5
Ella Wallawaya Road • Starting from Ella Wallawaya road and ending at the tunnel of Rawan City • The stretch of Ella – Wallawaya road stating from the Dewalaya (south boundary of Rawan city)and ending at the south boundary of Ella planning area)	A	Road Development Authority	8	8.4-9	5
Ballaketuwa Road	A	Road Development Authority	6	8.4-9	5
Kithalella Road	A	Road Development Authority	6	8.4-9	6
Gotuwela Road (Maduragama Road)	B		4-6	4.5	3.5
Baddewala Nawala Road	B	Provincial Road Development Authority	6	7	2
Rathwaththa Bungalow Road	B	Provincial Road Development Authority	4	7	1
Kinnallen Watta (estate) Road	D	Private Road	3-4	(3-4 m)	0.9
Kanatha Road	C	Pradeshiya Saba	5	7	2
Embiliyagolla Road	C	Pradeshiya Saba	4	7	2
Bank Hill Estate Road	C	Pradeshiya Saba	5	7	0.2
Rawana Temple Road	C	Pradeshiya Saba	5	7	1

1st Mile Post Road	C	Pradeshiya Saba	5	7	1.5
Yahalawela Road	C	Pradeshiya Saba	3	7	0.8
Hettipola Road (Badulla – Halpe Road)	C	Pradeshiya Saba	4	4.5	0.8
Gowussa Pussallawa Road	C	Pradeshiya Saba	4	7	1.8
Gowussa Temple Road	C	Pradeshiya Saba	4	7	0.9
Gowussa Road	C	Pradeshiya Saba	4	7	1.1
Watagodawatta Road	C	Pradeshiya Saba	4	7	0.2
School road (Kithalella)	C	Pradeshiya Saba	4	7	0.3
Arukku Nine (Nine Arches) Bridges Access Road	C	Pradeshiya Saba	4	7	1.2
Kirimatiya Road	C	Pradeshiya Saba	4	7	1.5
Railway Road Kithaella	C	Pradeshiya Saba	4	7	1
Kithalella Temple Road	C	Pradeshiya Saba	3	7	0.8

Table 5-3: A summary of the proposed Road Improvements in Ella Development Area

STRATEGY

Safety Improvement

06

Fear not,
we have ensured your safety in Ella

6. Safety Improvement Strategy

The background studies and situation analysis revealed that there are some issues which threaten the safety of the tourists visiting Ella. One of such major issues is the landslide risk in Ella. National Building Research Organization has identified Ella as a moderate hazard area with high landslide risk. Therefore, with the consultation of National Building Research Organization, Ella TDMP proposes various proposals and regulatory guidelines to minimize the landslide risk in Ella.

Another issue is the risk of air pollution in Ella due to increase of vehicle influx to the city. Ella is renowned as the one of the best places with ambient air quality with high level of Oxygen. Therefore, this strategy also focuses on safeguarding the ambient air quality in Ella.

The third aspect focused in this strategy is the safety issues faced by the tourists due to illegal activities that may be induced as a result of unsafe physical environments.

Accordingly, the Safety Improvement Strategy proposes following strategies to address the above identified issues.

6.1 Resilient City Strategy (Project Code – SI-1)

6.1.1 Construction of Retention Walls at identified locations prone for landslides (Project Code – SI-I-1)

The Ella TDMP recommends to carry out a comprehensive study on landslide risks in Ella Planning Area and identify the locations where the risks can be reduced by mitigation measures. One of the frequent used mitigation methods is the construction of retention walls to stabilize the soil mass. Therefore, Ella TDMP proposes to apply appropriate mitigation methods especially at Ella – Wellawaya Road (which has already been identified as a landslide risk area) and other critical places identified by a comprehensive study under the consultation of the National Building Research Organization.

Further, the Plan recommends to camouflage such mitigation structures with suitable vegetation in order to blend them with natural setting without being visual disturbances.

6.1.2 Ensuring the adherence to NBRO guidelines in all types of constructions within Ella

National Building Research Organization has introduced construction guidelines when building on sloppy terrains. The Ella TDMP recommends all constructions in Ella to follow these guidelines to mitigate the risk of landslides and cutting failures.

Reference to Regulations.

Further, the NBRO has introduced series of instructions on how to monitor the signs of landslides and cutting failures and the immediate actions to be followed in case any of such sign is observed. These instructions are included in the Volume II – Part A of the Ella TDMP.

- Carrying out continuous awareness programs on landslide mitigation methods (Project Code – SI-1-2)

The Plan proposes to carryout continuous awareness programs in Ella Planning Area to disseminate these information regarding the available guidelines and instructions and aware people on how to follow them.

- Establishing a landslide early warning system in Ella (Project – SI-1-3)

6.2 Maintaining the ambient air quality in Ella

One of the main strategies proposed to maintain the ambient air quality in Ella was to encourage people to reduce the use of private vehicles and promote zero emission transport modes.

The Transport Development Strategy presented the proposed projects to enhance walkability, use of bicycles and other carbon free transport modes like electric taxis and modified electric train journeys.

6.3 Ensuring safety of tourists in Ella

The perception surveys and the situation analysis revealed that many tourists find it inconvenient to walk along the main roads in the Ella town as there is no continuous dedicated pedestrian way but at some places they have to step on the carriage way to continue the walk. Given the high traffic flow in Ella – Wellawaya road, this threatens the pedestrians' safety.

Another complain reported was the insecurity felt when walking on narrow streets, alleyways and footpaths which are deserted during odd hours and dark at night. Further, tourists also complained about not having sign boards, information centres, trained guides and proper responsible agency to report and rely on in case of an emergency.

Therefore, considering the above, Ella TDMP proposes various proposals and measures to ensure safety of tourists in Ella.

6.3.1 Provision of street lights & pedestrian pathways

Section 5.1.2 of this report presents the footpaths proposed in Ella in order to improve the walkability. The road improvement projects presented in the section 5.1.1 explain how the Plan proposes to include and improve pedestrian paths at all main roads in Ella in order to ensure the safety of pedestrians. Further, the Plan also proposes a footpath by-passing the town where tourists can leisurely walk without any fear of accidents.

In addition to constructing and improving defined footpaths, Ella TDMP also proposes to introduce street lights. The intention is to make a comfortable walking environment during nigh time and to create a sense of safety on these streets. The proposed Street Light Project (Project Code – DM-2-3) has been introduced in the section 3.3.2.3 (c) of this report.

6.3.2 Introducing a unique signage system in Ella (Project Code – DM-2-2)

The Ella TDMP proposes a unique signage system to guide the tourists visiting Ella enabling them to safely travel across the entire destination. This project has been elaborated in the section 3.3.2.3 (c) of this report.

6.3.3 Introducing a website and a mobile application as a digital platform to facilitate the tourists and tourism service providers in Ella (Project Code – SI-3-1)

It is important to have a single platform to connect tourists and tourism service providers in Ella. Such a platform would enable the tourists to understand the options available and select the required services based on their preference. This digital platform will also be a good market space for the tourism service providers to promote their products and services.

In the planning perspective, the proposed digital platform will enhance the tourists' security as it will lead the tourists to accredited, reliable and quality services with transparent business transactions. This will enhance the tourists' trust in Ella tourism destination which in turn would enhance its attraction.

- Features to be included in the proposed digital platform including both the website and the mobile application.
    - Display only the registered Hotels/tourist guides/ taxi services
    - Display locations of tourists' police/ information center/ common service area/ parking areas/ sanitary services/ medical centers
    - Display locations of tourism activities and attractions
    - Display tour guide packages and package booking portals
    - Landslide risk alarming system/ weather reports
    - Emergency contact details
    - Price & Rates of tourism products and services

- Features to inspire the interface design of both website and the mobile application
    - Vision of the Ella tourism plan
    - Concept of the Ella tourism plan (three aisle)
    - Environmental features and assets
    - Historical legends and heritage features

6.3.4 Establishing a Tourist Police Unit in Ella (Project Code – SI-3-2)

The Ella TDMP recommends to establish a Tourist Police Unit at the proposed Tourism Service Centre at the Passara Road within the Ella City Centre (Ravan City).

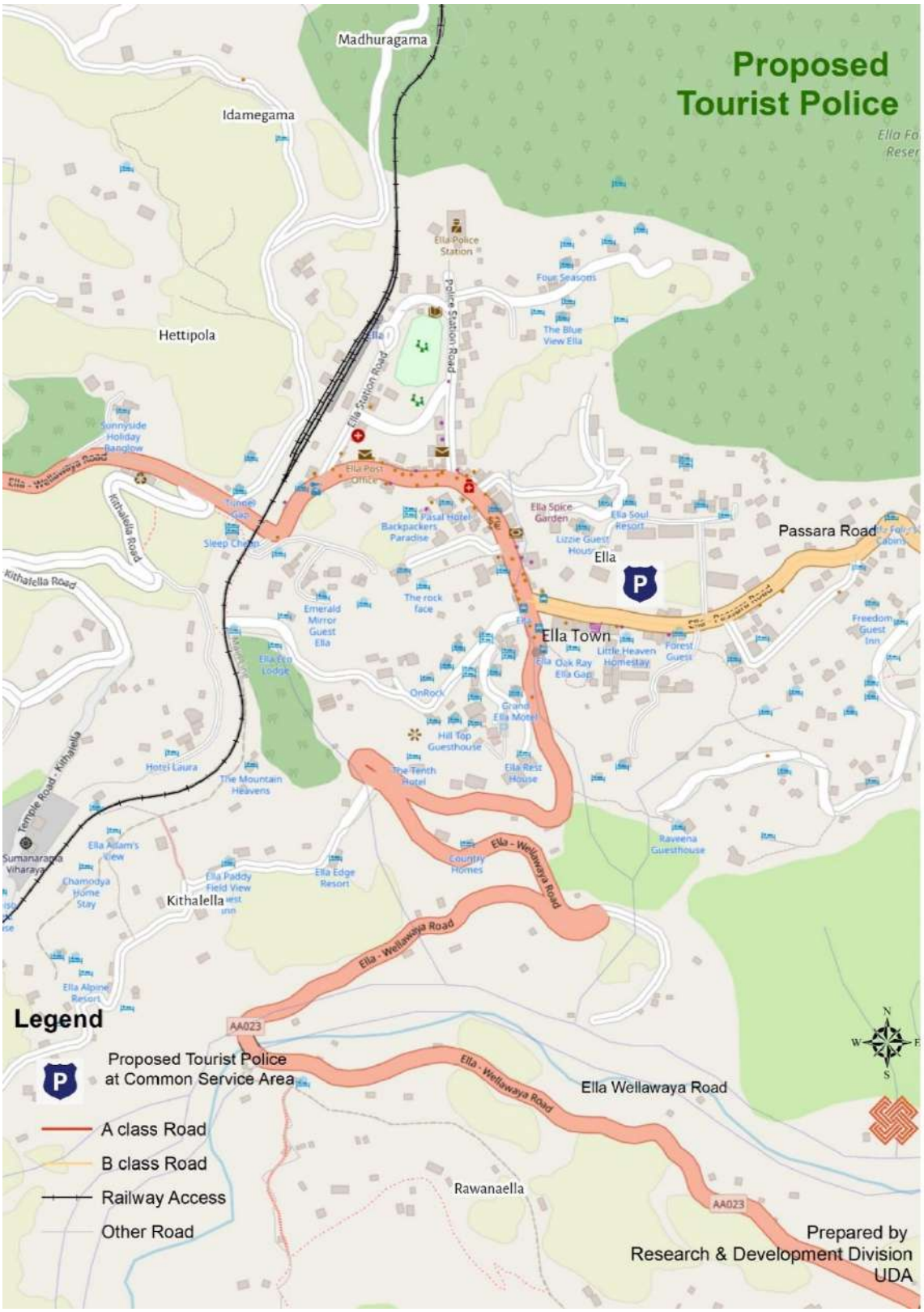


Figure 6-1: The location of the proposed "Toursit Police Unit"

STRATEGY 07

Infrastructure Management

A well facilitated destination

7. Infrastructure Management Strategy

The Carrying Capacity Analysis revealed that Ella is currently exceeding its carrying capacity in terms of infrastructure. However, the Ella TDMP has determined the scale of tourism in Ella in terms of number of tourists considering the existing carrying capacity and the provisions for future enhancement of the capacities.

Accordingly, this chapter presents an evaluation of the adequacy of existing infrastructure to meet the future demand corresponding to the envisaged scale of tourism development and proposed projects and recommended proposals to meet the demand in case of a deficiency.

The purpose of this strategy is to upgrade the existing infrastructure to facilitate the expected future tourism activities making it a convenient destination and as well as to ensure that the waste produced will be responsibly managed without causing any negative environmental impact.

The strategy consists of four components as mentioned below.

1) Water supply management
2) Electricity supply management
3) Sanitation facilities & waste water management
4) Solid waste management

7.1 Water Supply Management Strategy

Ella has greatly benefitted from the Badulla-Hali Ela-Ella Integrated Water Supply Scheme. Treated water is received at the Ella ground reservoir through Gotuwala ground reservoir at a maximum rate of 1,458 m3/day. This water is distributed to Ella Distribution zone at a maximum rate of 1,086 m3/day and to Kithal Ella at a maximum rate of 372 m3/day. Out of the water transmitted to the Ella distribution zone (1,086 m3/day), the current maximum capacity is 446 m3/day with additional demand provision of 300 m3/day. Also, there is a demand provision for Ballaketuwa and Namunukula for 340 m3/day. The maximum demands have been assumed for the year 2030. More details of the Badulla-Hali Ela-Ella Integrated Water Supply Scheme are given in the Annexure 1.

The records of NWSDB, Uva Regional Support Centre indicate that the current water demand is far below the capacity of the water supply scheme. The maximum daily flow from Gotuwala to Ella was 690.1 m3/day in April 2019, whereas the existing capacity is 1,086 m3/day. The maximum daily flow from Ella to Kithal Ella was 151.01 m3/day in March 2019, whereas the existing capacity is 372 m3/day.

Currently, there are about 180 hotels in the Ella area comprising about 600 rooms. Assuming triple occupancy, and 100% occupancy, the water demand by the hotel sector is about 192 m3/day. Assuming the increase in the number of rooms by 2030 would be 100%, then the water demand will increase to about 530m3/day. Additional Water consumption is needed by the restaurants, which will be an additional (approx.) 100–150 m3/day. Therefore, the tourism sector will demand about 700 m3/day of water in Ella. Kithal Ella, Ballaketuwa and Namunukula have separate feeders to satisfy the water demand.

Therefore, it is clear that water available satisfies the current needs of Ella (both the commercial sector and the domestic sector), and there is an additional capacity of 40–60% for both Ella and Kithal Ella at present. Assuming that the domestic demand increases by 1.5-2.0% annually, the rest

of the water is available for the commercial sector, up to at least 2030, which is the design horizon of the Badulla-Hali Ela-Ella integrated water supply scheme.

Current population (2019) of Ella is about 9000.The future population in 2030 would be around 9600 (assuming an annual growth of about 0.6%). The domestic water demand (assuming 50% of all the households are supplied with pipe-borne water) will be around 768 m3.

In addition, to the potable water supplied by the NWSDB, there is another water supply scheme operated by the Ella Pradeshiya Sabha, which has a capacity of about 150 m3/day.

Accordingly, national water supply and drainage board has capability of providing water supply for the areas of Ella, Kithal Ella, Yahalawela and Maduragama. And its s proposed to depend by the well - water for the areas of Idamagama and Hettipola.

7.2 Electricity Supply Management

As per the Ceylon Electricity Supply Board, there is no deficiency in supply to cater the current as well as the future electricity demand in Ella.

7.3 Sanitation facilities & waste water management

7.3.1 Sanitation Facilities

7.3.1.1 Domestic Toilet Facilities

The availability of toilet facilities in Ella DS illustrates a gloomy picture. Approximately 8% of the housing units in 2018 had toilet facilities for the exclusive use of the housing unit and 4% had toilets for exclusive use outside the housing unit. About 88% had toilets sharing with other households.

	No of Housing Units	**Toilet Facilities**						
		Within the Unit		**Outside the Unit**		**Other**		
		Exclusive	**Sharing**	**Exclusive**	**Sharing**	**Sharing**	**Public**	**Other**
Ella GND	388	-	123	201	185	-	-	-
TOTAL Ella DSD	13,653	1,138	4,398	748	7,201	442	30	45

Table 7-1: Availability of Domestic Toilet Facilities in Ella GND & DSD- 2012

7.3.1.2 Public and Community Toilets Facilities

Within the Ella Town area, there is only one public toilet, which is managed privately. There are no public toilet facilities available in the Ella area. The toilets in the Ella town are located at the railway station square.

