हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

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Land Resource and Hydrological Inventory of Dharmapur Sub-watershed for Watershed Planning and Development Yadgir Taluk, Yadgir District, Karnataka (AESR 6.2)

Sujala – III
Karnataka Watershed Development Project- II
Funded by World Bank

ICAR - NBSS & LUP

ICAR - National Bureau of Soil Survey and Land Use Planning, Bangalore
Watershed Development Department, Govt. of Karnataka, Bangalore

About ICAR - NBSS&LUP

The National Bureau of Soil Survey and Land Use Planning (ICAR-NBSS&LUP), Nagpur, a premier Institute of the Indian Council of Agricultural Research (ICAR), was set up during 1976 with the objective to prepare soil resource maps at national, state and district levels and to provide research inputs in soil resource mapping and its applications, land evaluation, land use planning, land resource management, and database management using GIS for optimizing land use on different kinds of soils in the country.

The Bureau has been engaged in carrying out soil resource survey, agro-ecological and soil degradation mapping at the country, state and district levels for qualitative assessment and monitoring the soil health towards viable land use planning. The research activities have resulted in identifying the soil potentials and problems, and the various applications of the soil surveys with the ultimate objective of sustainable agricultural development. The Bureau has the mandate to correlate and classify soils of the country and maintain a National Register of all the established soil series. The Institute is also imparting in-service training to staff of the soil survey agencies in the area of soil survey, land evaluation and soil survey interpretations for land use planning. The Bureau in collaboration with Panjabrao Krishi Vidyapeeth, Akola is running post-graduate teaching and research programme in land resource management, leading to M.Sc. and Ph.D. degrees.

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PART - A

Land Resource Inventory of Dharmapur Sub-watershed for Watershed Planning and Development

Yadgir Taluk, Yadgir District, Karnataka (AESR 6.2)

CONTENTS

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How to read and use the Atlas

The Land Resource Inventory of Dharmapur sub-watershed (Yadgir Taluk, Yadgir District) for Watershed Planning (AESR 6.2) was undertaken to provide comprehensive site- specific cadastral level information useful for farm level planning and integrated development of the area under Sujala – III, Karnataka Watershed Development Project- II.

This atlas contains the basic information on kinds of soils, their geographic distribution, characteristics and classification. The soil map and soil based thematic maps derived from soils data on soil depth, soil gravelliness, slope, land suitability for various crops and land use management maps are presented on 1:12,500 scale. The maps of fertility status (soil reaction, organic carbon, available phosphorus, available potassium, available sulphur, available calcium, available copper, available manganese, available zinc, available iron, available boron and salinity (EC) on 1:12,500 scale were derived from grid point sampling of the surface soils from the watersheds.

The atlas illustrates maps and tables that depict the soil resources of the watershed and the need for their sustainable management.

The user, depending on his/her requirement, can refer this atlas first by identifying his/her field and survey number on the village soil map and by referring the soil legend which is provided in tabular form after the soil map for details pertaining to his/her area of interest.

The atlas explains in simple terms the different kinds of soils present in the watershed, their potentials and problems through a series of thematic maps that help to develop site-specific plans as well as the need to conserve and manage this increasingly threatened natural resource through sustainable land use management. The Land Resource Atlas contains database collected at land parcel/ survey number level on soils, climate, water, vegetation, crops and cropping patterns, socio-economic conditions, marketing facilities *etc.* helps in identifying soil and water conservation measures required, suitability for crops and other uses and finally for preparing a viable and sustainable land use options for each and every land parcel.

For easy map reading and understanding the information contain in different maps, the physical, cultural and scientific symbols used in the maps are illustrated in the form of colors, graphics and tables.

Physical, Cultural and Scientific symbols used in the Atlas

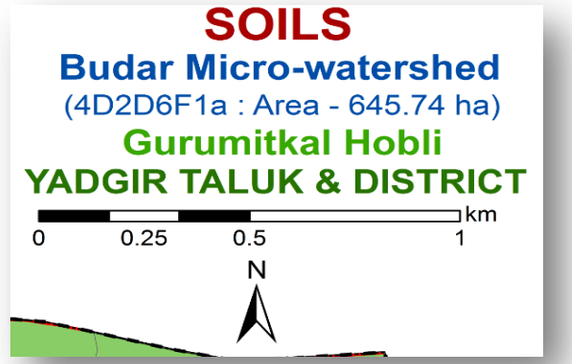
Each map in the atlas sheet is complemented with the physical, cultural and scientific symbols to facilitate easy map reading.

Inset map

Inset provided in each map conveys its strategic location i.e. Taluk, Sub-watershed and Micro-watershed.

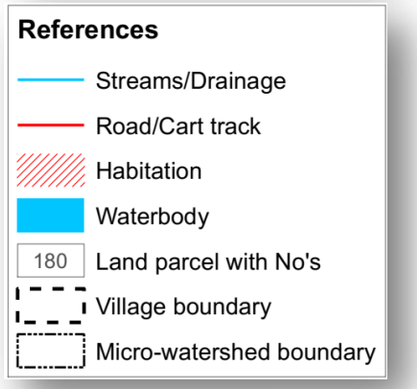
Map title

Map title conveys the relevance of thematic information presented along with a graphical scale, geographical location and watershed details in text form.



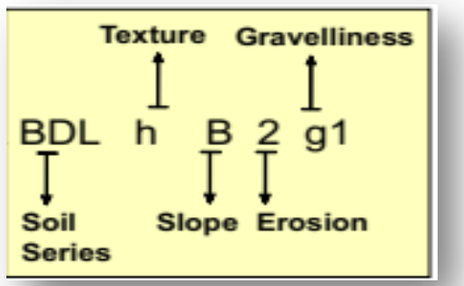
Legends and symbols

*Two legends accompany each map, a **map reference**, which depicts geographic features and a **thematic legend** which portrays spatial information. Picking up the symbol and colour of a particular enables one to go to the legends to obtain the required information.*



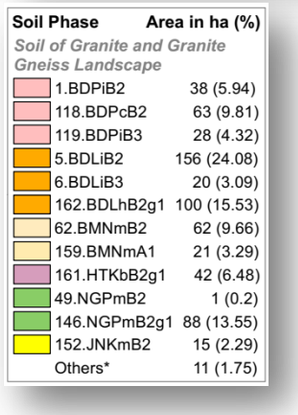
Soil Units

The soil map may be read at different levels. The most detailed level is that of the soil phase. Soil phases are distinguished within soil series mainly based on differences in surface of soil texture, slope, gravelliness , erosion ,etc.



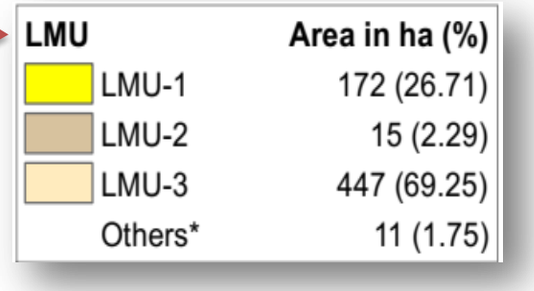
Map colours

Different shades of colours are used as an aid to distinguish the different classes of soils, crop suitability and other maps.



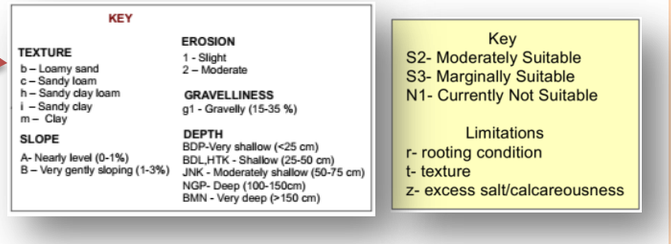
Land Management Units (LMU)

Grouping of similar soil areas based on their soil-site characteristics into management units that respond similarly for a given level of management are designated as land management units..



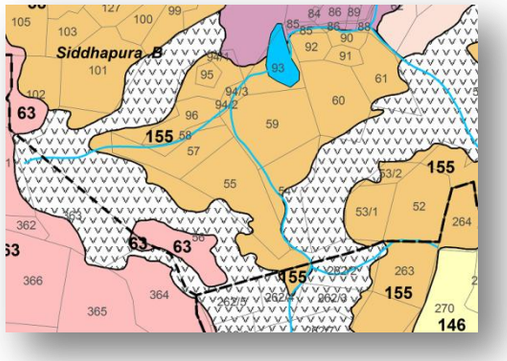
Map key

There are many thematic types to be differentiated on the map solely based on colour. Therefore soils and suitability types and their limitations are distinguished by colours with a combination of alpha-numeric characters.



Soil and plot boundaries

Soil units shown on the map are represented by both the color and a numeral. The soil boundaries are superimposed on land parcel with revenue survey number boundaries to visualize its spatial extent.



LAND RESOURCE INVENTORY OF DHARMAPUR SUB-WATERSHED FOR PLANNING YADGIR TALUK, YADGIR DISTRICT

A pilot study by ICAR-NBSS&LUP, Bangalore

1. INTRODUCTION

Land is a scarce resource and basic unit for any material production. It can support the needs of the growing population, provided they use land in a rational and judicious manner. But what is happening in many areas of the state is a cause for concern to anyone involved in the management of land resources at the grassroots level. In India the area available for agriculture is about 51 per cent of the total area and more than 60 per cent of the people are still relying on agriculture for their livelihood. The limited land area is under severe stress and strain due to increasing population pressure and competing demands of various land uses. Due to this, every year there is a significant diversion of farm lands and water resources for non-agricultural purposes. Apart from this, due to lack of interest for farming among the farmers in many areas, large tracts of cultivable lands are turning into fallows and this trend is continuing at an alarming rate.

The watershed management programs are aimed at designing suitable soil and water conservation measures, productivity enhancement of existing crops, crop diversification with horticultural species, greening the wastelands with forestry species of multiple uses and improving the livelihood opportunities for landless people.

The objectives can be met to a great extent when an appropriate Natural Resources Management (NRM) plan is prepared and implemented. It is essential to have site specific Land Resources Inventory (LRI) indicating the potentials and constraints for developing such a site specific plan. LRI can be obtained by carrying out detailed characterization and mapping of all the existing land resources like soils, climate, water, minerals and rocks, vegetation, crops, land use pattern, socio-economic conditions, infrastructure, marketing facilities and various schemes and developmental works of the government. From the data collected at farm level, the specific problems and potentials of the area can be identified and highlighted, conservation measures required for the area can be planned on a scientific footing, suitability of the area for various uses can be worked out and finally viable and sustainable land use options suitable for each and every land holding can be prescribed to the farmer and other land users of the area.

The Yadgir, popularly called as “Yadavagiri” by the local people, district came to existence on 30th Dec 2009 by carving out of erst-while Kalaburagi district of Karnataka with a geographical area of 5234.4 square kilometers, located in the northern part of the state. It lies between north latitudes 16° 56’ and 16° 54’ and east longitudes 77° 18’ and 77° 20’. The climate of the district is very hot and dry. The district has an average annual rainfall of 636 mm. Soils are well drained red sandy loam to medium deep black soils. This may be the weathering product of gneissic and granite terrain. Agriculture in Yadgir district is dependent upon rainfall, irrigation tanks, wells, streams etc. The major agricultural crops grown are Jowar, Groundnut, Cotton, Red gram, Bengal gram etc.

As a pilot study, **ICAR-NBSS&LUP, Bangalore** carried out the generation of LRI for the Dharmapur Sub-watershed in Yadgir taluk, Yadgir district. It was selected for data base generation under Sujala III project. This sub-watershed encompasses of 8 MWs namely, Bodabanda-2 (4D2D6F1b), Budar (4D2D6F1a), Bodabanda-1 (4D2D6F1c), Chinakar-2 (4D2D6F2c), Dharmapur (4D2D6F2a), Chinakar-3 (4D2D6F2e), Gotamidapalli (4D2D6F2b) and Chinakar-1 (4D2D6F2d) micro watersheds. Land Resource Inventory (LRI) was generated for one micro-watershed (Budar–4D2D6F1a) among eight micro-watersheds.

To be continued….

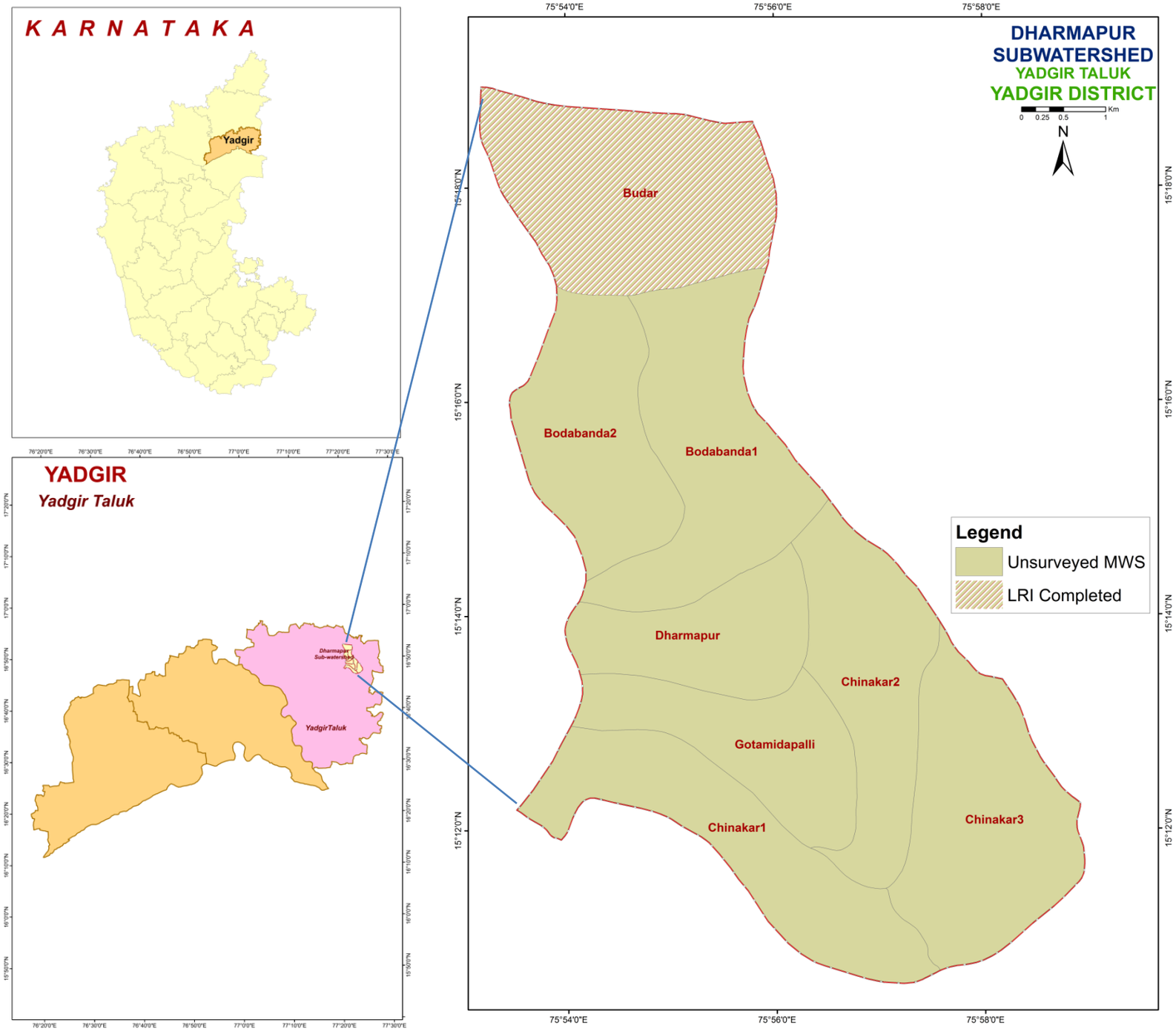
2. GENERAL DESCRIPTION

The major landforms identified in the micro-watershed (Budar–4D2D6F1a) of Dharmapur sub-watershed are uplands and low lands. The database was generated by using cadastral map of the village as a base along with high resolution satellite imagery (IRS LISS IV and Cartosat-1). The objectives of the land resource survey, carried out in the Budar micro-watershed spread across Boodhura, Himalapura, Chapetla, Kakalawara, Gurumitkal and Narayanapura villages covering an area of 645.74 ha. are indicated below.

- Detailed characterization of all the land resources like soil, water, land use, cropping pattern and other resources available at parcel level in the village.
- Delineation of homogenous areas based on soil-site characteristics into management units.
- Collection and interpretation of climatic and agronomical data for crop planning.
- Identification of problems and potentials of the area and strategies for their management.
- Assessment of the suitability of land resources for various crops and other uses.
- Establishment of village level digital land resources database in a GIS framework.
- Enable the watershed and other line departments to prepare an action plan for the integrated development of the watershed.

LOCATION AND EXTENT OF DHARMAPUR SUB-WATERSHED

Dharmapur sub-watershed (Yadgir taluk, Yadgir district) is located between $16^{0}50'52''–16^{0}52'40''$ North latitudes and $77^{0}20'37''–77^{0}22'21''$ East longitudes, covering an area of about 3825 ha. Where, the Budar micro-watershed (Yadgir taluk, Yadgir district) is located in between $16^{0}51' – 16^{0}52'$ North latitudes and $77^{0}20' – 77^{0}22'$ East longitudes, covering an area of about 645.74ha, bounded by Boodhura, Himalapura, Chapetla, Kakalawara, Gurumitkal and Narayanapura villages.