There are no properly built and operated public toilets available for visitors to the area (especially the Ella, Ravana Ella, Kithal Ella areas), and for the use of local visitors who visit Ella and Ravana Ella very frequently.

Therefore, Ella TDMP proposes to develop public toilet facilities in three identified locations and this project has been elaborated in the section 4.2.2 under the Project Code – TP-3-2.

7.3.2 Waste water management

At present, the Ella Planning Area does not have a piped sewerage system. Most of the households and other buildings and establishments (offices, hotels, and commercial buildings) have their own wastewater collection and on-site disposal systems. These individual households and commercial establishments are dependent on septic tanks and disposal of wastewater are through soakage pits. Many of such septic tanks overflow and flow into nearby streams and canals.

There are only a very few hotels that have built properly functioning wastewater treatment systems, and according to the Ella Traders' Association, the number is about 5 hotels.

However, only a few of the systems in the urban area have soakage pits that are sufficiently sized and have sufficient percolation rates. This is due to the high water table and non-availability of space for proper septic-soakage systems. However, the systems in operation in the Ella area and Ella commercial area is effectively off-site systems as it often relies on disposal of sewage sludge collected by gulley bowsers which are emptied off-site.

In terms of wastewater management, the present system in the study area needs major interventions. The issues related to the current system (only limited to tourism development sector: Ella town area and other areas in Ella DSD) are as follows:

i. The entire study areas are dependent on septic tanks or pit latrines (mainly individual households). This includes all residential areas, town centre, hotels, restaurants and other commercial establishments, administrative buildings, etc.

ii. Unfortunately, most septic tanks are not built in accordance with standard environmental engineering specifications. It was also found that in most cases both black water and grey water are directed to the septic tank. This can reduce biological digestion resulting in more sludge accumulating in the tank. Therefore, it becomes necessary to empty these septic tanks more frequently. The Ella Pradeshiya Sabha is equipped to handle this demand having only one gully bowzer. Although management of individual septic tanks are the responsibility of the owners, due to malfunctioning of most of them the local authority has intervened. The Ella Pradeshiya Sabha charges Rs.3,500–4,000 for emptying one septic tank using these Gulley Bowzers.

iii. The Ella Town centre and the areas where hotels and restaurants are located in the Ella area have serious issues of small plot sizes which do not provide adequate space for the construction of septic tanks and soakage pits. As a result, most septic tanks are undersized. According to the information gathered by conducting a field survey, it was found that less than 20% of the septic tanks located in Ella area function properly.

Therefore, the local authority is compelled to empty them frequently. Many of the septic tanks overflow, and septage flow into nearby streams and canals.

Figure 7-1: The Ella PS owns a gulley bowser to empty septic tanks

The present housing density of the study area does not justify the development of a pipe borne sewerage system to cover the entire Ella DS area and Ella urban area. When designing a suitable arrangement, the following aspects need to be considered:

i. All the large establishments should be encouraged to develop their own wastewater collection and treatment plants. Treated effluent must comply with national environmental standards, before the use for irrigation purposes or discharged to a watercourse or the canals.

ii. In residential areas having plot sizes of more than 150 m2, septic tanks should be used. Households should be informed about the basic environmental regulations of managing a septic tank. They should also be encouraged to install “ready-made” septic tanks which are manufactured to environmental engineering specifications in place of in situ construction.

iii. Town Centre (Ella area) – the heavily built-up and densely developed areas could be provided with a separate sewerage system, but a suitable location for a wastewater treatment plant requires investigation. As for Tourism Development, the discussion is limited to Ella area.

Options available for appropriate wastewater management

Four scenarios are evaluated to identify the best option to manage the wastewater generated in Ella.

1) **Do-nothing option**

   The do-nothing option will allow the present scenario to continue without notable interventions. This option will exacerbate the present problems of not having systems for a proper system for wastewater collection, treatment and its safe disposal.

2) **Limited intervention with improved septic tank desludging practices**

   This will also require a proper sludge disposal and treatment facility for the town. A septage treatment plant has been proposed to be built at the solid waste management facility to be located at Karandagolla.

   As a temporary measure, assuming that the storm water drainage system will be improved in congested areas, this will result in significant improvements to the local environment, especially where the storm water drains are lined. This will reduce the nuisance due to restaurant/hotel/domestic wastewater diverted or overflown into road-side drains, but not eliminate it.

   At the moment, the main canal is frequently blocked by large debris and solid waste dumped by hotels and restaurants. This practice has to be stopped immediately. Proper solid waste collection and disposal practice has to be implemented as a matter of urgency, together with a proper septage treatment.

3) **On-site systems with restructuring the present wastewater systems**

   These systems are applicable for most of the areas where soil conditions and ground water levels allow such systems to be adopted, including Ella and Kithal Ella area where hotels and restaurants are located away from the main business area (hotels and restaurants which are clustered in Ella town area). Other areas away from the Bay areas have many options for on-site disposal of wastewater.

4) **Off-Site Systems (Decentralized Wastewater Treatment system operated by the Local Authority)**

   Conventional off-site sewerage systems should only be considered where on-site sanitation systems fail.

Option Comparison and opinions of the Stakeholders

During the reconnaissance field visits in some of the areas within Ella, Kithal Ella, Ravana Ella and areas of interest, a number of options were identified where on-site wastewater disposal is possible, mainly due to small quantities of wastewater generation and appropriate soil conditions for such on-site disposal systems.
Considering the ground conditions in the area, continued use of the existing hybrid off-site sanitation system (on-site septic tank and off-site discharge of septic tank effluent/sludge) is sensible in conjunction with:

- The settled sewage is treated by way of anaerobic fliters/reactors, constructed wetlands where on-site disposal is not possible
- The treated effluent (e.g., by way of anaerobic filters) disposed to improved storm water drainage – including the main canal and the streams (however, this needs the consent of both the Central Environmental Authority and the relevant Local Authority).
- Improved septic tank maintenance to improve the quality of septic tank effluent.
- Improved disposal of septage at the treatment plant proposed at the integrated waste management facility.
- Improved solid waste collection, which is an essential part of wastewater management.

This system:

- Acknowledges the real difficulties of satisfactory on-site systems in high water table environments, and
- Provides a staged upgrade towards an extensive off-site system (e.g. small bore sewer system which collects septic tank effluent to treat downstream).

Improved septic tank sludge disposal management of the systems is needed. A critical step for this is a dedicated site for waste material treatment.

Once a dedicated septage disposal site is established, the use of private contractors for collection and disposal of the contents of on-site tanks reduces the demand on the UC and PS resources, provided they adequately manage and regulate this process.

Wastewater from toilets in highly populated areas where there is insufficient space for properly sized septic tanks or where they cannot be reached by gully bowzers should drain to a common septic tank constructed with an effluent infiltration chamber.

In areas with a high groundwater table where septic tank effluent cannot drain naturally into the ground, in order to reduce pollution of the surface

drainage system (and water bodies) alternative secondary treatment is required.

The most economical solution is to install small bore sewerage to collect septic tank overflows connected to a small decentralized effluent treatment (DEWATS) plant. If the topography is flat and the distance to the treatment plant is great, a small wastewater pumping station might be required.

Proposed Sanitation and Wastewater Component

Five sub-project components are identified in the sanitation sector.

- Increase sanitation coverage to un-served public areas, including public amenities.
- Provision of DEWATS(s) for the core business/high density areas. The land has to be identified and quarantined for the proposed small decentralized wastewater treatment plants serving these areas.
- Provision of a dedicated disposal site for septage sludge. This would be best located at the proposed solid waste disposal site at Karandagolla.
- Appropriate regulations and enforcement for the proper disposal of contents of on-site tanks should be undertaken once a dedicated site is developed.
- Capacity building of the urban authorities to increase their technical and management skills of on-site sanitation.

A comprehensive explanation of the waste water management strategy has been given in the Annexure 2

7.4 Solid Waste Management Strategy

The following assumptions are made for identifying the solid waste generation by 2030.

- Population in Ella DS Division in 2018 was 52,986. Assuming an annual population increment of 2% pa, the current population of Ella DS Division would be about 64,600 by 2030 (i.e., about 10 years from now). Out of this population, currently, only 1% live in urban areas (511 persons), and about 37,000 live in a rural context and the rest (5,550 persons) live in tea estates. Assuming the tourist and visitor arrival will further increase the total population in addition to the influx of people who will include those migrate to touristic areas due to the increased economic opportunities, and also the floating population which include workers, school children, and others who visit the town for various purposes. All these persons will raise the total population to about 70,000 on a given day. And each of them would contribute to solid waste generation.

The analysis has indicated that the following targets are feasible thus Ella TDMP proposes the Ella Pradeshiya Sabha to make an attempt to achieve them.

- It is possible that 90–100% of the municipal solid waste is collected from the urban areas (households and hotels), and waste to be collected from households who live along Wellawaya Road, Passara Road, and Ella Police Station Road. The short term biodegradable waste is composted, and from the remaining, approximately 50–70% is recycled, and the rest of the waste will be landfilled;
- implementation strategies of 3R Principle and waste minimisation are rigorously enforced: plastic and polythene, which is about 8%, Metal and paper and paper account to a further 10%, can be readily recyclable
- Improved lifestyles and standards of the tourism sector will contribute to the generation of more waste; e.g., 20% increment of per capita waste generation (mostly packaging – at least 80% to be recycled)

At present waste collection is about 4.5–6 tons/day (generation is about 20 tons/day), of which the entire waste is dumped at the solid waste management site at Kithal Ella Road. Based on the above assumptions a population of 70,000 and the commercial entities in the area would generate about 25–30 tons/day to be disposed of at the landfill if 3R and waste minimisation strategies are not implemented. Without such strategies, the landfill will rise in height, and invariably the dump will spread horizontally, which may demand additional land for operational infrastructure and facilities.

The proposed site for waste management and processing

A land plot of about 5 acres (2 ha) has been earmarked by the Ella PS for the establishment of a solid waste processing facility. The proposed land within the Ella DS division is located in a land called 'Mukalanyaya', within the Madugasthalawa Village in Karandagolla GN Division (See Figures 7.2). The land which is part of the forest land belonging to the Department of Forestry.

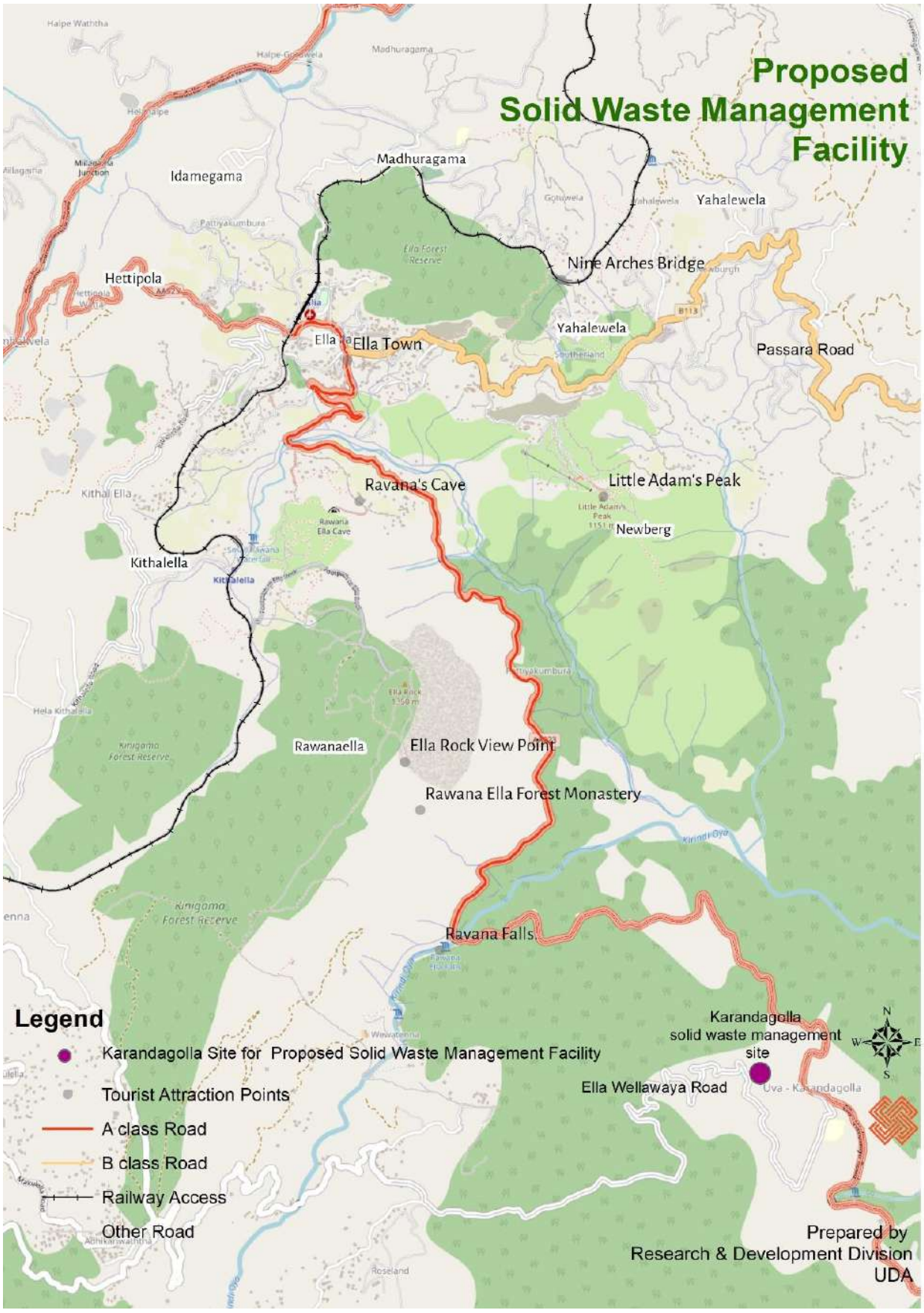


Figure 7-2: Proposed Solid Waste Management Site at Karadagolla

The land identified for the Municipal Solid Waste management facility is a hilly forest land covered with large trees, shrubs and undergrowth. There is no proposer access road. However, the access road can be constructed during the construction stage. The IEE prepared for the establishment of the MSW management facility has been approved by the Central Environmental Authority, and the land has been cleared by the National Building Research Organization as having a very low incidence of landslides.

It is proposed to construct a composting facility for productive use is biodegradable solid waste. The initiative should aim at separating the waste at source and to transport the bio-degradable waste to the composting yard. Under the guidance of various governmental and non-governmental organisations, such composting systems have been introduced to several local authorities, and according to the information of the National Solid Waste Management Support Centre, some local authorities (such as Balangoda, Kuliyapitiya, Tangalla) are implementing it very successfully and the output (compost fertiliser) has had a good demand and thus has become good source of income. If Ella PS can develop a suitable market for the compost produced, it could be a source of income generation.

The facility is proposed to have the following facilities:

1. Security; Waste Reception; Weighbridge
2. Waste Inspection; Sorting; Composting Yard; Storage for compost
3. Septage Treatment Plant; Leachate Treatment Plant; Wheel Wash (these have to be located depending on the location of the land to be acquired)
4. Administration Building
5. Equipment, machinery and vehicle yard
6. Soil Storage (location depends on the working cell); Landfill for different Phases of fill.

*Notes:

(a) Exact locations and dimensions have to be decided after a technical design.
(b) Stormwater drainage paths have to be done after a thorough hydrological study. Proper design of stormwater drainage is extremely important.
(c) Service roads are not shown.
(d) There should be a fence at the boundary after allowing for a buffer zone of at least 50 m.
(e) Leachate monitoring wells should be located at appropriate locations.
(f) Civil amenities can be located approximately as required. This may include facilities provided for visitors, recyclers, service personnel etc.

The land strip should be reserved for waste sorting and storage of recyclables and should be set aside for future use. A typical layout for the existing landfill would be to have a waste reception facility at the entrance to the landfill site (adjoining the access road). The landfilling would proceed vertically at the furthest point from the entrance. If needed, a septage treatment plant and the composting facility can also be located closer to the reception facility (on the land towards the right-hand side of the entrance, where the waste sorting building is located). Other facilities such as parking, administrative buildings etc. can be located appropriately.