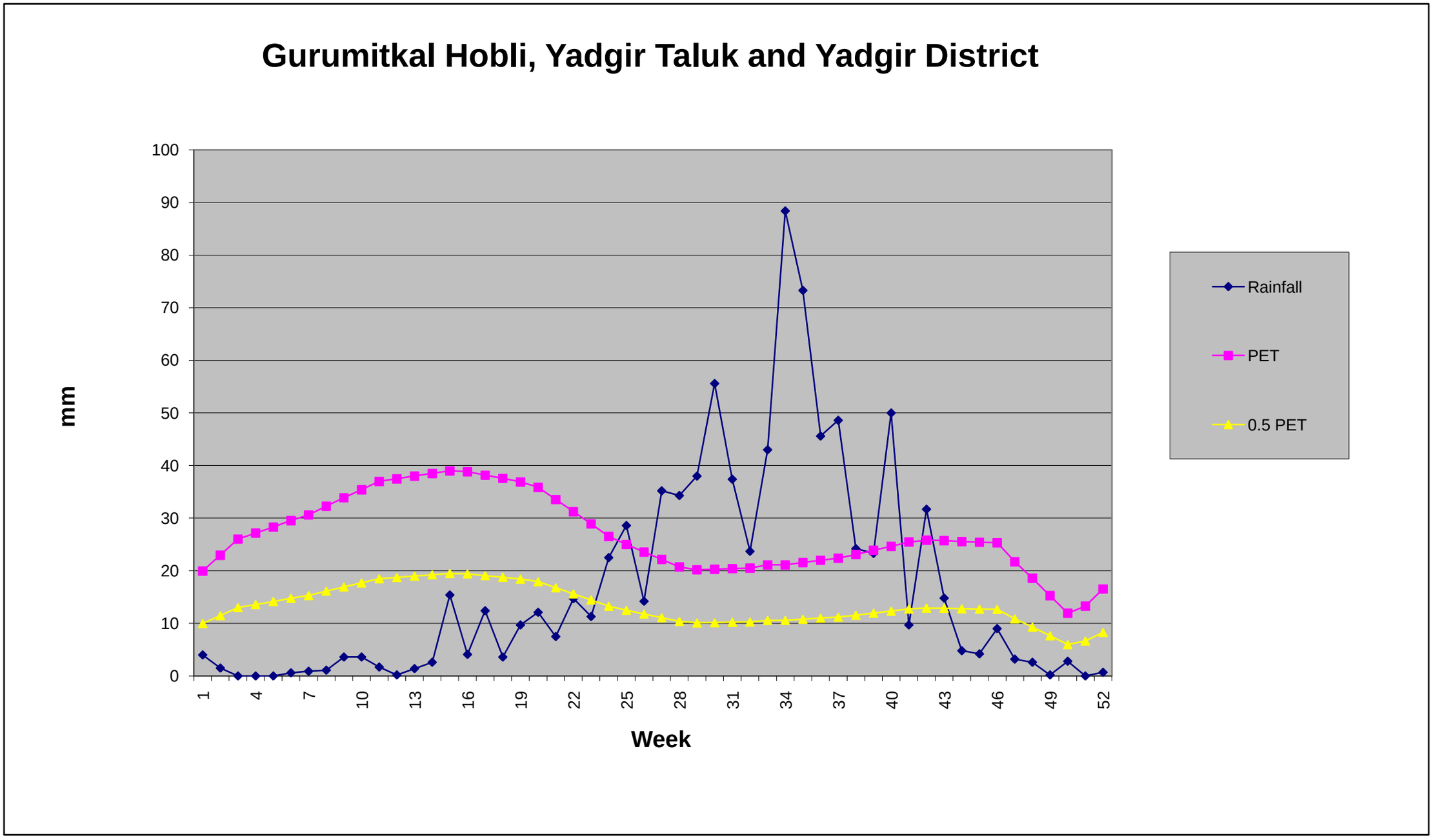


Agro Ecological Sub Region (AESR) 6.2: Central and Western Maharashtra Plateau and North Karnataka Plateau and North Western Telangana Plateau, hot moist semi-arid ESR with shallow and medium loamy to clayey Black soils (medium and deep clayey Black soils as inclusion), medium to high AWC and LGP 120-150 days.

Agro-climatic Zone 2: North-eastern Dry Zone: The total geographic area of this zone is about 1.76 M ha covering 8 taluks of Gulbarga district and 3 taluks of Raichur. Net cultivated area in the zone is about 1.31 M ha of which about 0.09 M ha are irrigated. The mean elevation of the zone is 300-450 m MSL. The main soil type is deep to very deep soils with small pockets of shallow to medium black soils. The zone is cropped predominantly during rabi due to insufficient rainfall (465-785 mm). The principal crops of the zone are jowar, bajra, oilseeds, pulses, cotton and sugarcane.

NOTE: In this Sub-Watershed, Land Resource Inventory (LRI) was generated for one micro-watershed (Budar–4D2D6F1a) among the eight micro-watersheds.

Climate

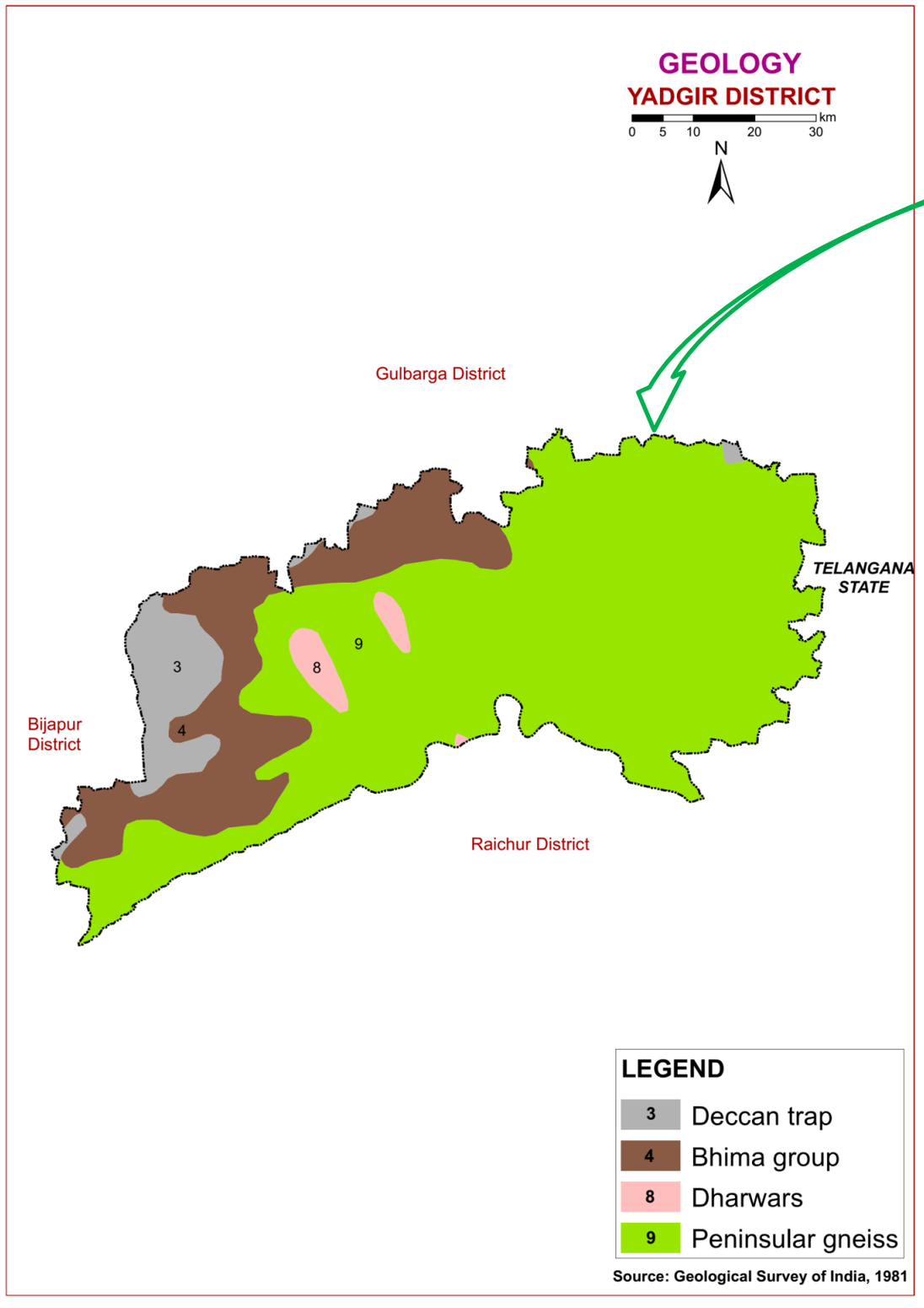


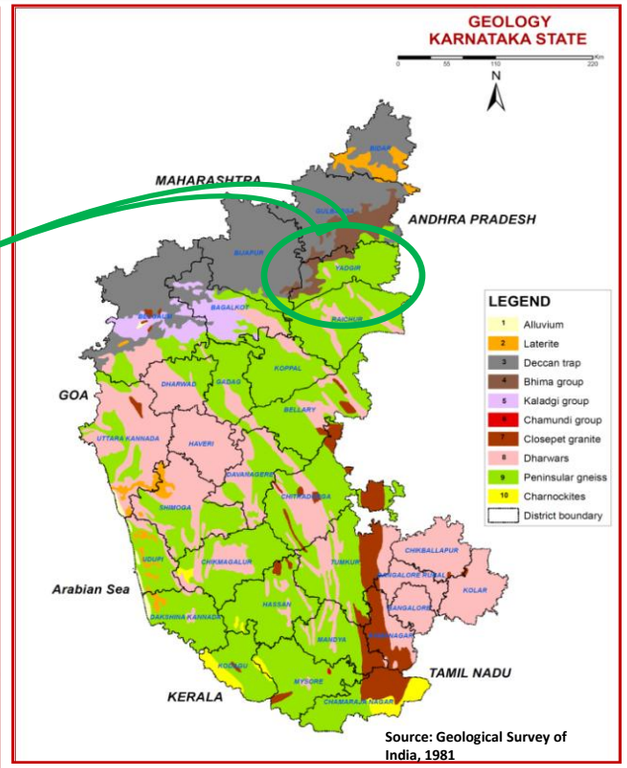
Length of Growing Period (LGP) is varying from June 4th week to 3rd week of October (120 - 150 days)

Annual Rainfall : 882 mm. in the Gurumitkal Hobli, Yadgir Taluk & District

Source: KSNDMC (1980-2011)

Geology





GEOLOGY - KARNATAKA STATE

Karnataka forms part of the Peninsular Shield, which is an ancient stable block of the earth's crust. The shield is composed of geologically ancient rocks of diverse origin. These rocks have undergone various degrees of metamorphism and crushing. Overlying these ancient rocks are Proterozoic, lete Creteceous to Palaeocene, Palaeocene to Recent, and Recent sediments.

In the stratigraphic succession of rocks in Karnataka the Archaean group is the oldest, followed by Proterozoic, Mesozoic and Cainozoic formations.

GEOLOGY - YADGIR DISTRICT

Mesozoic Group

Towards the end of the Cretaceous Period there was tremendous volcanic activity in the Peninsular part of India with eruption of a series of lava flows which came out through fissures and cracks. This formation is Known as the Deccan Trap.

Deccan Trap: The Deccan Trap covers an area of 25,000 sq. km. Eight lava flows have been identified in Karnataka, horizontally overlying the older formations. The thickness of the individual flows averages about five metres. The Deccan Trap is relatively uniform in petrographic character. The most common type is augite basalt. Dominant colour is greyish green; texture ranges from cryptocrystalline to glassy. The rock is often visicular and scoriaceous.

Upper Proterozoic Group

Formations of the Upper Proterozoic in Karnataka are closepet granites, Chamundi granites, Kaladgi series and Bhima series.

Bhima series

This series, equivalent to the Kurnool formations, is named after the Bhima river and occurs in Bijapur and Gulbarga districts. It covers an area of about 4200 sq. km and is overlain by the Deccan trap. The group consists of horizontal, unfossiliferous, unmetamorphosed sedimentary rocks such as sandstones, green, purple and black shales, and cream and bluish limestones. The thickness is about 400 metres.

Dharwar schists

The Dharwar schists consist of a complex series of crystalline schists associated with ultrabasic rocks such as amphibolite, peridotites and dunites. These schists are found in long, narrow bands of various dimensions running NW-SE through the Peninsular Gneiss. The Dharwars are divided into Upper and Lower.

Upper Dharwars are equivalent to the Archaean to Lower Proterozoic, and are divided into Bababudan.

Lower Dharwars occur in Mysore district and include amphibolite schist, quartzite, ironstone and marble.

Peninsular Gneiss

Exposed over a large area of Karnataka in all the districts except Bidar is the Peninsular Gneiss which is a heterogeneous mixture of several types of granitic rocks such as banded gneisses, granitic gneisses, granites and gneissic granites, granodiorites and diorites. The banded gneisses consist of white bands of quartz-feldspar alternating with dark bands of biotite, hornblende, and minor accessories. The granite group includes granites of all shades with varying composition. Peninsular gneiss seems to have formed by the granitization of the older rocks.

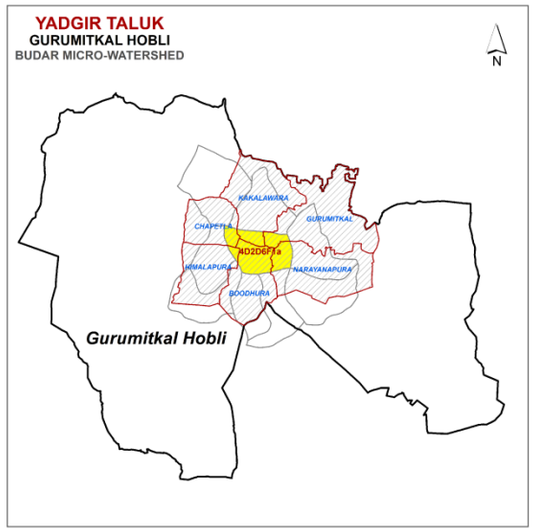
SURVEY METHODOLOGY

Sequence of activities in generation of LRI

- Traversing the watershed using cadastral maps and imagery as base
- Identifying landforms, geology, land use and other features
- Selecting fields representing land units
- Opening profiles to 2 m depth
- Studying soil and site characteristics
- Grouping similar areas based on their soil-site characteristics into land management units
- Preparation of crop, soil and water conservation plan
- Socio-economic evaluation

The required site and soil characteristics are described and recorded on a standard proforma by following the protocols and guidelines given in the soil survey manual and field guide. Collection of soil samples from representative pedons for laboratory characterization and collection of surface soil samples from selected fields covering most of the management units for macro and micro-nutrient analysis is being carried out (320m grid intervals). Further processing of data at chemical lab and GIS lab are carried out to generate various thematic maps for each of the study area.

3. DATA BASE USED



Budar Micro-watershed
(4D2D6F1a : Area - 645.74 ha)
Gurumitkal Hobli
YADGIR TALUK & DISTRICT

0 0.25 0.5 1 km

N

CHAPETLA

KAKALAWARA

GURUMITKAL

Chapetla

Kakalawara

Gurumitkal

Himalapura

HIMALAPURA

Boodhura

BOODHURA

Narayanapura

NARAYANAPURA

References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Source: ICAR-NBSS&LUP, Bengaluru

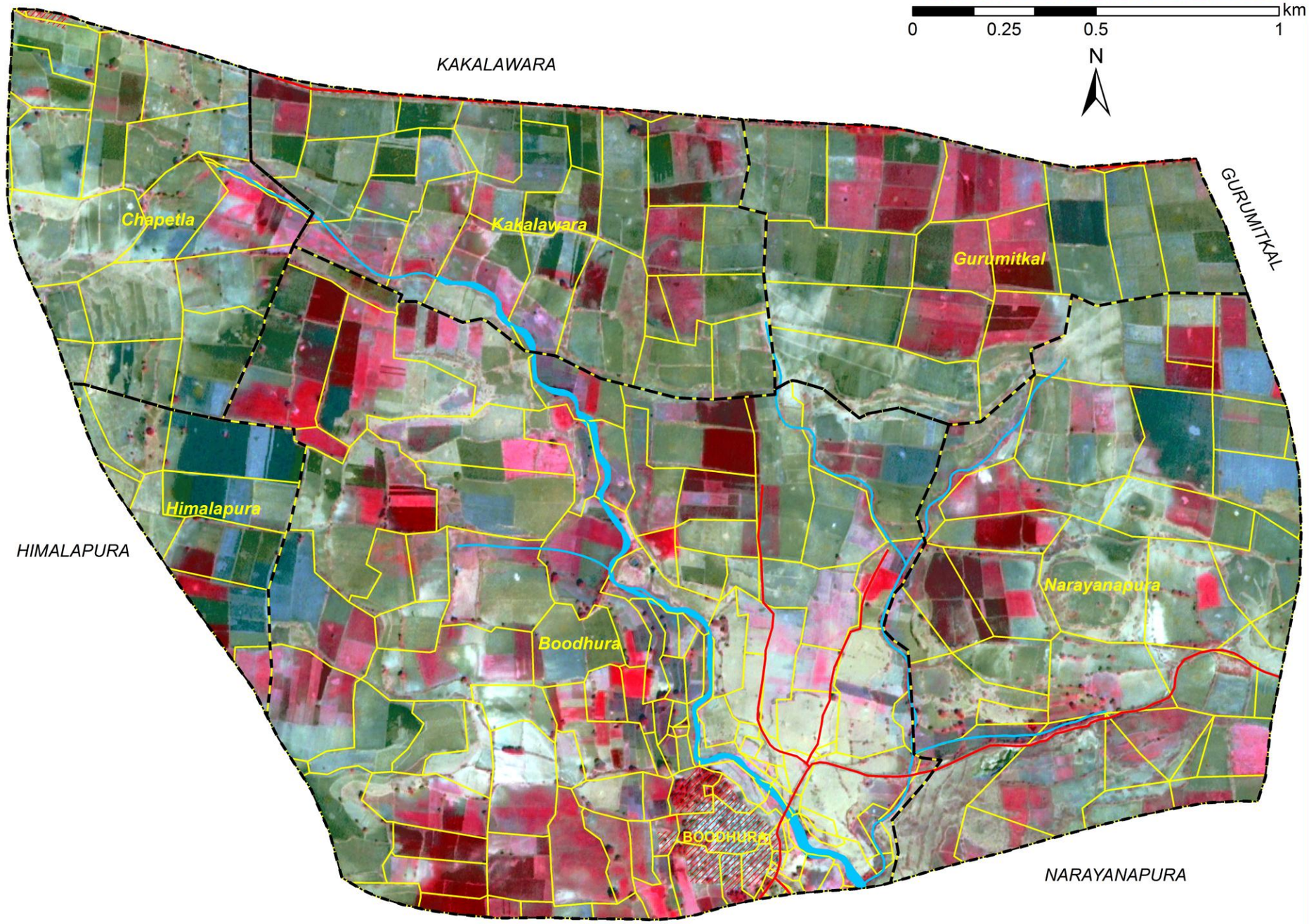
SATELLITE IMAGE

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- Land parcel
- Village boundary
- Micro-watershed boundary