Although the local authorities in the area, with external assistance, have embarked on several projects on solid waste management, they have not been fully implemented and not integrated as a whole. Responsibility for operation and maintenance of the proposed systems are unclear. A comprehensive explanation of the waste water management strategy has been given in the Annexure 3

STRATEGY

Implementation

08

Realizing the vision with successful execution

8. Implementation Strategy

The Vision of the Ella Tourism Master Plan "Gallery of the mountain" will be achieved through the four main Goals and 14 Objectives. The plan will be executed using three implementation tools namely Planning & Building Regulations, Planning Guidelines and Strategic Projects. Planning & Building Regulations derived from both Ella Development Plan and Ella Tourism Development Master Plan are presented in the Volume II – Part A of the Ella Tourism Development Master Plan. The Planning Guidelines and the Strategic Projects proposed by the Ella TDMP are presented under six strategies (Chapter 02 – Chapter 07) and this chapter presents the criteria of prioritization and the prioritized list of projects.

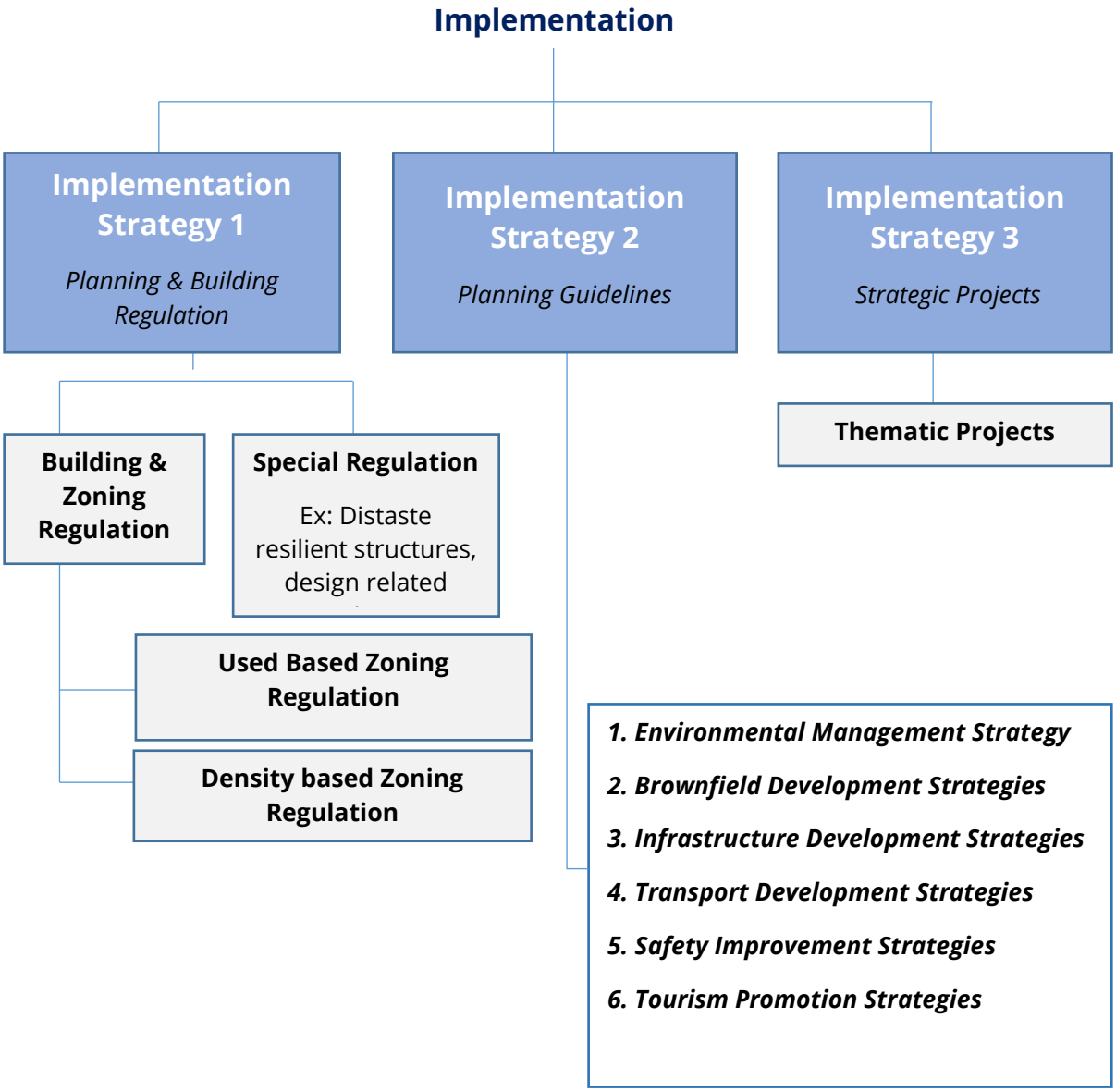


Figure 8-1: Implementation Mechanism of the Ella TDMP

8.1 Prioritization of Strategic Projects

The Ella TDMP has proposed Strategic Projects under main six thematic strategies. There are number of strategic projects identified by the Plan which are of different nature and which serve different purposes. However, considering the time and resource limitations, the execution of all identified projects is challenging thus these projects need to be prioritized to ensure successful implementation of the plan and thereby achieving the envisaged vision of the Plan.

Prioritization of Projects was carried out based on four major criteria's such as projects Risk, Complexity of the Project, Inter – Dependency of Projects, Strategic Value of the Project. The implementation strategy also has identified the stakeholders responsible for executing the identified projects. The appropriate financing mechanism is also proposed in order to guide the relevant stakeholder in implementation of identified projects and to ensure smooth realization of the vision of the Ella.

Project Prioritization

1. Strategic Value of the Project to achieve the Vision and Concept of the Plan.
2. Inter Dependency of the Projects / Operational Benefits to the Other Projects.
3. Projects which have highest Complexity in terms of Inherent Complexity, Project Uncertainty, Project Rigidity of Sequence and No of Technologies use.
4. Project Risk Identification

Table 8-1: Project Prioritization Criteria

1. **Strategic Value of the Project to achieve the Planning Concept.**
   All these listed Projects are expected to bring the Value for the Ella Tourism Development Master Plan. Under this criteria, the projects were evaluated based on their level of contribution to achieve the anticipated vision, concept, goals and objectives of the Plan. The projects were initially scored based on 1 – 5 range. 1 was given for projects with lower strategic value to achieve the Concept and 5 was given for projects with higher strategic value. Scores were determined based on the Planning Team's perception through comprehensive brainstorming session.

2. **Inter Dependency of the Projects / Operational Benefits to the Other Projects**
   The concept here is that a project which is a pre-requisite for a one or more other project automatically gains its priority in the order of implementation. Hence, a Pair-wise Matrix was worked out to derive the order of implementation of the identified projects. In initial stage three Color codes used to identify the Dependency level of Projects and then base colored image convert for the numerical values.

Project	P1	P2	P3	P4	P5	Total	Normalized Value
P1	0						
P2		0					
P3			0				
P4				0			
P5					0		
Total							
Normalized Value							

Table 8-2: Matrix to analyze Inter dependency of Projects

- If left hand project is a pre-requisite for the top project – 1
- If left hand project is not a pre-requisite for the top project – 0

3. **Projects which have highest Complexity in terms of Inherent Complexity, Project Uncertainty, Project Rigidity of Sequence and No of Technologies use.**

   To identify the highly Complex Project Complexity Index was developed based on 7 Components. The following index was developed to evaluate each project in terms of following mentioned criteria. 1 – 5 scale was adopted in here as well in the inverse terms as to give 5 for projects with Highly Complex and 1 for projects with low Complex.

4. **Project Risk Identification**

   Risk analysis is essential in planning, as it helps to identify the potential issues that can cause negative impacts to the projects and also it is used in here as a criteria to prioritize the identified projects. Risk Index Analysis is mainly based on two criteria as probability and severity. By using these two criteria, 6 Risk types (Cost Risk, Schedule Risk, Governance Risk, Strategic Risk, Operational Risk, Market Risk,) were considered as mentioned in the below table in order to identify the range of risks of the identified projects within this plan. The overall prioritization value of each project was obtained through a weighted overlay analysis using all four criteria above. The weights for each criteria were determined based on a brainstorming session.

Project	Inherent Complexity	Uncertainty	No of Technologies	Rigidity of Sequence	Organizational inherent Complexity	Total	Complexity Index
P1							
P2							
P3							
P4							
P5							
Total							
Normalized Value							

Table 8-3: Matrix to analyze Project Risks

Projects	Risk	Weight 20 %	Complexity	Weight 15%	Dependency	Weight 30%	Strategic Value	Weight 35%	Total
P1									
P2									
P3									
P4									
P5									
Total									

Table 8-4: Identification of overall prioritization level of projects

8.2 Prioritized Projects

The prioritized projects were classified into three broader categories such as 1st priority, 2nd priority and 3rd priority projects. Given the implementation mechanism and the financing capabilities, it was identified that the 1st priority projects are implementable with the next 10 years in the period of 2020 to 2030.

Project Prioritization	No	Project Name	Responsible Agency
Phase I (2021-2023)	1	Demarcate 414 ha of identified vegetation area as reserved forests	Forest Department/ UDA
	2	Demarcate 790 ha of identified vegetation area as green conservation area	Forest Department/ UDA
	3	Linear water path development along the existing storm water canal from proposed Ella garden to city center	Urban Development Authority, Private investor, NBRO,NWSDB
	4	Construction of a foot path from tunnel entry to Ella Wellawaya road	Road development authority , NBRO, Local Authority
	5	Incorporating the solid waste management system proposed by Ella PS with recommendations	Local Authority, CEA
	6	Septage Treatment Plant at Karadagolla	Local Authority, CEA
	7	Introduce Unique Lightning System	Local Authority/ Electricity Board
	8	Introduce Unique signage System	RDA/ Local authority
	9	Construction of Information centers at Eidetic Palace (common service facilitated area) & SMART railway transit square	SLTDA, Local Authority
	10	Introduce an unique web site / app for Ella	SLTDA
	11	Tower at city center	SLTDA
	12	Two View Decks along Ella Wellawaya road	SLTDA
	13	Bridge at Kithal ella road	SLTDA
	14	Introduce Bungee Jump at proposed Hand Bridge in Kithal Ella	SLTDA, UDA, Private investor
	15	Construction of Ella Garden beneath the pines forest	SLTDA, LA, Private investor
Phase II (2024-2026)	16	Reforestation of Pinus forest	Forest Department/ UDA
	17	Physically demarcate the reservations of blue network according to stream order	Local Authority, Irrigation Department
	18	Improvement of existing Madhuragama Road	Local Authority
	19	Landscape & Walkability Improvement beside the main strip of Ella Town	RDA/ Local authority
	20	Construction of a foot path from Nine Arch bridge to Kithal Ella adventure based camping site	Local Authority/ UDA/ Railway Department
	21	Introduce electrical taxi service	Local Authority/ Private Investor

	22	Introduce a rail tour from Ella Station to Demodara Station	Railway Department
	23	Construct a smart transit square at existing Ella railway station area	Railway Department
	24	Provide 100% coverage of water supply for tourism related activities by incorporating Badulla- Haliela- Ella integrated water supply system for the areas of Ella, Kithal Ella, Yahalawela and Madhuragama	NWSDB
	25	Close down of existing dump site and convert the area as a Service area for the proposed electrical taxi service	Local Authority/ Private Investor
	26	Septage Treatment Plant at Karadagolla	Local Authority/ CEA
	27	Construction of a drainage network	National water supply and drainage board
	28	Construction of Rawan City Guardian Wall (Retention wall)	National Building Research Organization
	29	Introduce Landslide Warning Alarm system for Rawan City	National Building Research Organization
	30	Provision Pedestrian Pathways	Road development authority ,Local Authority,National Building Research Organization
	31	Construction of Service facilitated area at city center	Local Authority/ SLTDA
	32	View Decks at Demodara	SLTDA
	33	Promote Forest Camping at current Pinus Forest	Forest Department
	34	Introduce a rail tour from Ella Station to Demodara Station	Railway department/SLTDA
Phase III (2026-2030)	35	Ravana Cave Temple access Road landscaping	Local Authority
	36	Nine Arch bridge surrounding development	1.
	37	Entrance gate at City entrance tunnel	Urban development authority/Road development authority
	38	Entrance gate At 500m away from the Ravana Waterfall	Urban development authority/Road development authority
	39	Improvement of existing Passara Road	Road Development Authority
	40	Widening of Badulla - Halpe road to serve proposed tourism promotion zone II	Local authority
	41	Construction of a Nature trail from Forest camping site to Borawewa water based recreational camping site	Local Authority/ SLTDA/Private investor/ Forest Department

	42	Introduce additional luxury Observation Train Compartment to Colombo – Ella train service	Railway department
	43	Vehicle park At Ella City Center	Local Authority
	44	Vehicle park At Smart Rail Transit Square	Local Authority
	45	Vehicle park At Passara Road	Local Authority
	46	Establishment of Tourist Police at common service area	Local Authority/SLTDA
	47	Provide Sanitary Facilities at Service facilitated area, railway transit square, proposed parking center at Passara road	Local Authority
	48	Promote Water based Recreational Camping at Bora Wawe Area	SLTDA/Private Investor
	49	Promote Water based Water based Adventure Camping close to the Kithal Ella Waterfall	SLTDA/Private Investor
	50	Promote Stargazing Camping Site at the top of the Ella Rock	SLTDA/Private Investor
	51	Tree planting around the boundary of Ravan City	Local Authority/SLTDA

Annexure 01

Badulla, Hali-ela and Elle Integrated Water Supply Project

The Badulla, Hali-ela and Elle integrated water supply project was declared open in September 2017. The water project covers 42 Grama Niladhari Divisions in the Badulla Hali-ela and Elle Divisional Secretariat Divisions. The project provides safe drinking water round the clock for more than 100,000 people in Badulla Hali-ela and Elle.

The water system originates at the new Demodara Dam, located on the *Badulu Oya* (Badulla River) about 12 kilometers (km) upstream of the city of Badulla. The dam will create a reservoir to store raw water for the system. The packaged water treatment centre constructed on a mountain slope of Badulla has also saved a large extent of land area required for a project of this nature in traditional land areas. The smaller footprint of the package treatment system provides an additional benefit in the mountainous region where suitable land for construction is limited. The package treatment plant was built on 1.5 acres, instead of the 4 to 5 acres typically required for conventional systems constructed commonly in Sri Lanka.

The project consists of a water treatment plant which can purify 15,000 m^3 of water per day, a concrete dam with a tank of 17 m high which can store 132,000 m^3 of water, eight water storage tanks, pumping houses, transmission and distribution centres. The government has spent Rs. 11,800 million for the project with the assistance of the United States.

The new water treatment plant can treat up to 15,000 m^3 of water per day using four high-solids packaged treatment units. Treatment includes conventional pre-sedimentation, sedimentation with mixed Tube Settlers and Absorption Clarifiers, clarification in adsorption clarifiers, mixed-media filtration, and disinfection. The plant design also incorporates a system for treating and recycling backwash waste, along with solids handling and disposal equipment.

Storage and distribution facilities in the integrated water system of the treatment plants include eight bolted steel tanks and skid-mounted booster pump stations at multiple remote sites. The pipeline system includes 46 km of transmission, trunk, and rider mains and 111 km of distribution system lines. Selected piping materials are a combination of high-density polyethylene and ductile iron piping, depending upon pipe diameter and pressure requirements.