Source : Cartosat 1 Imagery

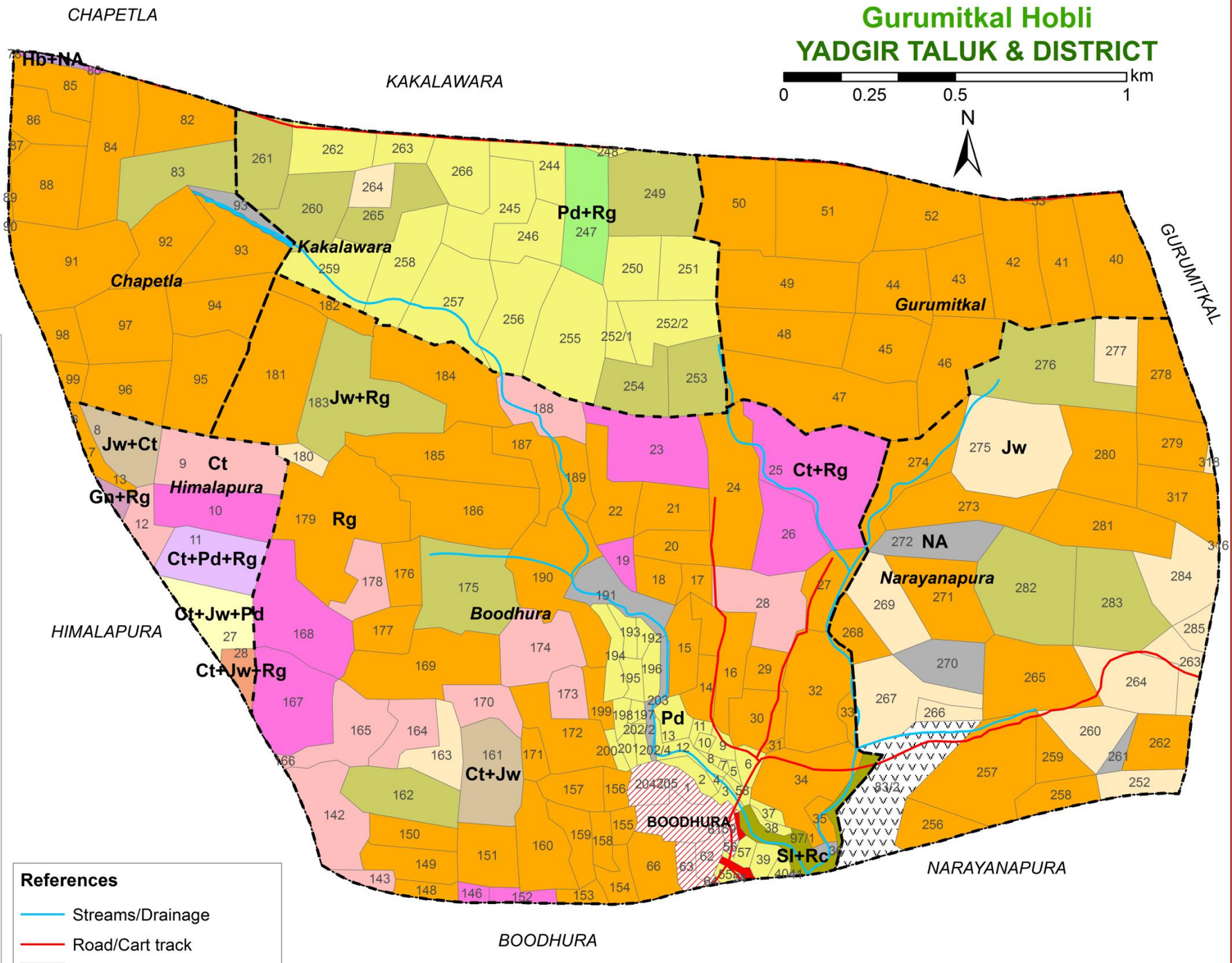
CURRENT LANDUSE (2018)

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



Current LandUse

- Cotton (Ct)
- Jowar (Jw)
- Paddy (Pd)
- Redgram (Rg)
- Cotton+Jowar (Ct+Jw)
- Cotton+Redgram (Ct+Rg)
- Groundnut+Redgram (Gn+Rg)
- Habitation+Not Available(Hb+NA)
- Jowar+Redgram (Jw+Rg)
- Paddy+Redgram (Pd+Rg)
- Cotton+Jowar+Paddy (Ct+Jw+Pd)
- Cotton+Jowar+Redgram (Ct+Jw+Rg)
- Cotton+Paddy+Redgram (Ct+Pd+Rg)
- Scrub land+Rockout crop (Sl+Rc)
- Rock outcrops (Rc)
- Road
- Habitation
- Waterbody
- Not Available (NA)

References

- Streams/Drainage
- Road/Cart track
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Source: ICAR-NBSS&LUP, Bengaluru

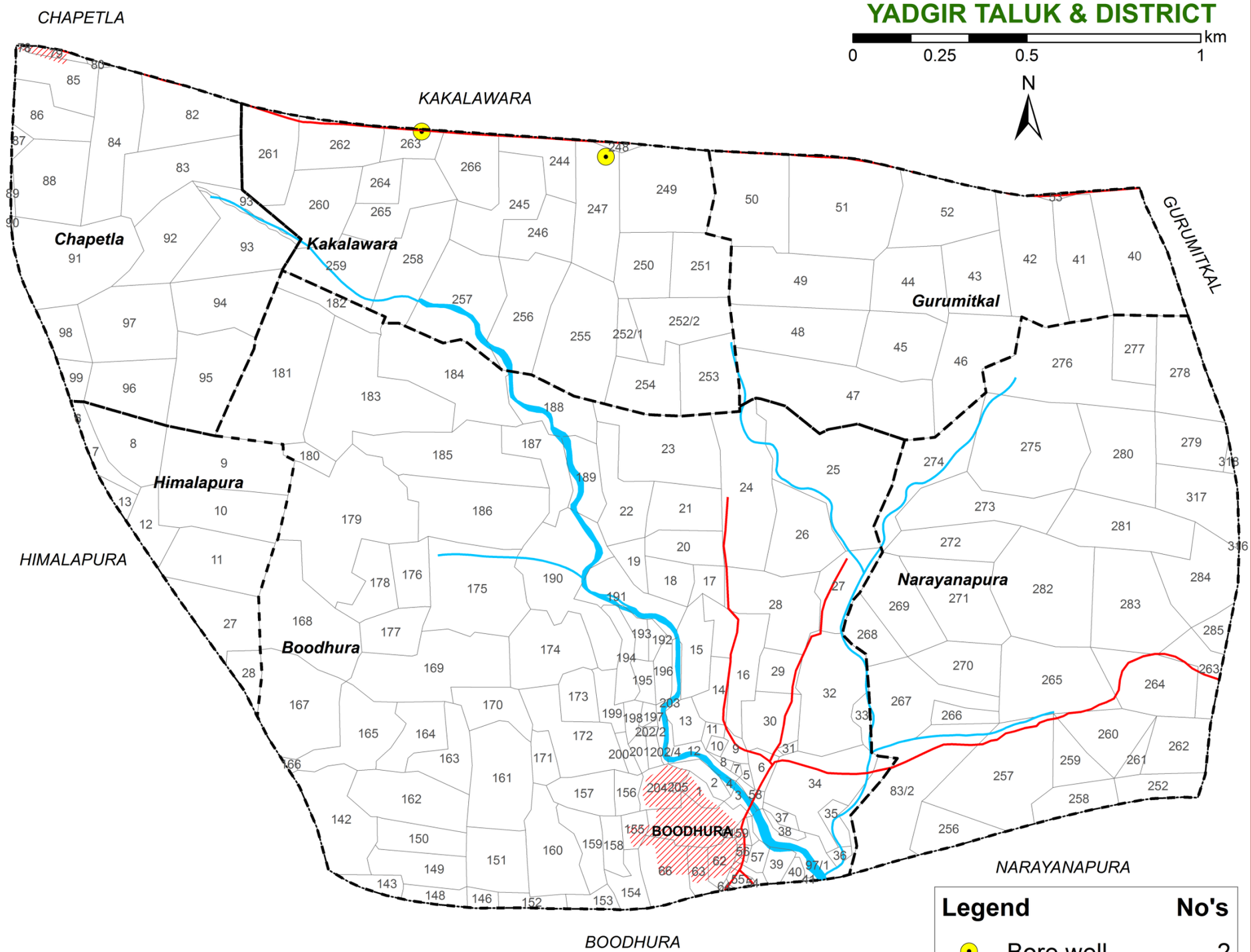
LOCATION OF WELLS

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Legend	No's
Bore well	2

Source: ICAR-NBSS&LUP, Bengaluru

4. THE SOILS

SOILS

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT

0 0.25 0.5 1 km

N

KAKALAWARA

CHAPETLA

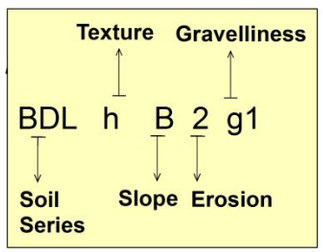
GURUMITKAL

NARAYANAPURA

BOODHURA

Soil Phase	Area in ha (%)
Soil of Granite and Granite Gneiss Landscape	
1.BDPiB2	38 (5.94)
118.BDPcB2	63 (9.81)
119.BDPiB3	28 (4.32)
5.BDLiB2	156 (24.08)
6.BDLiB3	20 (3.09)
162.BDLhB2g1	100 (15.53)
62.BMNmB2	62 (9.66)
159.BMNmA1	21 (3.29)
161.HTKbB2g1	42 (6.48)
49.NGPmB2	1 (0.2)
146.NGPmB2g1	88 (13.55)
152.JNKmB2	15 (2.29)
Others*	11 (1.75)