Figure 01: Demodara Dam

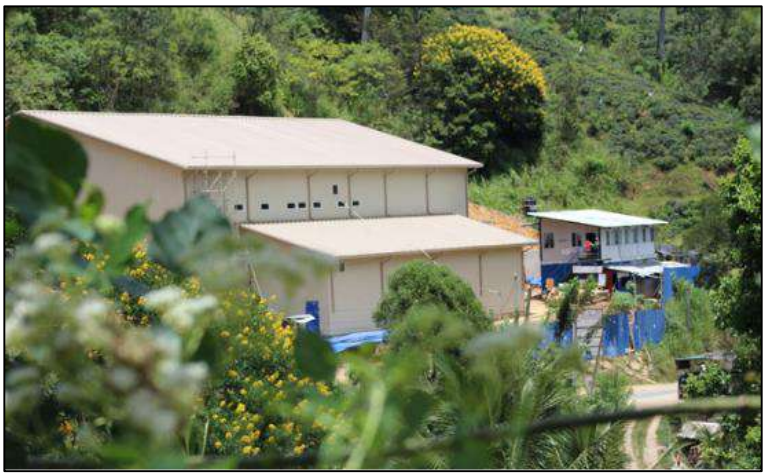


Figure 02: Badulla-Hali Ela-Ella Integrated Water Supply Project

1	Intake - Demodara	
	Reservoir capacity – 358,000 m^3	
	Low lift pump station capacity – 15,750 m^3 /d	
2	Treatment Plant at Uduwarawatte	
	Capacity – 15,000 m^3 /d	
3	Storage tanks - 09 Nos	
	* Uduwara	(2750 m^3)
	* Udawela	(250 m^3)
	* Gotuwala	(500 m^3)
	* Bandarapura	(500 m^3)
	* Ella	(250 m^3)
	* Rockhill	(150 m^3)
	* Kithal Ella	(100 m^3)
	* Medapathana	(225 m^3)
	* Judge's Hill	(1000 m^3)
4	Transmission &Trunk mains	
	(DI or PE 450-150dia.) - 71 Km	
5	Distribution	
	(100-300dia.) - 111 Km	

Figure 03: Components of the Badulla-Hali Ela-Ella Integrated Water Supply Project

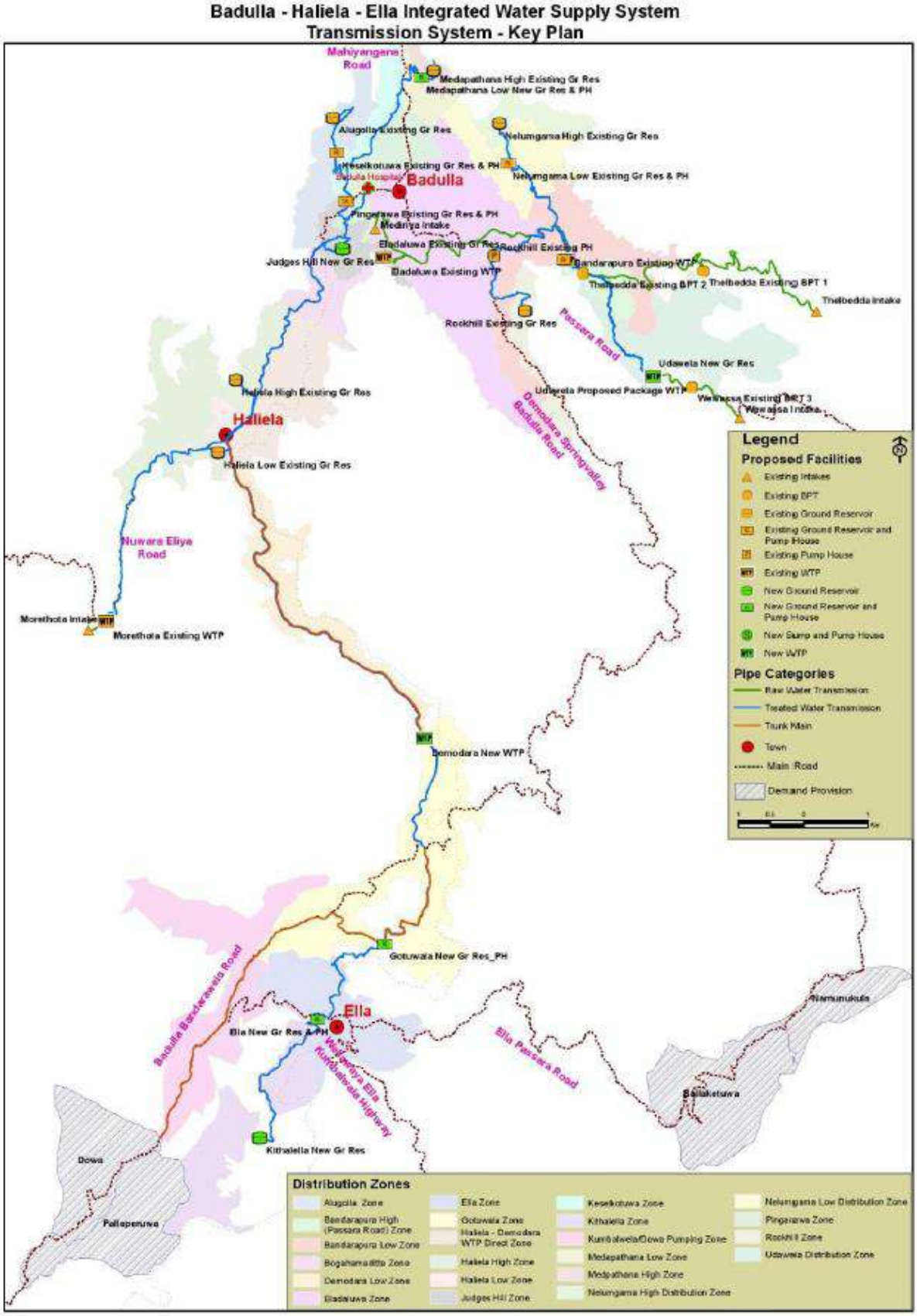


Figure 04: The transmission system of Badulla-Hali Ela-Ella Integrated Water Supply Scheme

Ella has greatly benefitted from the Badulla-Hali Ela-Ella Integrated Water Supply Scheme. Treated water is received at the Ella ground reservoir through Gotuwala ground reservoir at a maximum rate of 1,458 m^3/day. This water is distributed to Ella Distribution zone at a maximum rate of 1,086 m^3/day and to Kithal Ella at a maximum rate of 372 m^3/day. Out of the water transmitted to the Ella distribution zone (1,086 m^3/day), the current maximum capacity is 446 m^3/day with additional demand provision of 300 m^3/day. Also, there is a demand provision for Ballaketuwa and Namunukula for 340 m^3/day. The maximum demands have been assumed for the year 2032.

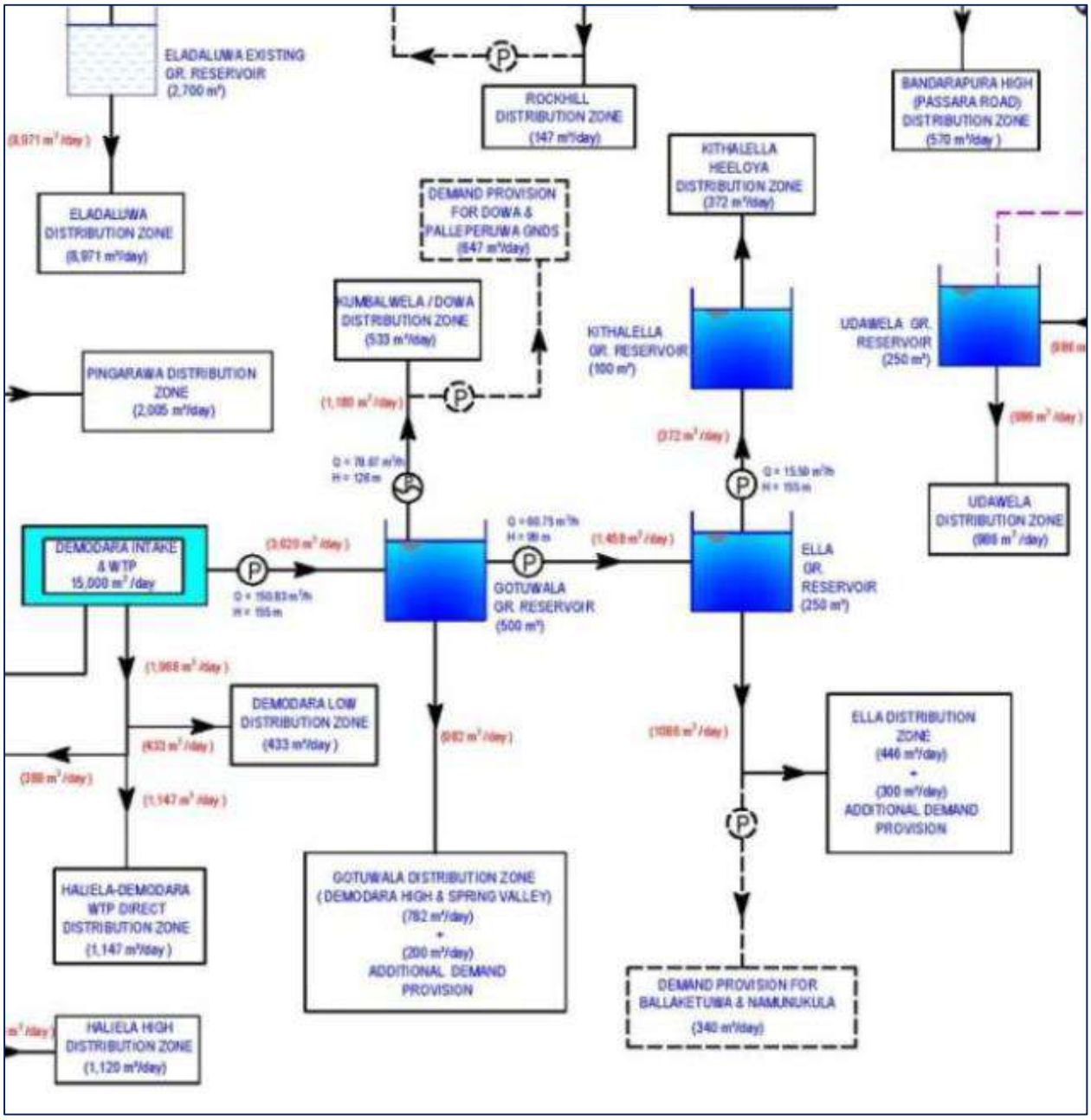


Figure 04: Schematic layout of the water distribution for Elle and Kithal Ella area

Month	Booster to Gotuwela	Gotuwala to Ella	Gotuwala to Dowa	Ella to Kithal-Ella
January	20,900	13,123	1,414	3,766
February	20,556	13,080	1,713	3,682
March	27,003	17,596	1,884	4,684
April	29,659	20,717	1,862	4,436
May	23,750	13,483	2,181	3,663
June	22,883	11,549	1,456	3,182
July	28,047	15,651	2,904	3,967
August	32,993	19,541	3,245	4,899
September	30,145	15,805	3,837	3,768
October	26,587	13,522	4,031	3,213
November	26,069	14,589	3,530	3,492
December				

Table 01: Monthly water distribution record for Ella and Kithal Ella (January to November 2019)
(Source: NWSDB, Uva Regional Support Centre)

Annexure 02

Sanitation Facilities and Waste Water Management

1) Toilet Facilities

1.1) Domestic Toilet Facilities

The availability of toilet facilities in Ella DS illustrates a gloomy picture. Approximately 8% of the housing units in 2018 had toilet facilities for the exclusive use of the housing unit (Table 1) and 4% had toilets for exclusive use outside the housing unit. About 88% had toilets sharing with other households.

	No of Housing Units	Toilet Facilities						
		Within the Unit		Outside the Unit		Other		
		Exclusive	Sharing	Exclusive	Sharing	Sharing	Public	Other
Ella GND	388	-	123	201	185	-	-	-
TOTAL Ella DSD	13,653	1,138	4,398	748	7,201	442	30	45

Table 01: Housing by Toilet Facilities – 2012 (Ella GND and Ella DSD)
Source: Sampath Pethikada, Ella DS, Year 2018

1.2) Public and Community Toilets Facilities

Within the Ella Town area, there is one public toilet, which is managed privately. There are no public toilet facilities available in the Ella area. The toilets in the Ella town are located at the railway station square.

There are no properly built and operated public toilets available for visitors to the area (especially the Ella, Ravana Ella, Kithal Ella areas), and for the use of local visitors who visit Ella and Ravana Ella very frequently.

2) Wastewater Collection and Treatment

2.1) Existing Sanitation Systems

The study area does not have a piped sewerage system. Most of the households and other buildings and establishments (offices, hotels, and commercial buildings) have their own wastewater collection and on-site disposal systems. These individual households and commercial establishments are dependent on septic tanks and disposal of wastewater are through soakage pits. Many of such septic tanks overflow and flow into nearby streams and canals.

There are only a very few hotels that have built properly functioning wastewater treatment systems, and according to the Ella Traders' Association, the number is about 5 hotels.

An on-site system is one that collects and disposes of wastewater (with or without treatment) on the site where the wastewater is generated. A proper on-site system like a septic tank facility comprises two built facilities - a wastewater collection/holding system, and a land application system, and the soil beneath the land application system. It usually consists of a sealed septic tank, and a soil leach or drain field or in some case a leach pit. The typical sanitation system consists of a sealed septic tank which discharges directly to a soakage pit

However, only a few of the systems in the urban area have soakage pits that are sufficiently sized and have sufficient percolation rates. This is due to the high water table and non-availability of space for proper septic-soakage systems. However, the systems in operation in the Ella area and Ella commercial area is effectively off-site systems as it often relies on disposal of sewage sludge collected by gulley bowsers which are emptied off-site.

In terms of wastewater management, the present system in the study area needs major interventions. The issues related to the current system (only limited to tourism development sector: Ella town area and other areas in Ella DSD) are as follows:

i. The entire study areas are dependent on septic tanks or pit latrines (mainly individual households). This includes all residential areas, town centre, hotels, restaurants and other commercial establishments, administrative buildings, etc.

ii. Unfortunately, most septic tanks are not built in accordance with standard environmental engineering specifications. It was also found that in most cases both black water and grey water are directed to the septic tank. This can reduce biological digestion resulting in more sludge accumulating in the tank. Therefore, it becomes necessary to empty these septic tanks more frequently. The Ella Pradeshiya Sabha is equipped to handle this demand having only one gully bowzer. Although management of individual septic tanks are the responsibility of the owners, due to malfunctioning of most of them the local authority has intervened. The Ella Pradeshiya Sabha charges Rs.3,500–4,000 for emptying one septic tank using these Gulley Bowzers.

iii. The Ella Town centre and the areas where hotels and restaurants are located in the Ella area have serious issues of small plot sizes which do not provide adequate space for the construction of septic tanks and soakage pits. As a result, most septic tanks are undersized. According to the information gathered by conducting a field survey, it was found that less than 20% of the septic tanks located in Ella area function properly. Therefore, the local authority is compelled to empty them frequently. Many of the septic tanks overflow, and septage flow into nearby streams and canals.

Figure 01: The Ella PS owns a gulley bowzer to empty septic tanks

2.2) Problem Analysis

As a whole, the wastewater management system in the study area is inadequate. The suitability of an existing sanitation practice is strongly interconnected to the water supply, the soil type, proximity to the water ways (streams and canals) (e.g., streams and canals in the Ella town area) and the groundwater depth. High groundwater levels make it difficult to operate an on-site system entirely satisfactorily. There are two aspects to this:

- Satisfactory disposal of the effluent
- Impact on ground water quality, stream and river water quality

Figure 02: Hotels and households have connected their sewer lines into nearby streams and canals

Figure 03: The main canal is extremely polluted with raw sewage, and the flow is interrupted by solid waste dumped into the canal

Figure 04: Some hotels have septic tanks, but without any soakage pits. These tanks are either emptied by gulley bowzers or simply overflow/emptied into the nearby streams or canals

The first aspect depends not only on the depth of water table but on the permeability of the soil. Heavy clay soils will exacerbate the difficulties in some locations. The existing practice of surface discharge of the septic tank effluent to some extent reduces the problems of disposal provided it is transported away before it causes a nuisance and is probably a historical reason behind the practice. However, poor operation of septic tanks (e.g. inadequate de-sludging) reduces the quality of the septic tank effluent, as noted above.

The second aspect is related to the use of groundwater. When ground water is used as drinking water, contamination from on-site sanitation is always a potential risk. To reduce the risk of

contamination, it is usual to adopt a minimum hydraulic time of 25 days from the bottom of the disposal point to the groundwater, as this allows sufficient time for die-off of the micro-organisms before they reach the groundwater. With groundwater less than 5 m below the bottom of the discharge point, for all soil types, there is high risk of organisms reaching the groundwater in unacceptable concentrations.

The risk to extracted groundwater quality depends on the actual aquifer from which the well draws water, and on mechanical/hydraulic barriers included as part of the well construction. If a well sources water from a deeper aquifer but has inadequate sealing at the top of the well, there is a high likelihood of contamination from shallow groundwater. Systems being constructed should be appropriately checked and inspected to ensure they will meet environmental standards.

The most important reason for having a proper wastewater collection and a treatment system is to keep the streams and canals clean by not allowing untreated wastewater to contaminate such areas. The objective would be to protect public health, keep the streams and canal waters free of any contaminants, pathogenic microorganisms, and free of any nuisance (e.g., due to bad odor, unpleasant landscapes due to pollution).

The present housing density of the study area does not justify the development of a pipe borne sewerage system to cover the entire Ella DS area and Ella urban area. When designing a suitable arrangement, the following aspects need to be considered:

i. All the large establishments should be encouraged to develop their own wastewater collection and treatment plants. Treated effluent must comply with national environmental standards, before the use for irrigation purposes or discharged to a watercourse or the canals.

ii. In residential areas having plot sizes of more than 150 m^2, septic tanks should be used. Households should be informed about the basic environmental regulations of managing a septic tank. They should also be encouraged to install “ready-made” septic tanks which are manufactured to environmental engineering specifications in place of in situ construction.

iii. Town Centre (Ella area) – the heavily built-up and densely developed areas could be provided with a separate sewerage system, but a suitable location for a wastewater treatment plant requires investigation. As for Tourism Development, the discussion is limited to Ella area.

Generic causes in these areas for not investing in proper wastewater treatment systems are often related to:

- Insecure land tenure of hoteliers– consequently lack the willingness to invest in on-site sanitation.
- Rented premises – tenants are unlikely to invest, and landlords will not invest without associated regulations and enforcement.

- Lack of adequate water supply (in limited number of cases) – this particularly affects the overall provision of sanitation facilities.
- Lack of political will to invest and support sanitation/wastewater management programs.
- Inappropriate approaches to managing sanitation and wastewater related issues.
- Neglecting consumer preferences.
- Lack of informed technological choices that allow for different affordability levels or user preferences.
- Ineffective promotion and low public awareness.
- No facilities that allow access and use by the disabled.
- Lack of funds to spend on proper wastewater systems

2.3) Options available for appropriate wastewater management

Sanitation and wastewater responsibility

According to the Urban Council Ordinance and Pradeshiya Sabha Act, sanitation comes under the authority of the local government. However, similar to many other local authorities in the country, Ella Pradeshiya Sabha does not have adequate financial, technical and managerial capabilities for developing and managing a fully mechanized pipe borne sewerage system. Thus, such wastewater management systems in the country at present (except for the city of Colombo) are developed and managed by National Water Supply and Drainage Board (NWSDB) which has a specialized section for wastewater management.

2.3.1) Do-nothing option

The do-nothing option will allow the present scenario to continue without notable interventions. This option will exacerbate the present problems of not having systems for a proper system for wastewater collection, treatment and its safe disposal. Some of the impacts of do-nothing option would be as follows:

- Water pollution: due to sewage, untreated wastewater from restaurants, hotels and household communities
- Ground water pollution: due to untreated sewage
- Public health: due to fecal pollution of the streams, ground water and soils
- Nuisance: odor, unpleasant surroundings, flies, rodents

2.3.2) Limited intervention with improved septic tank desludging practices

The do-nothing option accepts that septic tank effluent will continue to be discharged on-site. This is in the context of the difficulties of operating a system as a strictly on-site system. It also reflects the gloomy realities of current practice.

Septic tanks provide, at best only primary treatment of the influent wastewater. The design of a normal domestic sized septic tanks is based on minimum hydraulic retention of 24 hours. However, if the sludge level is high in the tank, it is common for a channel to form on top of the sludge, and consequently, the influent completely short circuits the tank. In these cases, there is virtually no treatment from the tank, and the effluent discharged is essentially raw sewage.

Frequency of desludging of septic tanks should increase, and desludging should be carried out before the tanks are overflowing. Ground soakage should (if available) should be properly sized and placed, so that ground water quality is not affected due to effluent discharged to such infiltration/percolation/soakage pits. If the water table is at depth, the soil at the interface of the land application system and to some depth beneath the soil interface further treats the effluent before it reaches the groundwater. Treatment is most effective where the soil is unsaturated (i.e., above the groundwater level).

This will also require a proper sludge disposal and treatment facility for the town. A septage treatment plant has been proposed to be built at the solid waste management facility to be located at Karandagolla.

As a temporary measure, assuming that the storm water drainage system will be improved in congested areas, this will result in significant improvements to the local environment, especially where the storm water drains are lined. This will reduce the nuisance due to restaurant/hotel/domestic wastewater diverted or overflown into road-side drains, but not eliminate it.

At the moment, the main canal is frequently blocked by large debris and solid waste dumped by hotels and restaurants. This practice has to be stopped immediately. Proper solid waste collection and disposal practice has to be implemented as a matter of urgency, together with a proper septage treatment.

2.3.3) On-site systems with restructuring the present wastewater systems

<u>On-site disposal: For individual hotels, commercial establishments or small clusters:</u>

Options for on-site disposal of wastewater are provided in the following:

- SLS 745 – Part 1: 2004; Code of practice for design and construction of septic tanks and associated effluent disposal systems Part 1 - Small systems disposing to ground.

  This code of practice covers the design, construction, testing and maintenance of septic tanks for the disposal of domestic wastewater including all waste, black water and grey water systems for small installations disposing effluent into the ground and is limited to systems producing an average daily effluent flow of 5 m^3/ day or less.

- SLS 745 – Part 2: 2009; Code of practice for design and construction of septic tanks and associated effluent disposal systems Part 2 - Systems disposing to surface, systems for on-site effluent reuse and larger systems disposing to ground.

  This code of practice covers the design, construction, testing and maintenance of septic tanks for the disposal of domestic wastewater including all waste, black water and grey water systems. It also recommends guidelines for the selection, design, construction and maintenance of systems for the on-site disposal of effluents from septic tanks.

- PHI Manual: Manual for Sri Lanka Public Health Inspector (1989) published by the Ministry of Health of Sri Lanka

- NWS&DB Design Manual D7: For wastewater treatment - March 1989, National Water Supply and Drainage Board of Sri Lanka

Any treatment system should be designed based on the above Standards/Guidelines.

These systems are applicable for most of the areas where soil conditions and ground water levels allow such systems to be adopted, including Ella and Kithal Ella area where hotels and restaurants are located away from the main business area (hotels and restaurants which are clustered in Ella town area). Other areas away from the Bay areas have many options for on-site disposal of wastewater.

2.3.4) Off-Site Systems

Conventional off-site sewerage systems should only be considered where on-site sanitation systems fail. This is because conventional off-site sewerage systems are:

- Considerably very expensive than on-site systems
- Require increased water supply to operate the system – this increases the costs of the water supply.
- Require regular and continuous maintenance.
- Have high operational costs (much higher than water supply schemes), especially if gravity systems are not possible
- They have a poor track record of good performance and sustainability in most developing countries.

Despite the difficulties of an entirely satisfactory on-site sanitation solution, the above indicates that a conventional centralized off-site system should only be adopted when absolutely necessary. A poor operated off-site system can be worse than a less than satisfactorily operated on-site systems.

Decentralized Wastewater Treatment system operated by the Local Authority

These systems are applicable to Ella town area. For all other areas, on-site disposal systems should be considered, with sludge/septage removal for treatment.

Given the context in the town, Decentralized Wastewater Treatment Systems (DEWATS) can be used where small isolated pockets or areas (e.g., core business areas in Ella) suggest that an improved system is desirable. There is a wide range of technologies from low energy (e.g., septic tanks followed by constructed wetlands), small package up-flow anaerobic plants, to more compact high energy systems. DEWATS are gaining popularity as effective small scale treatment systems in developing countries as they are designed to provide effective treatment without external energy supplies, chemical dosing, and moving parts.

For preliminary planning purposes, DEWATS options for hotels/restaurants (that can include households, too) could consist of two or three main stages:

(i) Preliminary/Primary treatment (e.g., grease traps and septic tank)

followed by treatment of settled sewage by:

(ii) Secondary Treatment - Anaerobic digestion (e.g., anaerobic filters/baffled reactor)

and/or,

(iii) Tertiary treatment (e.g. horizontal planted gravel filters)

The existing on-site septic tanks could be maintained as part of this system, thus reducing the components of the DEWATS plant.

Anaerobic filters or anaerobic baffled reactors are the preferred secondary treatment options that are suitable for the single or small neighborhood where septic-soakage arrangements are not technically feasible options. This is essentially a fixed-bed bioreactor where wastewater flows through the filter, and the particles and organic matter trapped are degraded by the biomass attached to the filter material. The settled sewage has to be directed to the filter/reactor, which may consist of several chambers depending on the size and the design. The filters can be operated either by up flow or down flow mode, although the up flow is preferred as it reduces the risk of having the fixed biomass being washed out. Operation of the filter at full capacity may take some time considering the start-up time required for the anaerobic biomass to stabilize. Installation of the filter/reactor, whether above or below ground depending on the hydraulic gradient

For clusters of hotels/restaurants and houses, places where a large amount of wastewater is generated, septic tank systems will not be applicable. This also includes the railway station and the square, public places proposed within the town, the drainage generated from the peripheral areas that are discharged to the main canal are several locations where separate treatment systems are needed. Preferred DEWATS options for such large volumes of wastewater are described below:

Settled sewage from septic tanks of the clusters of hotels/restaurants/households can be connected to a decentralized wastewater treatment facility, which can be designed to treat volumes of wastewater ranging from 10-100 m^3/d of wastewater or even more, and can comprise of the following components (a combination of the following):

(i) Gravity-fed sewer systems: It should consist of small-bore piping installed for each connected household to carry the settled sewage from the septic tank and grey water to the DEWATS.

(ii) Primary settling units: This unit installed just before the DEWATS system will serve as a wastewater retention point and an area for control of influent fluctuations (an equalization tank), which allows any large sludge, debris and other floatable and visible wastes to settle or be screened out.

(iii) Anaerobic baffled reactor (ABR): An upgraded baffled anaerobic septic tank (BAST) that uses static devices to regulate the flow fluids, forcing wastewater to flow from the inlet to the tank outlet.

(iv) Anaerobic filters (AF): Particles and dissolved solids are trapped, organic matter is degraded, and pathogens and chemicals in the wastewater are removed by the bacterial biofilm in the filters.

(v) Horizontal gravel filter (HGF) and constructed wetlands: The vegetated soil filter (or reed bed) is used to further treat wastewater by copying the natural purification abilities of wetlands. The plant roots within the gravel helps to oxygenate the wastewater. This oxygenation helps to degrade remaining organic pollutants and reduce the door.

(vi) Discharge: After the AF and/or HGF, the effluent is usually considered clean enough for discharge to a nearby drain or canal. However, discharge by way of having Infiltration gulleys, galleries or trenches are preferred.

Discharge of treated effluent into streams or the main canal is usually not permitted under National Environmental (Protection and Quality) Regulations, No. 1 of 2008 (Gazette Extraordinary of the Democratic Socialist Republic of Sri Lanka – No. 1534/18, 01.02.2008): Schedule 1: Tolerance limits for industrial waste discharged to Inland Surface Waters. Therefore, obtaining prior approvals and consent of both the Central Environmental Authority and the relevant Local Authority is needed.

For a population of about 2,000 person equivalents, the footprint would be about 60 m x 120 m for a simple DEWATS plant without facultative ponds. About 90% of the footprint is associated with the planted gravel filter. The shape of the land can be adjusted to fit drainage channels or pond edges.

2.4) Option Comparison and opinions of the Stakeholders

During the reconnaissance field visits in some of the areas within Ella, Kithal Ella, Ravana Ella and areas of interest, a number of options were identified where on-site wastewater disposal is possible, mainly due to small quantities of wastewater generation and appropriate soil conditions for such on-site disposal systems.

Considering the ground conditions in the area, continued use of the existing hybrid off-site sanitation system (on-site septic tank and off-site discharge of septic tank effluent/sludge) is sensible in conjunction with:

- The settled sewage is treated by way of anaerobic fliters/reactors, constructed wetlands where on-site disposal is not possible
- The treated effluent (e.g., by way of anaerobic filters) disposed to improved storm water drainage – including the main canal and the streams (however, this needs the consent of both the Central Environmental Authority and the relevant Local Authority).
- Improved septic tank maintenance to improve the quality of septic tank effluent.
- Improved disposal of septage at the treatment plant proposed at the integrated waste management facility.
- Improved solid waste collection, which is an essential part of wastewater management.

This system:

- Acknowledges the real difficulties of satisfactory on-site systems in high water table environments, and
- provides a staged upgrade towards an extensive off-site system (e.g. small bore sewer system which collects septic tank effluent to treat downstream).

Improved septic tank sludge disposal management of the systems is needed. A critical step for this is a dedicated site for waste material treatment.

Once a dedicated septage disposal site is established, the use of private contractors for collection and disposal of the contents of on-site tanks reduces the demand on the UC and PS resources, provided they adequately manage and regulate this process.

Wastewater from toilets in highly populated areas where there is insufficient space for properly sized septic tanks or where they cannot be reached by gully bowzers should drain to a common septic tank constructed with an effluent infiltration chamber.

In areas with a high groundwater table where septic tank effluent cannot drain naturally into the ground, in order to reduce pollution of the surface drainage system (and water bodies) alternative secondary treatment is required.

The most economical solution is to install small bore sewerage to collect septic tank overflows connected to a small decentralized effluent treatment (DEWATS) plant. If the topography is flat and the distance to the treatment plant is great, a small wastewater pumping station might be required.

2.5) Proposed Sanitation and Wastewater Component

Five sub-project components are identified in the sanitation sector.

- Increase sanitation coverage to un-served public areas, including public amenities.
- Provision of DEWATS(s) for the core business/high density areas. The land has to be identified and quarantined for the proposed small decentralized wastewater treatment plants serving these areas.
- Provision of a dedicated disposal site for septage sludge. This would be best located at the proposed solid waste disposal site at Karandagolla.
- Appropriate regulations and enforcement for the proper disposal of contents of on-site tanks should be undertaken once a dedicated site is developed.
- Capacity building of the urban authorities to increase their technical and management skills of on-site sanitation.

2.5.1) The preferred option for the septic tank sludge treatment facility

Lime stabilization is a likely component of the septage treatment facility; other major unit processes include settling/sand filtering and treating/disposing of liquid and solids fractions. Liquid fraction treatment can be either biological or physical-chemical systems.

The proposed option for treatment of the liquid fraction is by means of an anaerobic reactor followed by an aerobic reactor. The effluent should then be clarified and disinfected before being discharged to comply with national regulations[1]. If there are no natural water courses close to the proposed treatment site, the option is to use the treated wastewater for irrigation or ground application. The solid fraction that is settled in the settling tank and retained in the sand filter beds can be composted at the composting yard that has been proposed at the same site.

2.5.2) Preliminary Estimated Cost

The infrastructure needed for final disposal of septage sludge is as follows:

- Site preparation, access roads, vehicle parking bays, office space.
- Septage receiving facility, preliminary treatment, settling tanks and sand filter beds, effluent treatment plant, pipe network for treated effluent disposal.

The local authority need at least two more gully bowzers for effective collection and conveyance of septage. Using the gully bowzer which is presently in use and the two additional bowzers the daily collection can reach as high as 20-25 m^3/day. Therefore, the treatment plant capacity has to meet this quantity.

[1] National Environmental (Protection and Quality) Regulations, No. 1 of 2008 (Gazette Extraordinary of the Democratic Socialist Republic of Sri Lanka – No. 1534/18, 01.02.2008): Schedule 1: Tolerance limits for industrial waste discharged on land for irrigation purpose.

Estimated cost for the sanitation and wastewater component is provided in Table 2.

Description	**Estimated cost (LKR Million)**
Site preparation, access roads, vehicle parking bays, office space	4.5
Septage receiving station including pumps	2.5
Preliminary treatment: screening, grit chamber	4.0
Lime stabilization, Settling tanks and Sand filtration	4.0
The effluent treatment plant, including civil & electromechanical works	18.0
Effluent disposal system: storage, pumps and pipe network	4.0
Storage and transfer mechanism of solids for composting	1.5
Sub Total	**38.5**
Construction of septic tanks and bio-filters for individual/cluster of hotels	
Construction of DEWATS for large volumes and drainage connections (up to 15 locations)	7.5
Equipment:- Two gulley bowzers (4,000 l)	25.0
Sub Total	**32.5**
Sanitation and Wastewater Total	**71.0**

Table 02: Cost Estimate for Sanitation Component

2.5.3) Operation and Maintenance

Options for operating and maintaining the waste collection and treatment facilities can include total in-house responsibility of the owner or a Private Public Partnership (PPP). These options can be analyzed further as a detailed feasibility study.