* - Habitation & Waterbody



KEY

TEXTURE
b – Loamy sand
c – Sandy loam
h – Sandy clay loam
i – Sandy clay
m – Clay

SLOPE
A- Nearly level (0-1%)
B – Very gently sloping (1-3%)

EROSION
1 - Slight
2 – Moderate

GRAVELLINESS
g1 - Gravelly (15-35 %)

DEPTH
BDP-Very shallow (<25 cm)
BDL,HTK - Shallow (25-50 cm)
JNK - Moderately shallow (50-75 cm)
NGP- Deep (100-150cm)
BMN - Very deep (>150 cm)

References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Source: ICAR-NBSS&LUP, Bengaluru

Mapping unit description of Budar (4D2D6F1a) Micro-watershed in Yadgir taluk, Yadgir district

*Soil map unit No.	Soil Series	Soil Phase	Mapping Unit Description	Area in ha (%)
Soils of Granite and Granite Gneiss Landscape				
	BDP	Baddeppalli soils are very shallow (<25 cm), well drained, have dark brown to dark reddish brown, calcareous sandy clay loam soils occurring on very gently sloping uplands under cultivation		**129 (20.07)**
118		BDPcB2	Sandy loam surface, slope 1-3%, moderate erosion	63 (9.81)
1		BDPiB2	Sandy clay surface, slope 1-3%, moderate erosion	38 (5.94)
119		BDPiB3	Sandy clay surface, slope 1-3%, severe erosion	28 (4.32)
	HTK	Hattikuni soils are shallow (25-50 cm), well drained, have dark yellowish brown sandy loam soils occurring on very gently sloping uplands under cultivation		**42 (6.48)**
161		HTKbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	42 (6.48)
	BDL	Badiyala soils are shallow (25-50 cm), well drained, have dark brown to very dark brown and dark yellowish brown, slightly calcareous sandy loam soils occurring on very gently to gently sloping uplands under cultivation		**176 (42.7)**
162		BDLhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	100 (15.53)
5		BDLiB2	Sandy clay surface, slope 1-3%, moderate erosion	156 (24.08)
6		BDLiB3	Sandy clay surface, slope 1-3%, severe erosion	20 (3.09)
	JNK	Jinkera soils are moderately shallow (50-75 cm), well drained, have dark brown to very dark grayish brown, slightly calcareous sandy clay loam soils occurring on very gently sloping uplands under cultivation		**15 (2.29)**
152		JNKmB2	Clay surface, slope 1-3%, moderate erosion	15 (2.29)
	NGP	Nagalapur soils are deep (100-150 cm), moderately well drained, have very dark gray to very dark grayish brown, black calcareous cracking clay soils occurring on very gently sloping uplands under cultivation		**89 (13.7)**
49		NGPmB2	Clay surface, slope 1-3%, moderate erosion	1 (0.2)
146		NGPmB2g1	Clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	88 (13.55)
	BMN	Bhimanahalli soils are very deep (>150 cm), moderately well drained, have very dark gray, calcareous cracking clay black soils occurring on nearly level to very gently sloping uplands under cultivation		**83 (12.95)**
159		BMNmA1	Clay surface, slope 0-1%, slight erosion	21 (3.29)
62		BMNmB2	Clay surface, slope 1-3%, moderate erosion	62 (9.66)
1000		Others	Habitation and water body	**11 (1.75)**

* Soil map unit numbers are continuous for the taluk, not for the micro-watershed

5. SOIL SURVEY INTERPRETATIONS

LAND CAPABILITY

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT

0 0.25 0.5 1 km

N

CHAPETLA KAKALAWARA GURUMITKAL HIMALAPURA NARAYANAPURA BOODHURA

IIIes IIes IIs IVs IVes

References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Capability subclass	Area in ha (%)
IIes	166 (25.71)
IIs	21 (3.29)
IIIes	318 (49.18)
IVes	91 (14.13)
IVs	38 (5.94)
Others*	11 (1.75)

* - Habitation & Waterbody

Key

II - Good cultivable land
III - Moderately good cultivable lands
IV - Fairly good cultivable lands

Limitations

e - erosion limitation
s - soil limitation
(depth, gravelliness, texture, salinity/alkalinity)

Source: ICAR-NBSS&LUP, Bengaluru

SOIL DEPTH

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT

0 0.25 0.5 1 km

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CHAPETLA

KAKALAWARA

GURUMITKAL

HIMALAPURA

BOODHURA

NARAYANAPURA

Chapetla

Kakalawara

Gurumitkal

Himalapura

Boodhura

Narayanapura

BOODHURA

References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Depth Class	Area in ha (%)
Very shallow (<25 cm)	130 (20.07)
Shallow (25-50 cm)	318 (49.18)
Moderately shallow (50-75 cm)	15 (2.29)
Deep (100-150 cm)	89 (13.76)
Very deep (>150 cm)	84 (12.95)
Others*	11 (1.75)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

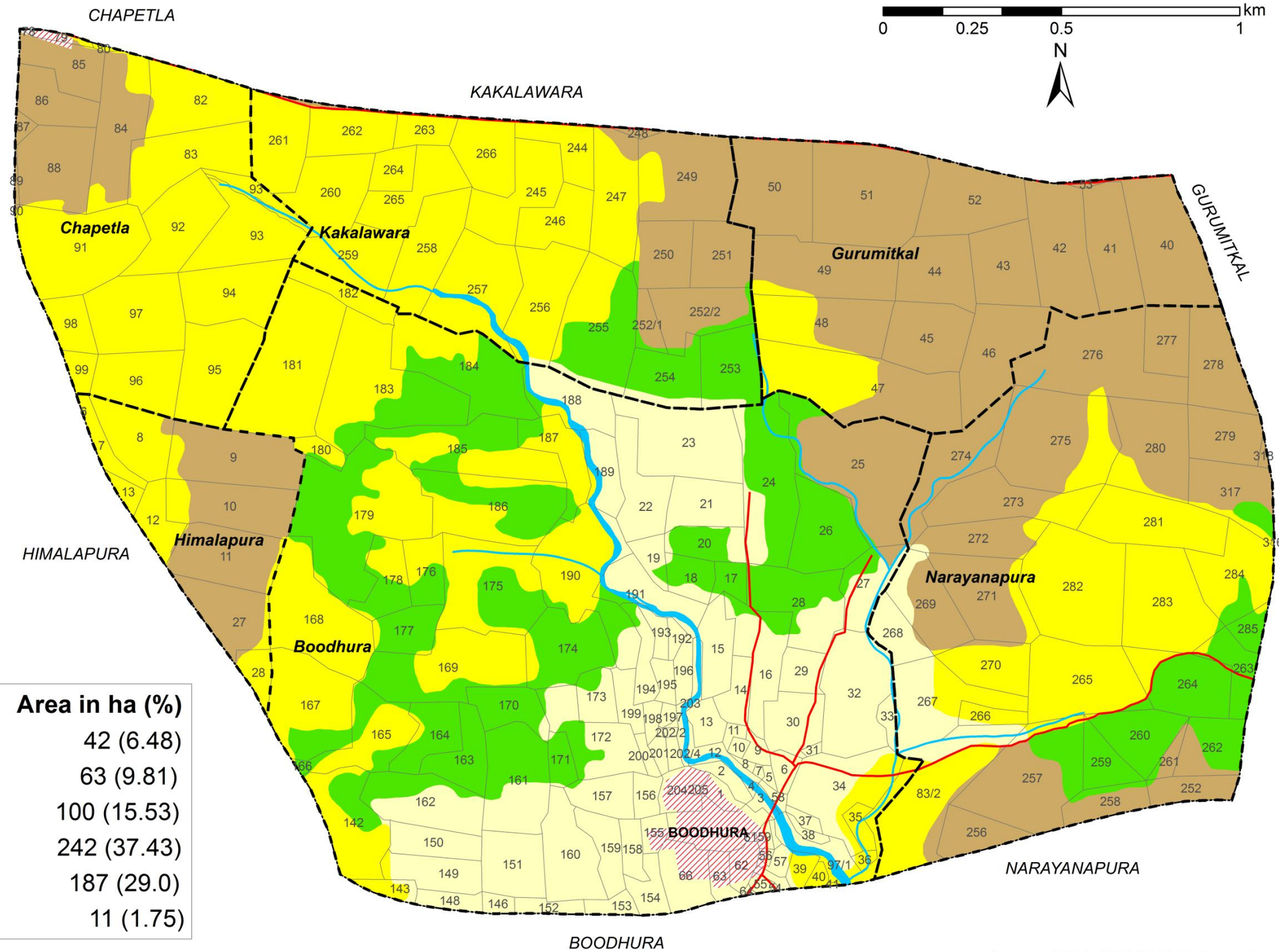
SURFACE SOIL TEXTURE

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Texture Class	Area in ha (%)
Loamy sand	42 (6.48)
Sandy loam	63 (9.81)
Sandy clay loam	100 (15.53)
Sandy clay	242 (37.43)
Clay	187 (29.0)
Others*	11 (1.75)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