2.5.4) Sewerage network and Off-site treatment by an investor

Proposed activities for the proposed wastewater treatment plant

a. Reconnaissance survey to be carried out in order to identify all the wastewater generation points. It is necessary that both grey and black water generation points be identified with their quantities (approximate), respectively. Design a separate network for storm water.
b. Characterization of the wastewater
c. Building or rehabilitating the sewerage network; manholes, gulleys, grease traps etc.
d. Providing separate pre-treatment system for hotels, restaurants, commercial buildings, houses, etc.
e. Installing a proper treatment system (completely new) as the case may be based on the demand (existing and future)
f. A system for re-use of treated effluent for toilet flushing, irrigation etc.
g. Install an effluent disposal system (which remains after part of treated effluent is re-used)

h. A proper system for de-sludging, drying and disposal of sludge

The following should be noted:

The wastewater collection and treatment system should have the following essential features:

- The collection system, including pipelines, manholes, pump stations have to be newly constructed making provisions for future expansions and new construction of facilities
- The treatment system should be:
    - Low sludge production, low O&M cost
    - Free from bad odor, noise and the arrangement of treatment plant does not create a visually unacceptable view
    - Compact enough to be located in a premises where land availability is limited
    - Automated system with minimum operator engagement

The treated effluent should be utilized for irrigation, rather than disposing without re-use

2.5.5) Proposed Treatment Process and Cost Estimates

The major unit processes shall comprise as follows.

(a) Sewerage Network
(b) Preliminary physical treatment units
(c) Equalization Tank with proper pumping arrangements
(d) Anaerobic Reactor
(e) Aerobic Reactor
(f) Sedimentation Tank
(g) Filter Unit for tertiary treatment for reuse of treated wastewater
(h) Disinfection Unit

The final treated wastewater could be safely used for toilet flushing and gardening purposes. And the remainder disposed as ground treatment/irrigation.

2.5.6) Estimated cost for the sanitation and wastewater component is provided below:

Cost items:

- Rehabilitation and/or construction of sewer network, manholes etc.
- Installation of preliminary treatment unit processes: screens, grease traps, grit chambers etc.
- Pre-treatment of wastewater from individual facilities: hotels, restaurants, shops etc.
- Primary and secondary treatment of wastewater (description as discussed above)
- Tertiary treatment for re-use of treated effluent
- Discharge of treated effluent by way of ground treatment or for irrigation
- Sludge management

The cost of the treatment plant incorporating the above unit processes has been estimated at LKR 80–90 million.

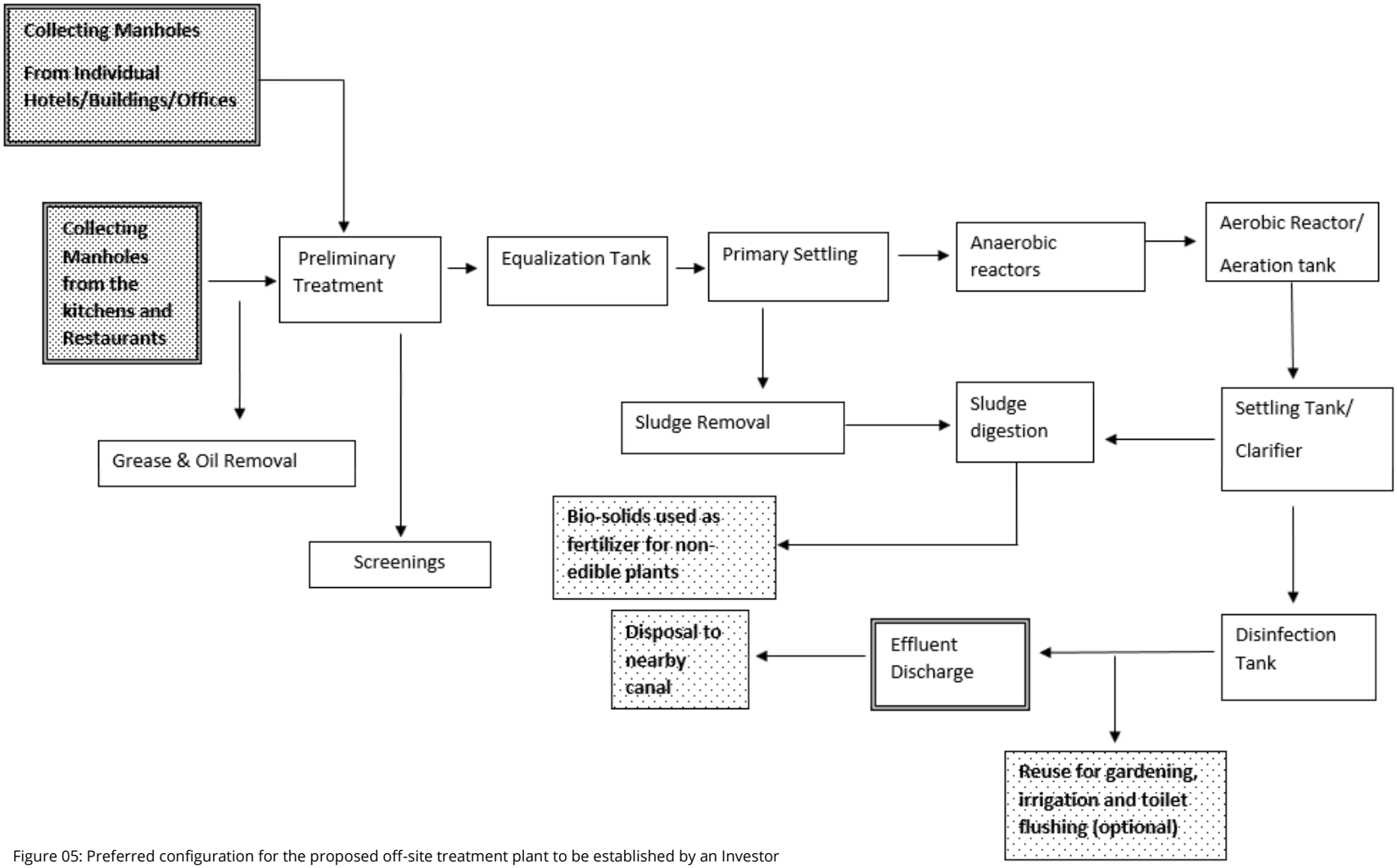


Figure 05: Preferred configuration for the proposed off-site treatment plant to be established by an Investor

Comparison between Central Wastewater Treatment & Disposal Vs. Decentralized Wastewater Treatment and Disposal

	Central Wastewater Treatment & Disposal	**Decentralized Wastewater Treatment and Disposal**
Cost		
- Capital cost	High	Low
- Operations and Maintenance	Electricity cost is high	Low
Treatment of wastewater	Quality of effluent conforms to Regulations	Quality of effluent may or may not conforms to Regulations
Reliability of operations	High reliability	Low reliability in the long-term
Disposal option	Effluent can be reused	Only part of effluent can be reused (depending on the designs and location)
Storage of treated effluent	Storage of effluent is possible for a few days	Storage of effluent may cause difficulties
Possibility of Pollution	No pollution is expected	High possibility of pollution due to the disposal of effluent, both surface, and groundwater. Re-use of effluent will also cause pollution.
Operations and Maintenance	Easy, though the cost is high	Operation is difficult; Troubleshooting is cumbersome

Table 03: Comparison between Central Wastewater Treatment & Disposal vs. Decentralized Wastewater Treatment and Disposal

2.6) Options for areas other than Ella Town area

On-site disposal: For individual locations, commercial establishments or small clusters:

Options for on-site disposal of wastewater are provided in the following:

- SLS 745 – Part 1: 2004; Code of practice for design and construction of septic tanks and associated effluent disposal systems Part 1 - Small systems disposing to ground.

  This code of practice covers the design, construction, testing and maintenance of septic tanks for the disposal of domestic wastewater including all waste, black water and grey water systems for small installations disposing effluent into the ground and is limited to systems producing an average daily effluent flow of 5 m^3/ day or less.

- SLS 745 – Part 2: 2009; Code of practice for design and construction of septic tanks and associated effluent disposal systems Part 2 - Systems disposing to surface, systems for on-site effluent reuse and larger systems disposing to ground.

  This code of practice covers the design, construction, testing and maintenance of septic tanks for the disposal of domestic wastewater including all waste, black water and grey water systems. It also recommends guidelines for the selection, design, construction and maintenance of systems for the on-site disposal of effluents from septic tanks.

- PHI Manual: Manual for Sri Lanka Public Health Inspector (1989) published by the Ministry of Health of Sri Lanka

- NWS&DB Design Manual D7: For wastewater treatment - March 1989, National Water Supply and Drainage Board of Sri Lanka

Considering the ample land availability, providing individual septic tanks is the best option for individual locations, commercial establishments or small clusters located outside Ella town area. Generation of wastewater for these entities is mostly during the daytime, hence the wastewater is predominantly wash water, wastewater generated at urinals and flushing of toilets. The solid accumulation is limited with compared to a place where people reside (e.g., the hotel). The effluent treatment will follow by use of constructed wetlands or provision allowed for soakage gullies/pits (Figure 3). The treated effluent can be utilized for watering gardens and green areas.

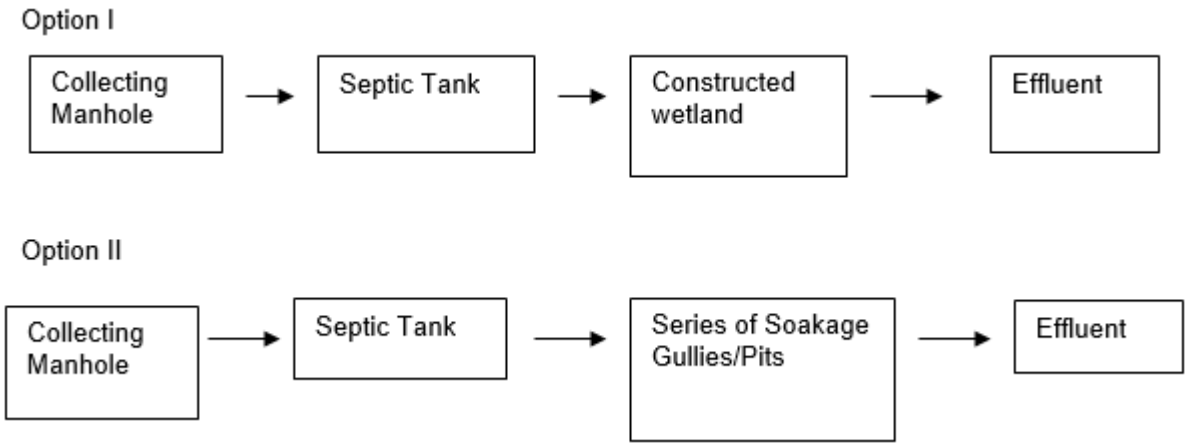


Figure 06: Options available for wastewater disposal for individual locations, commercial areas and other small clusters outside Ella

The expected volumes of wastewater should be calculated depending on the number of occupants of the particular location. The design and detailing of septic tanks, constructed wetlands, soakage gullies and pits should be based on SLS 745: Code of Practice: Sri Lanka Standards Part I and Part II (2004) on the design and construction of septic tanks and associated effluent disposal systems.

2.6.1) For Hotels located outside Ella Town area

The above description is valid also for individual hotels located outside Ella town area.

In addition, there is an option of installing small treatment plants, especially modular DEWATS systems which are commercially available. The selection of the technology will be dependent on the capacity requirement of the wastewater treatment plant.

Two separate systems are proposed for black water and grey water. Providing separate septic tanks for each hotel is an option for backwater generated from toilets while the effluent treatment will be by provision allowed for Anaerobic Biofilters (commercially available units) followed by on-site effluent disposal by providing soakage pits, seepage beds/seepage trenches (Figure 4). The effluent is then discharged on-site by having soakage pits and/or seepage beds/trenches. Settled wastewater from several septic tanks can be collected before on-site disposal.

For greywater which is collected separately from bathrooms and wash areas on to a distributor tank, percolation beds or constructed wetlands are proposed. The bed area of constructed wetlands and percolation beds can be used for growth of non-edible crops (or any other non-edible plants) such as flowering plants and can be used as green areas. The effluent can be re-used or disposal to surface water. For meaningful treatment, several sections of the hotel can be connected to one distribution tank before treatment, so that sufficient amounts of effluent can be collected for subsequent re-use.

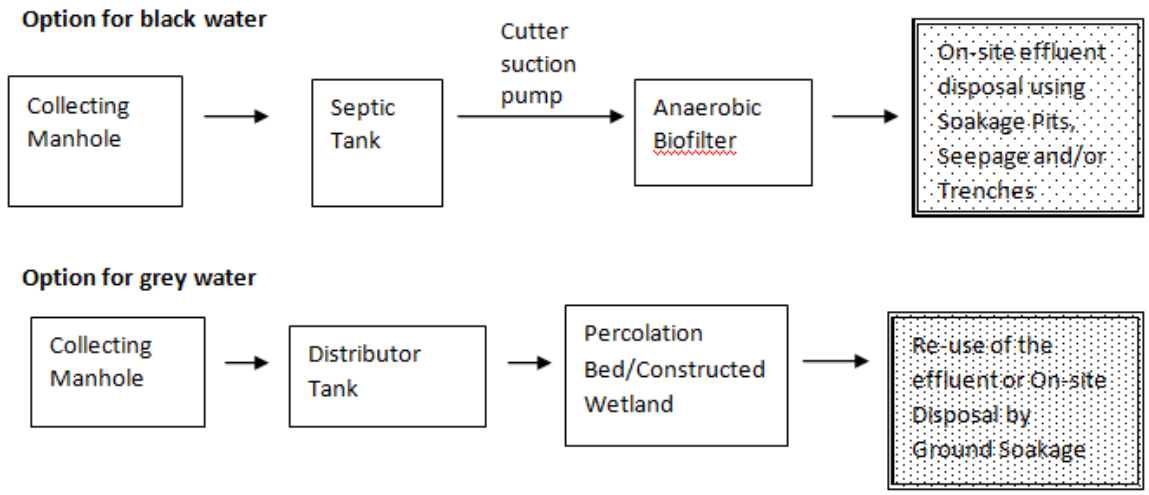


Figure 06: Options available for wastewater disposal

Out of the various options, the above option is recommended due to its ease of operation and suitability of the ground geology that allows high rates of percolation and climatic conditions favouring high rates of evaporation, which are both, very favourable for soakage/seepage and percolation beds.

Individual septic tanks need regular emptying (design period for de-sludging is one year), a task that has to be outsourced to commercial operators who uses gulley suction bowsers and who can ensure proper disposal.

2.6.2) Restaurants and Kitchens

Wastewater from the kitchens/restaurants will have to be pre-treated to remove food residue and grease and oil, before conveying to a soakage gulley. This wastewater has to be passed through screens and then through the grease trap to remove grease and oil, followed by soakage of effluent through soakage gullies.

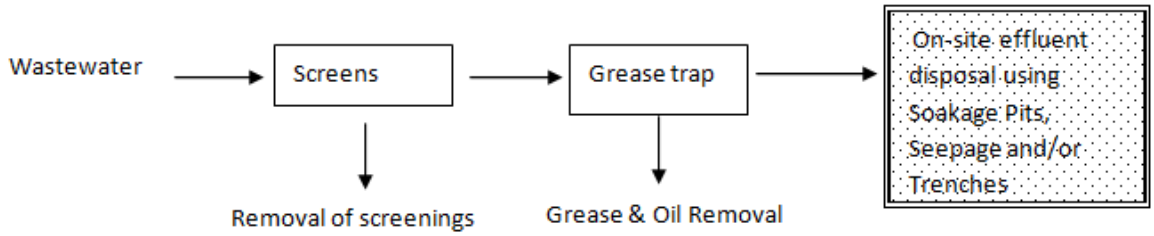


Figure 07: Options available for wastewater disposal for kitchen

Anaerobic Biofilters, Soakage pits, Percolation Beds and Constructed Wetlands

The Anaerobic Biofilters have to be designed according to SLS 745 (Part 1): Section 5.6 and Annex H of the SLS 745 OR commercially available units can be installed.

The Seepage trenches/percolation beds and constructed wetlands have to be designed according to SLS 745 (Part 1): Section 5.5 and Annex G of the SLS 745.

Criteria and effluent standards for treatment

Regular cleaning and flushing of the sewerage pipe network have to be carried out. Effluent quality has to be checked regularly to ensure that it conforms to CEA Effluent Standards: National Environmental (Protection and Quality) Regulations, No. 1 of 2008.

The operations of the anaerobic treatment units should be strictly monitored in order to ensure that the effluent quality conforms to CEA Standards. The disposal of treated effluent should conform to the National Environmental (Protection and Quality) Regulations, No. 1 of 2008 (Gazette Extraordinary of the Democratic Socialist Republic of Sri Lanka – No. 1534/18, 01.02.2008): Schedule 1, List 2: Tolerance limits for discharge of industrial waste discharged on land for inland waters.

Annexure 03

Solid Waste Management

1) Existing Solid Waste Management Practices

1.1) Need to pay attention to proper municipal solid waste management

- It is the largest municipal expenditure, but benefits have been often uncertain and are not maximised. Inadequate municipal solid waste management is negatively impacting public health, the environment and attractiveness across the area, especially the Ella town area, where touristic activities are flourishing.
- The tourism section will suffer most from inadequate solid waste management. Maintaining and building the tourism sector by maintaining high levels of cleanliness. Avoiding piling up of garbage, stray animals, vermin and pests. Most of all, the nuisance created by improper collection and disposal of solid waste.
- At Ella and other areas (Ballaketuwa, Demodara, Dowa, Bindunuwewa, Kithal Ella, Ravana Ella, Kumbalwela, etc.) enhanced waste management at the local level is possible and affordable, and can simultaneously address objectives for sustainable development, public health, environmental quality and local governance.
- Supporting local and national economic development through the recovery of value from wastes and benefits in agriculture through the application of compost.
- Enhancing municipal governance through strengthening waste management at the local level. Achieving higher levels of public health and lower health costs through improved environmental quality and the elimination of the reservoirs of disease that are created by inadequately managed solid wastes.
- Supporting achievement of water conservation and water quality goals through proper collection and disposal of solid waste and preventing contamination of surface and groundwater reserves.

1.2) Waste Generation

Solid waste generation is mainly due to two sectors: (i) Municipal solid waste (MSW) (households, commercial establishments including markets, shops, restaurants and hotels, institutions, etc.) and (ii) Industrial and hazardous waste (factories, medical centres etc.). The details contained in this section mainly refer to the former category, i.e., MSW. Waste generation and collection patterns in the Badulla District categorised into each local authority are shown in Figure 1.

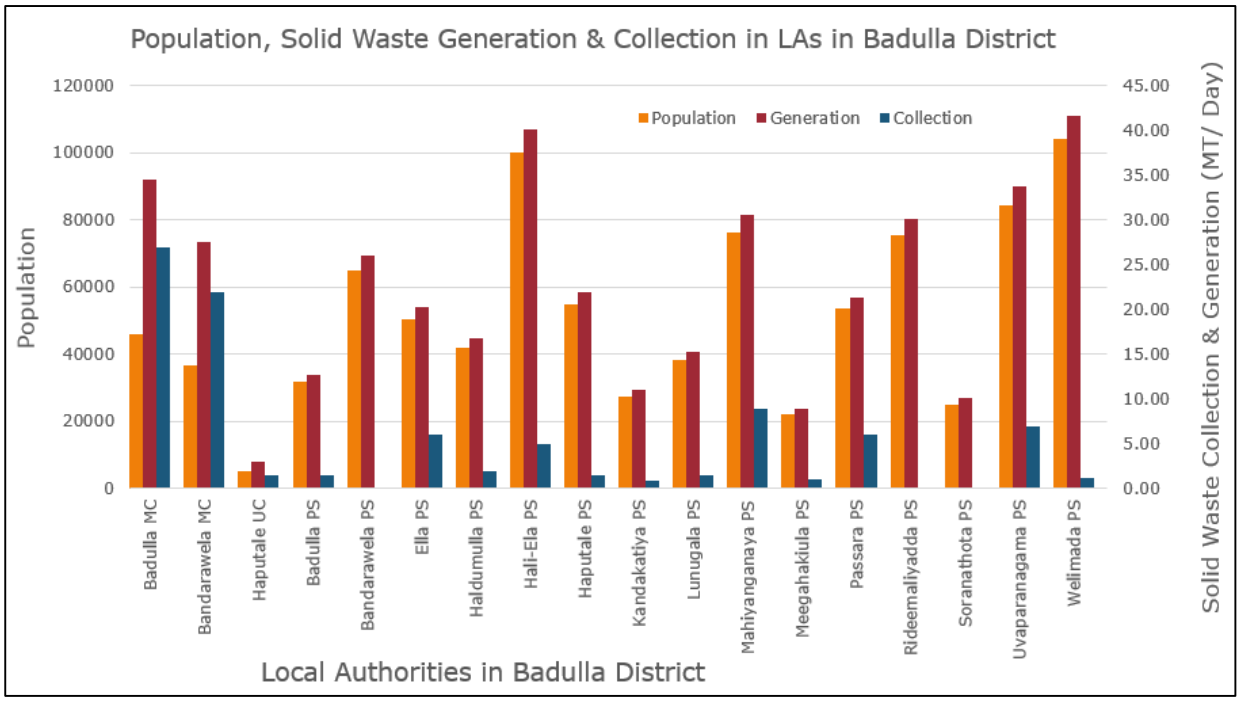


Figure 01: Solid Waste Generation and Collection in Badulla District
Source: University of Moratuwa & NSWMSC (Unpublished data, 2013)

It has been estimated that about 20 MT/day of MSW is generated within the Ella PS division, including areas such as (Yahalawela, Ballaketuwa, Demodara, Dowa, Bindunuwewa, Kithal Ella, Ravana Ella, Kumbalwela, etc.). Out of the MSW generation, about 4–6 MT/day is collected by the Ella PS.

1.3) Solid Waste Composition

Solid waste composition studies were conducted in Badulla District by University of Moratuwa for the NSWMSC in 2013. The composition of Municipal Solid Waste (MSW) in Ella Pradeshiya Sabha is given in Figure 2, which can be used as a design guide since the population characteristics, social conditions and settlement attributes are similar at present. The only difference, rather significant in nature, is the marked increase in the number of hotels and restaurants that have been built after 2013, which produce large amounts of municipal solid waste, particularly biodegradable waste. The biodegradable component that has risen since the rapid development of tourism in the short term biodegradable component rather than the and long term, depending on the waste characteristics.

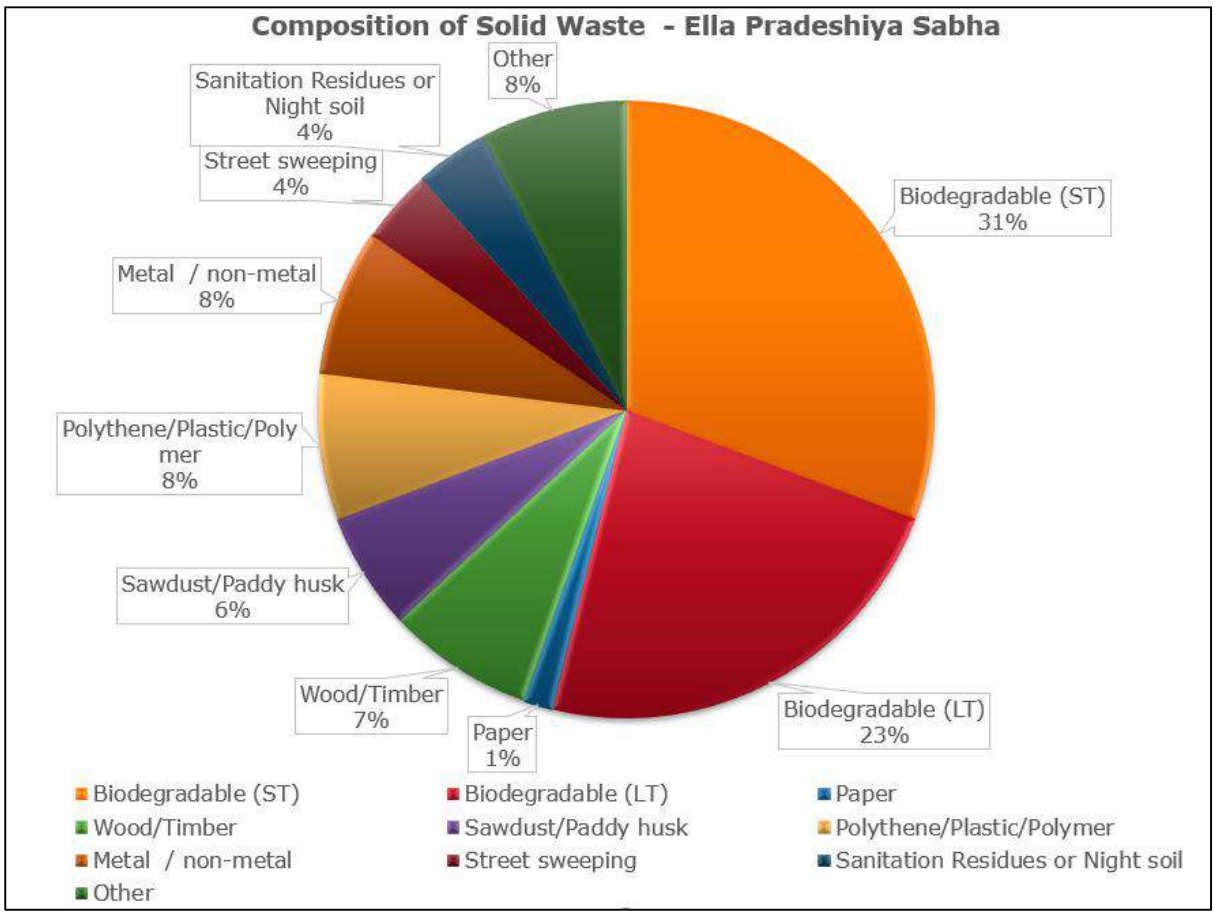


Figure 02: Composition of Solid Waste – Ella PS, Badulla District
Source: University of Moratuwa & NSWMSC (Unpublished data, 2013)

The composition of the MSW collected at Ella has its inherent characteristics. Notably, polythene and plastic composition is relatively high. The short-term biodegradable component is relatively high, whereas long-term biodegradable component is smaller than the short-term component. Glass, paper and textile waste are also notably high. These higher figures show the potential of recycling of such wastes.

The percentage of short term biodegradable component is low compared with what has been observed in other Districts where short term component is about 40-50% and long term component is 15-30%, depending on the collection pattern (especially sorted or unsorted) of MSW (an analysis carried out by the University of Moratuwa in 2017). Percentage composition depends on the source of collection, the pattern of collection, and alternative methods of waste management (recycling of waste, etc.).

1.4) Street Cleaning and Primary Collection

Street cleaning is carried out regularly in the Ella PS area, including the town area and Rawana Ella areas. However, according to the survey carried out, the households and the commercial sector (e.g., hotels), mentioned that the collection is not very systematically done in certain areas. The survey among the hotel sector revealed that the collection is done daily in some parts (only during weekdays), weekly in some parts and no collection at all in other areas. The commercial areas of

the PS, marketplaces and public places such as the railway station area and the Rawana Ella areas are cleaned regularly, and the solid waste is transferred directly to the dumping ground located at Kithal Ella Road.

All the hotels and commercial entities have their own collection bins: some hand over the garbage on the day of collection, others have their own temporary chambers to store waste until collection (Figure 3).

Figure 03: Individual hotels and common places (e.g., railway station) have their own way of collecting MSW and storage until collected by the PS tractors

1.5) Collection and Transportation

Collection of solid waste depends on the areas of intensity. Collection in commercial areas (e.g., Ella area) is regular while in residential areas it is once or twice a week. The PS area has been divided into different zones of which solid waste is collected daily in the commercial area of the zones. Waste is collected once a week in all other zones. There are facilities to collect the scheduled waste (hazardous and pathogenic waste), but certain amounts of such waste are collected by the council and mixed with general household solid waste. Table 3 provides basic details of their operations and equipment.

Item		**Unit**	**Area**
			Ella **PS**
Solid waste generation	Domestic	kg/day	12,000 (Collection 1,000–2,000)
	Commercial		5,000 (Collection 4,000–4,500)
	Institutional		500 (Collection 500)
	Street sweep		3,000 (Collection 3,850)
	Hazardous/industrial/ Pathogenic		N.A.
	TOTAL		**21,000 (Collection 5,000–6,000)**
Management Staff		Number	Engineer/Works Superintendent: 0

		Technical Officer: 01 MOH/PHI: 1 + 1 Environmental Officer: 0 Supervisors: 01 Drivers: 02 Labourers: 15 (permanent: 03; Causal: 12)
Compactors	Number	1 (out of service)
Tractors	Number	2 + 2 (out of service)
Trucks	Number	1
Gulley Bowser	Number	1 + 1 (out of service)
Collection	Times/ week	Once a week (households) Daily or once in three days (commercial, hotels, restaurants) Daily in marketplaces and public areas
Locations of significant amounts of waste are generated		Tourist hotels: 160 Restaurants: 200 Schools: 02 Market places: 01 Supermarkets and shops: 75 Institutional entities: 05 Public Places (Rawana Ella, Station square, etc.)

Table 01: Solid waste Management – Present Status

1.6) Organic Waste Composting

Composting is done at present at the plant located at the Kithal Ella Road. The Ella PS received this facility in 2009 from Pilisaru and NSWMSC, with a capacity of composting 500 kg/day. However, due to many reasons, the facility is not operating at the moment.

1.6.1) Sorting and Recycling of non-biodegradable waste

There is no adequately established system for recycling of waste. There are private collectors for metal and paper/cardboard, where modest sums are paid for such material. Glass and plastics have no demand from these collectors, other than for clear glass bottles. There are also private operators who visit the areas for collecting large plastic items such as broken plasticware and household items for an exchange of similar items depending on the weight of recyclable material.

1.6.2) Final Disposal

The area does not have a proper municipal solid waste management system. Solid waste is collected by the local authority and dumped on the land where the composting facility is located, 1.5 km away from the Town, see location in Figure 5. The dump yard has been built in the middle of a tea plantation on a very sloppy area.

Figure 04: Existing composting plant at Kithal Ella Road

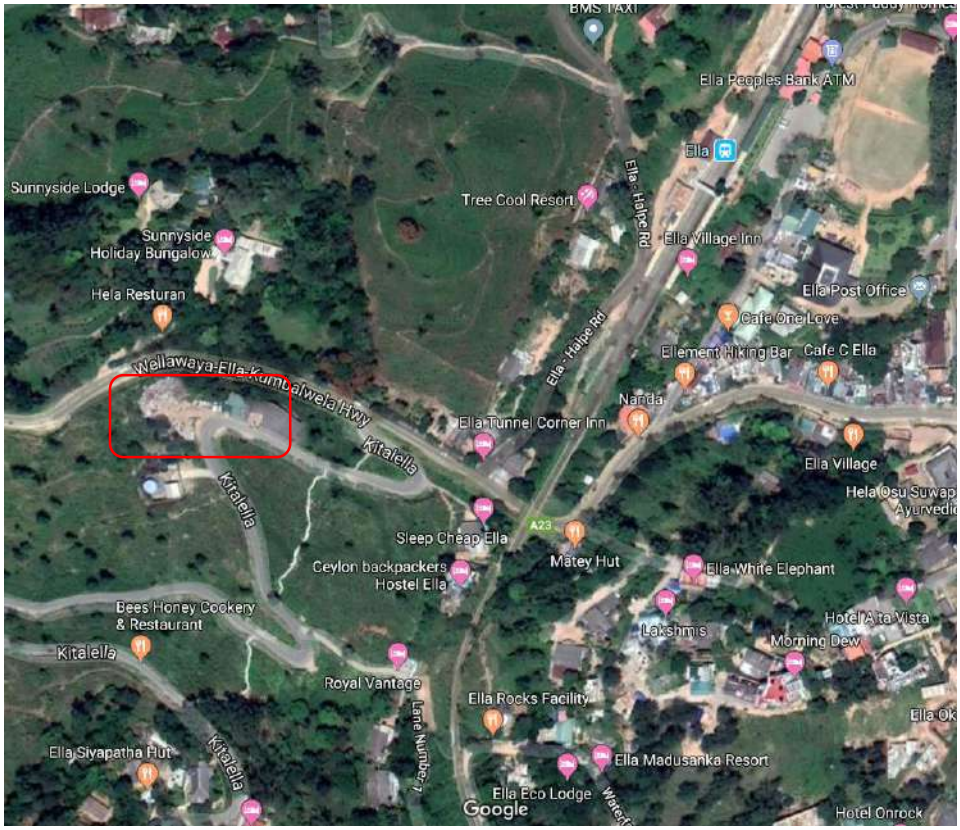


Figure 05: Open dump at Kithal Ella Road (6.874510 N, 81.044315E)
Source: Base map generated from Google Earth

2) Proposal for improvement

The following assumptions are made:

- Population in Ella DS Division in 2018 was 52,986. Assuming an annual population increment of 2% pa, the current population of Ella DS Division would be about 64,600 by 2030 (i.e., about 10 years from now). Out of this population, currently, only 1% live in urban areas (511 persons), and about 37,000 live in a rural context and the rest (5,550 persons) live in tea estates. Assuming the tourist and visitor arrival will further increase the total population in addition to the influx of people who will include those migrate to touristic areas due to the increased economic opportunities, and also the floating population which include workers, school children, and others who visit the town for various purposes. All these persons will raise the total population to about 70,000 on a given day. And each of them would contribute to solid waste generation.

The following targets are feasible, and the Ella PS should make an attempt to achieve them:

- It is possible that 90–100% of the municipal solid waste is collected from the urban areas (households and hotels), and waste to be collected from households who live along Wellawaya Road, Passara Road, and Ella Police Station Road. The short term biodegradable waste is

composted, and from the remaining, approximately 50–70% is recycled, and the rest of the waste will be landfilled;

- implementation strategies of 3R Principle and waste minimisation are rigorously enforced: plastic and polythene, which is about 8%, Metal and paper and paper account to a further 10%, can be readily recyclable

- Improved lifestyles and standards of the tourism sector will contribute to the generation of more waste; e.g., 20% increment of per capita waste generation (mostly packaging – at least 80% to be recycled)

At present waste collection is about 4.5–6 tons/day (generation is about 20 tons/day), of which the entire waste is dumped at the solid waste management site at Kithal Ella Road. Based on the above assumptions a population of 70,000 and the commercial entities in the area would generate about 25–30 tons/day to be disposed of at the landfill if 3R and waste minimisation strategies are not implemented. Without such strategies, the landfill will rise in height, and invariably the dump will spread horizontally, which may demand additional land for operational infrastructure and facilities.

2.1) The proposed site for waste management and processing

A land plot of about 5 acres (2 ha) has been earmarked by the Ella PS for the establishment of a solid waste processing facility. The proposed land within the Ella DS division is located in a land called 'Mukalanyaya', within the Madugasthalawa Village in Karandagolla GN Division (See Figures 6 and 7). The land which is part of the forest land belonging to the Department of Forestry.

The land identified for the MSW management facility is a hilly forest land covered with large trees, shrubs and undergrowth. There is no proposer access road. However, the access road can be constructed during the construction stage. The IEE prepared for the establishment of the MSW management facility has been approved by the Central Environmental Authority, and the land has been cleared by the National Building Research Organization as having a very low incidence of landslides.

It is proposed to construct a composting facility for productive use is biodegradable solid waste. The initiative should aim at separating the waste at source and to transport the bio-degradable waste to the composting yard. Under the guidance of various governmental and non-governmental organisations, such composting systems have been introduced to several local authorities, and according to the information of the National Solid Waste Management Support Centre, some local authorities (such as Balangoda, Kuliyapitiya, Tangalla) are implementing it very successfully and the output (compost fertiliser) has had a good demand and thus has become good source of income. If Ella PS can develop a suitable market for the compost produced, it could be a source of income generation.

The facility is proposed to have the following facilities:

1. Security; Waste Reception; Weighbridge
2. Waste Inspection; Sorting; Composting Yard; Storage for compost
3. Septage Treatment Plant; Leachate Treatment Plant; Wheel Wash (these have to be located depending on the location of the land to be acquired)
4. Administration Building
5. Equipment, machinery and vehicle yard
6. Soil Storage (location depends on the working cell); Landfill for different Phases of fill.

Notes:

(a) Exact locations and dimensions have to be decided after a technical design.
(b) Stormwater drainage paths have to be done after a thorough hydrological study. Proper design of stormwater drainage is extremely important.
(c) Service roads are not shown.
(d) There should be a fence at the boundary after allowing for a buffer zone of at least 50 m.
(e) Leachate monitoring wells should be located at appropriate locations.
(f) Civil amenities can be located approximately as required. This may include facilities provided for visitors, recyclers, service personnel etc.

The land strip should be reserved for waste sorting and storage of recyclables and should be set aside for future use. A typical layout for the existing landfill would be to have a waste reception facility at the entrance to the landfill site (adjoining the access road). The landfilling would proceed vertically at the furthest point from the entrance. If needed, a septage treatment plant and the composting facility can also be located closer to the reception facility (on the land towards the right-hand side of the entrance, where the waste sorting building is located). Other facilities such as parking, administrative buildings etc. can be located appropriately.

Although the local authorities in the area, with external assistance, have embarked on several projects on solid waste management, they have not been fully implemented and not integrated as a whole. Responsibility for operation and maintenance of the proposed systems are unclear.

Figure 06: Proposed site for the establishment of the MSW facility at Karandagolla

2.2) SWM Institutions

2.2.1) Responsibility of managing MSW

Sections 118, 119, 120 of the Urban Councils Ordinance, No. 61 of 1939 and Sections 93, 94, 95 of the Pradeshiya Sabhas Act, No. 15 of 1987 ensure the proper management of solid waste within the local authority areas by giving necessary measures, and directions to sweep and clean the streets, the removal of house refuse, and the proper disposal of all street refuse and house refuse and prevent public nuisance.

The responsibility and authority to collect, transfer and dispose of the collected solid waste are vested with the health department of the local authority. The head of the health department

together with the public health inspectors attached to the local council, are assigned the tasks related to collection, transfer and disposal of the waste.

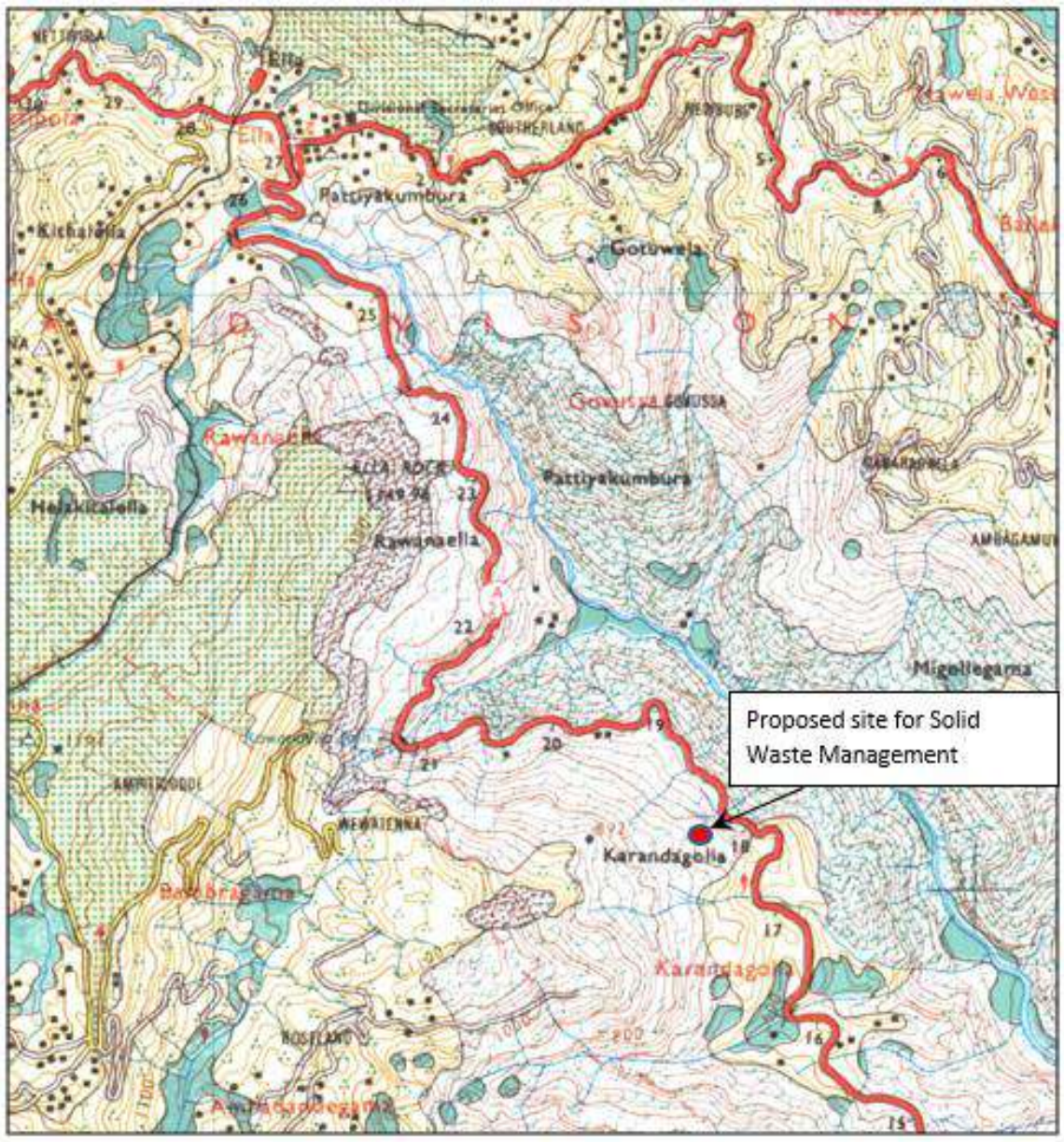


Figure 07: Location of the proposed site for the establishment of the MSW facility at Karandagolla

2.2.2) NGO and CBO Initiatives

No information could be found relating to NGO and CBO initiatives in SWM that had been carried out in the area, other than the initiatives implemented by the Traders' Association in installing waste bins in the town area.

2.2.3) Private Enterprises

Recycling of waste takes place without proper guidance. Private parties collect recyclable/reusable material such as metal, paper/cardboard, glass and hard plastics. There are no registered collectors (registered at the Central Environmental Authority) that operate within the area. However, there are several private sector parties that collect hard plastics and transport them to facilities that are available elsewhere. There is a considerable potential to initiate small-scale businesses related to recycling of waste material if source separation is practised.

2.2.4) Informal Sector

There are scavengers engaged in collecting marketable items such as metals, hard plastics, wood etc. Some of them can be seen in the existing dump yard in Kithal Ella Road.

2.3) Future Waste Generation and collection

Depending on the future tourism sector and population growth, further MSW generation will increase, and its composition will change due to a change in the economic structure of the society. For the projection of future waste generation, the effective population has been calculated with 10% on top of the projected population to account for temporary residents, floating population, landless settlers and tourists.

It shall be anticipated that the amount of solid waste generation (and hence collection) will increase by 2% per annum and any additional volumes if available are planned to be disposed of at the same location.

Current waste generation of 20 tons/day in the PS area will, therefore, be approximately 25–30 tons/day in 10 years. The amount of collection will also be higher with the capacity being built at the PS, and therefore it can be expected that the collection will be about 10–15 tons/day (assuming 50%–75% collection). However, with proper sorting, recycling (including composting), the amount of residual waste that will be dumped is expected to be 3–4 tons/day.

2.4) Proposed SWM Improvement

2.4.1) SWM Strategy

The main principle of the SWM strategy is the daily transport of collected waste to the landfill site delivered at the highest appropriate environmental standards. The local authorities have to follow the 3 R principles of waste minimisation in the SWM hierarchy (Reduce, Reuse, and Recycling).

The local authorities have to be responsible for SWM measures in their entire area. The institutional set-up has to ensure both financial sustainability and environmental compliance and responsibility and continuously updating. Therefore, day to day operation and maintenance costs should be covered by service fee collected from the waste generators. A more detailed survey will need to be taken to identify poverty pockets to assess the amount of waste being generated and

the fees that can be charged as the poor may not be able to afford the services. Based on the findings, appropriate steps may need to be identified and implemented.

Comprehensive and target-oriented institutional strengthening, HRD and capacity building has to enable the urban authorities to implement the SWM strategy. They also have to provide proactive SWM related awareness to the general public, in close cooperation with residents and stakeholders.

The precondition for separate treatment of different waste types is the source separation into 3–4 different waste fractions: biodegradable waste, paper/cardboard, plastics and polythene, metal and glass - at all levels from households, commercial to institutions.

The service has to be accessible for all service users (at least 80–90% coverage in 10 years). The local authority has to be in a position to improve performance continuously.

Sufficient transport capacity has to be established for daily transport of collected waste to the landfill site. Parts or entire service can be contracted out to NGOs, CBOs or private enterprises. Here women's groups or cooperatives can be promoted to work on a business enterprise basis. The transport capacity can be divided into secondary collection from the city to the waste disposal site. If haulage distances are more than 5 km, waste transfer stations might need to be considered; but should be avoided if possible, to reduce double handling.

Health Care Waste Management (HCWM), Hazardous Waste Management and Commercial/Industrial Waste Management have to be operated according to the highest possible environmental and socially acceptable standards. Legal and institutional preconditions have to be prepared and supervised by the respective SWM authority.

Recycling of non-organic valuables is already done by the informal sector and is well established as a profit-based activity. Only indirect support and supervision is required to increase the amount of recycled valuables and through that to reduce the amount of waste to be land-filled and to ensure that the poor, people of excluded groups and women involved are working under acceptable conditions. Supervision should be under local authority. Indirect support might be optional by the national and provincial government (i.e. at the district or regional level etc.).

Composting will be encouraged at the household level, or by indirect support and supervision. The support (both technical and financial) for composting at household levels can be explored through Pilisaru Project (Central Environmental Authority) and/or through NSWMSC.

2.4.2) SWM Development Recommendations

Project implementation plan covers the period until 2030 and the targets set, and investment done in this period has to follow a timely sequence.

a) Awareness Campaign, Institutional Building, and Capacity Building

Implementation will not be possible without the significant strengthening of the technical and managerial capacity of the local authorities, and therefore training for different target groups involved in various sectors of SWM is recommended. Community participation reduces the SWM system costs significantly. Public awareness about proper SWM is increasing, but the pace is slow. Community participation programs and public awareness campaigns are the preconditions for the implementation of all improvements in SWM to inform, motivate and train the public to cooperate and participate with the SWM service and to improve knowledge regarding public health issues which result from indiscriminate waste disposal.

b) Separation and Primary Collection

Waste should be separated in general into 4 fractions at household level:

- bio-waste: biodegradable organic waste like kitchen waste, grass, etc.
- recyclables: paper, plastic, glass, metal
- remaining waste (residual waste) to be disposed of in the landfill
- hazardous waste like chemicals, batteries, paints and solvents, cosmetics, aerosol cans, chemicals and sludges, petrochemicals and lubricants, pesticides and weedicides and other hazardous/toxic wastes to be handled by licensed waste operators

The separated wastes should be stored within the households in small bins or buckets and delivered regularly to the MSW collectors who need to be motivated to have separate bins for the different wastes. Source separation/storage should be introduced stepwise with household awareness campaigns and support to establish systems to separate waste in situations of scarce space or lack of appropriate collection bins, before full implementation of the system.

SW collection should be operated by the local authority trucks/tractors or third parties contracted by municipality depending upon the feasibility. Extension of the service area and improvement of coverage level to the highest possible extent (coverage level to reach above 90% of the households in 10 years).

c) Road network and Transport of solid waste

Collection fleet has to travel through each and every road to ensure proper collection. If any of such roads are not accessible, then temporary collection chambers have to be located at suitable locations. This includes beach areas, narrow alleys, and other recreational areas.

Based on the present and projected solid waste generation, the waste collection and vehicular transport fleet shall be designed. It shall be assumed that one vehicle can make a maximum of two trips to the site, and hence the total number of vehicles required shall be determined. For example, for Ella PS: the target collection of 10 tons/day may need five tractor-loads making two trips per day.

d) Recycling and Treatment of Special Wastes

Direct support could be in terms of mutual pilot projects of the public and private sector to extend the recycling industry. Also, indirect support could be provided, such as logistic support, staff training, the introduction of sustainable technology, management support, quality management, customisation, subsidies and soft loans for private entrepreneurs, guaranteed to take over contingents by local and/or public bodies. Here targeted support to women's groups, representative organisations' cooperatives to undertake this as an enterprise could be promoted systematically.

The support of CBO based recycling plants and a pilot compost plant should be considered since the capacity of the recycling industry seems to have the potential for expansion. Through Economic Development Schemes (EDS) as soft loans or indirect support as training or lowering administrative barriers, the 'added value' of recycling activities could be increased within the urban authorities.

e) Existing dump site

Open dumping in landfills or land-raise sites is currently the primary disposal methods for most of the MSW accounting for around 80% of the country's waste stream. Most types of waste may be dumped at such yards; however, this practice is currently being discouraged from encouraging more sustainable waste management practices such as minimisation, re-use, recycling and energy recovery. Nevertheless, in the foreseeable future, the present dump site shall still be required to dispose of the MSW.

The MSW should be spread out and compacted, by a compactor in a series of layers, such that void space is minimised. At the end of the working day, the final lift is often covered by 'daily cover' usually consisting of soil, or another inert material, to reduce odour, litter spread and access to the waste by birds and vermin. Open burning should be barred completely.

Figure 08: Inside the composting yard where biodegradable waste is temporarily stored. No compost is produced at the moment

Figure 09: Existing solid waste dump yard located next to the composting facility

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