SOIL GRAVELLINESS

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT

0 0.25 0.5 1 km

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Gurumitkal

Himalapura

Boodhura

Narayanapura

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References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Gravelly Class	Area in ha (%)
Non gravelly (<15%)	405 (62.69)
Gravelly (15-35%)	230 (35.56)
Others*	11 (1.75)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

AVAILABLE WATER CAPACITY

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT

0 0.25 0.5 1 km

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Kakalawara

Gurumitkal

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Narayanapura

Boodhura

BOODHURA

References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Available Water Capacity	Area in ha (%)
Very low (<50 mm/m)	447 (69.25)
Low (51-100 mm/m)	15 (2.29)
Very high (>200 mm/m)	172 (26.71)
Others*	11 (1.75)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

SLOPE

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT

0 0.25 0.5 1 km

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Boodhura

BOODHURA

Narayanapura

NARAYANAPURA

References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Slope Class	Area in ha (%)
Nearly level (0-1%)	21 (3.29)
Very gently sloping (1-3%)	613 (94.96)
Others*	11 (1.75)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

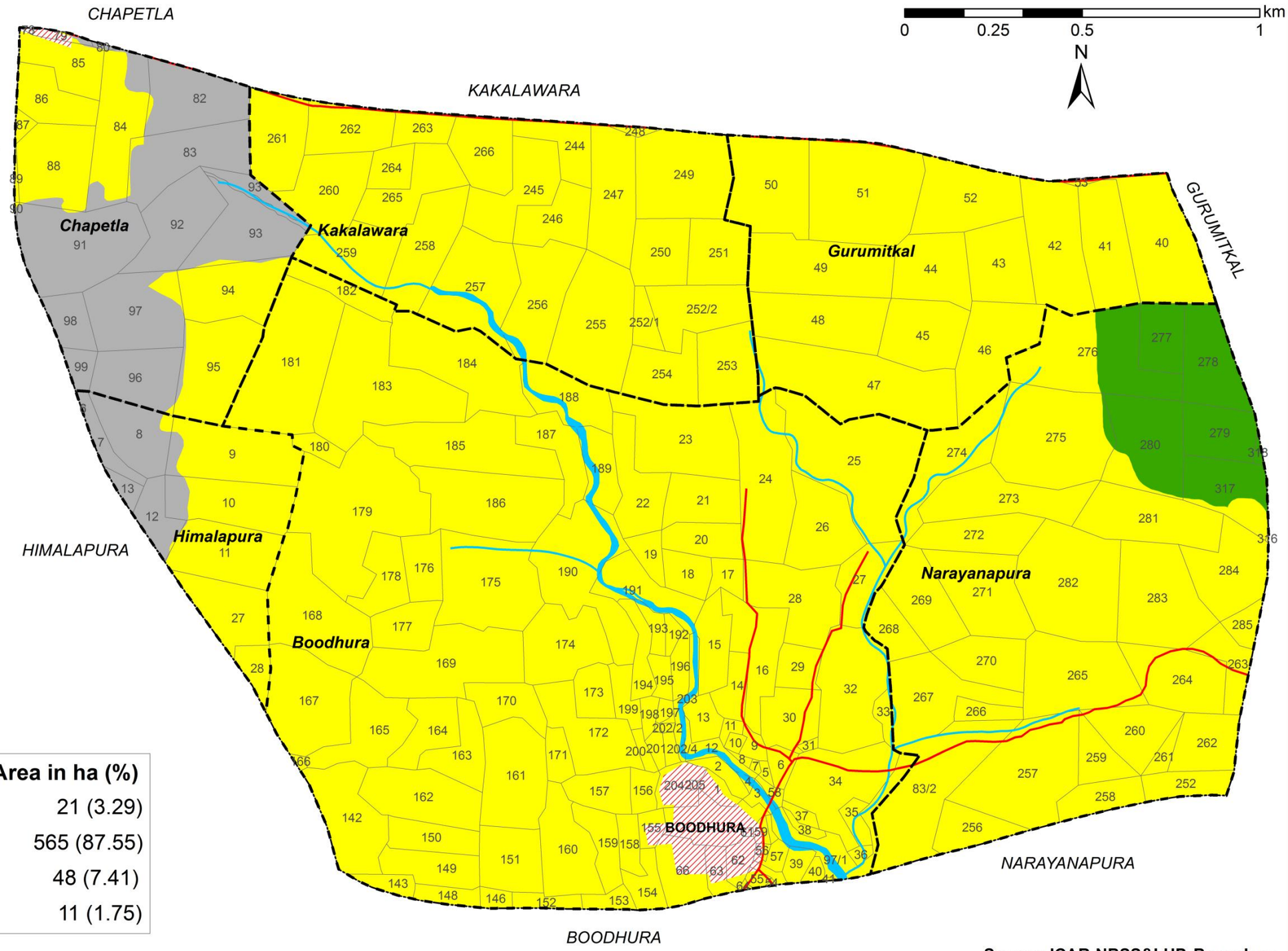
SOIL EROSION

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Erosion Class	Area in ha (%)
Slight	21 (3.29)
Moderate	565 (87.55)
Severe	48 (7.41)
Others*	11 (1.75)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

6. SOIL FERTILITY STATUS

SOIL REACTION (pH) (2018)

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT

0 0.25 0.5 1 km

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Himalapura

Boodhura

Narayanapura

BOODHURA

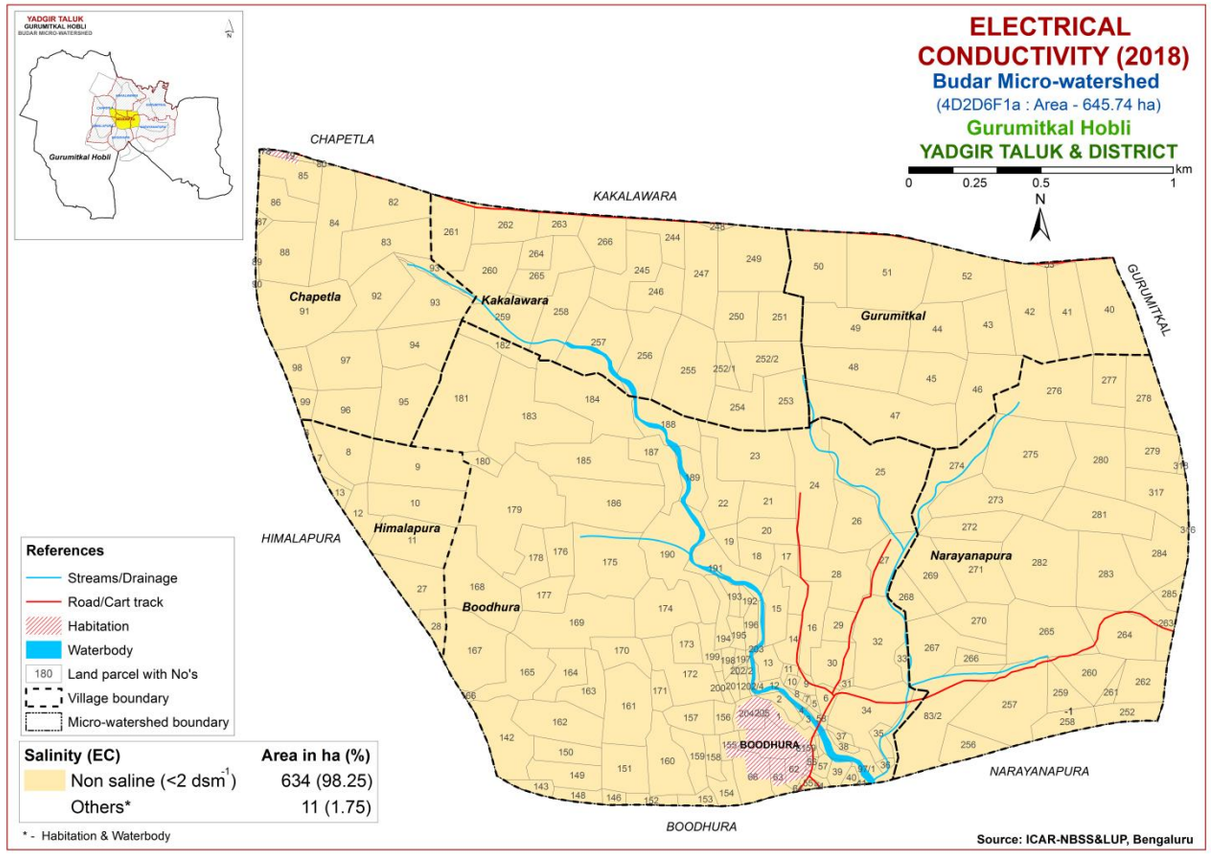
References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Reaction Class	Area in ha (%)
Neutral (pH 6.5 – 7.3)	467 (72.29)
Slightly alkaline (pH 7.3 – 7.8)	168 (25.96)
Others*	11 (1.75)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru


ELECTRICAL CONDUCTIVITY (2018)
Budar Micro-watershed
(4D2D6F1a : Area - 645.74 ha)
Gurumitkal Hobli
YADGIR TALUK & DISTRICT
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GURUMITKAL HOBLI
BUDAR MICRO-WATERSHED
Gurumitkal Hobli
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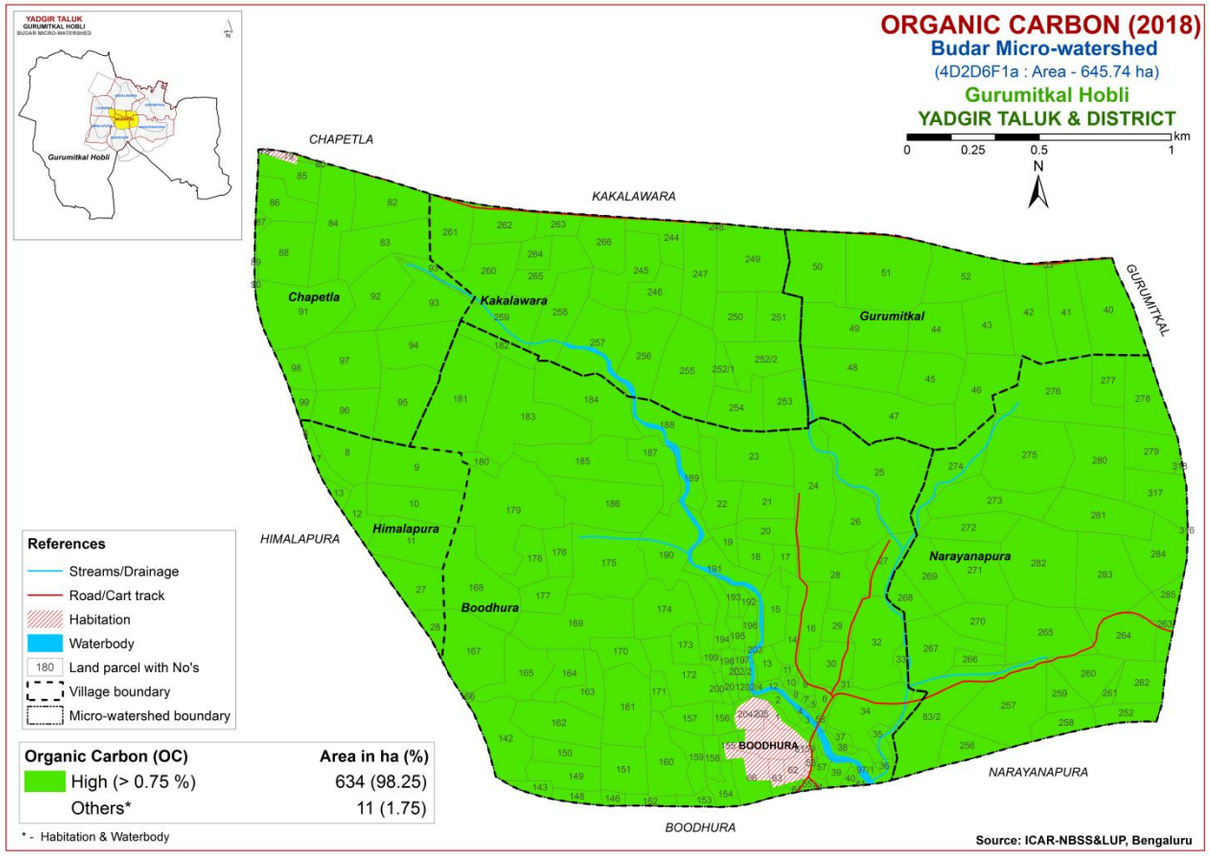
Gurumitkal
Himalapura
Boodhura
Narayanapura
BOODHURA
References
Streams/Drainage
Road/Cart track
Habitation
Waterbody
180 Land parcel with No's
Village boundary
Micro-watershed boundary
Salinity (EC)
Area in ha (%)
Non saline (<2 dsm-1)
634 (98.25)
Others*
11 (1.75)
* - Habitation & Waterbody
Source: ICAR-NBSS&LUP, Bengaluru


ORGANIC CARBON (2018)
Budar Micro-watershed
(4D2D6F1a : Area - 645.74 ha)
Gurumitkal Hobli
YADGIR TALUK & DISTRICT
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GURUMITKAL HOBLI
BUDAR MICRO-WATERSHED
Gurumitkal Hobli
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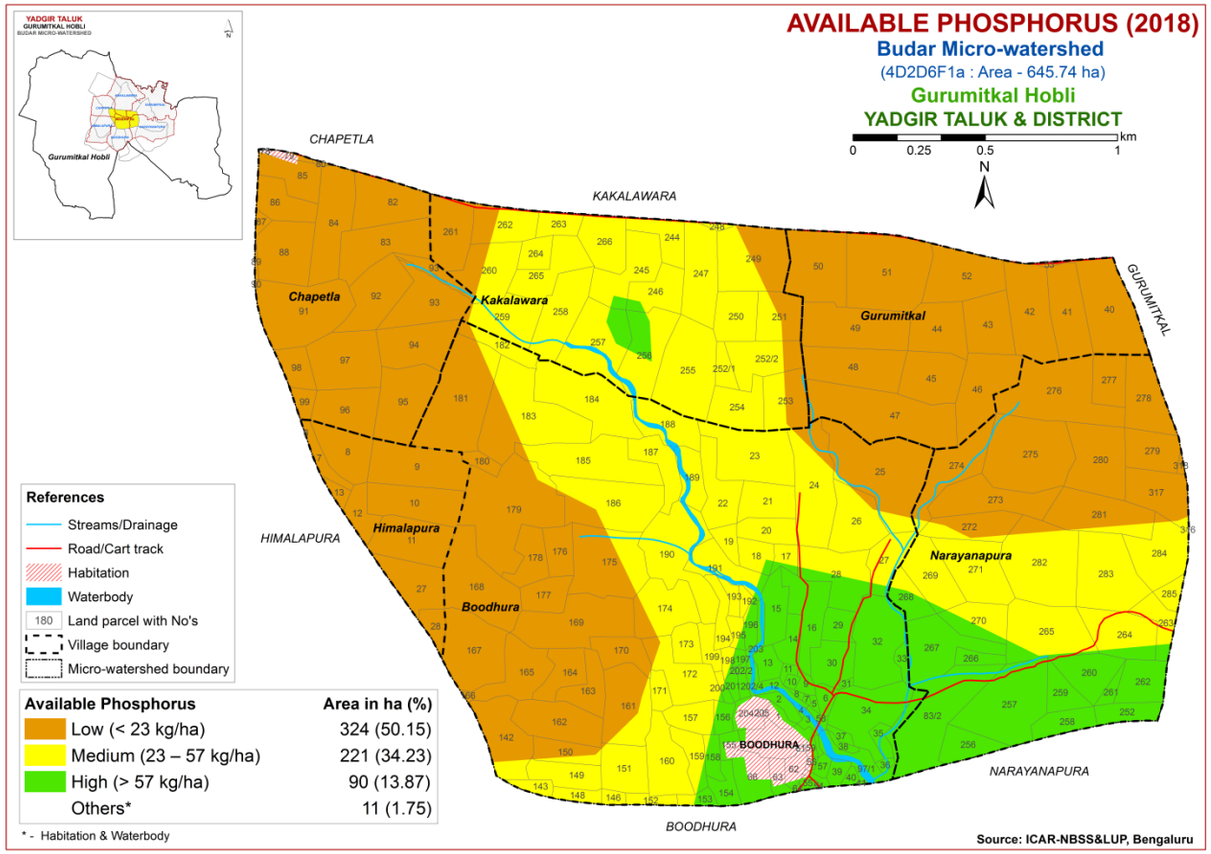
References
Streams/Drainage
Road/Cart track
Habitation
Waterbody
180 Land parcel with No's
Village boundary
Micro-watershed boundary
Organic Carbon (OC)
Area in ha (%)
High (> 0.75 %)
634 (98.25)
Others*
11 (1.75)
* - Habitation & Waterbody
Source: ICAR-NBSS&LUP, Bengaluru


AVAILABLE PHOSPHORUS (2018)
Budar Micro-watershed
(4D2D6F1a : Area - 645.74 ha)
Gurumitkal Hobli
YADGIR TALUK & DISTRICT
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BUDAR MICRO-WATERSHED
Gurumitkal Hobli
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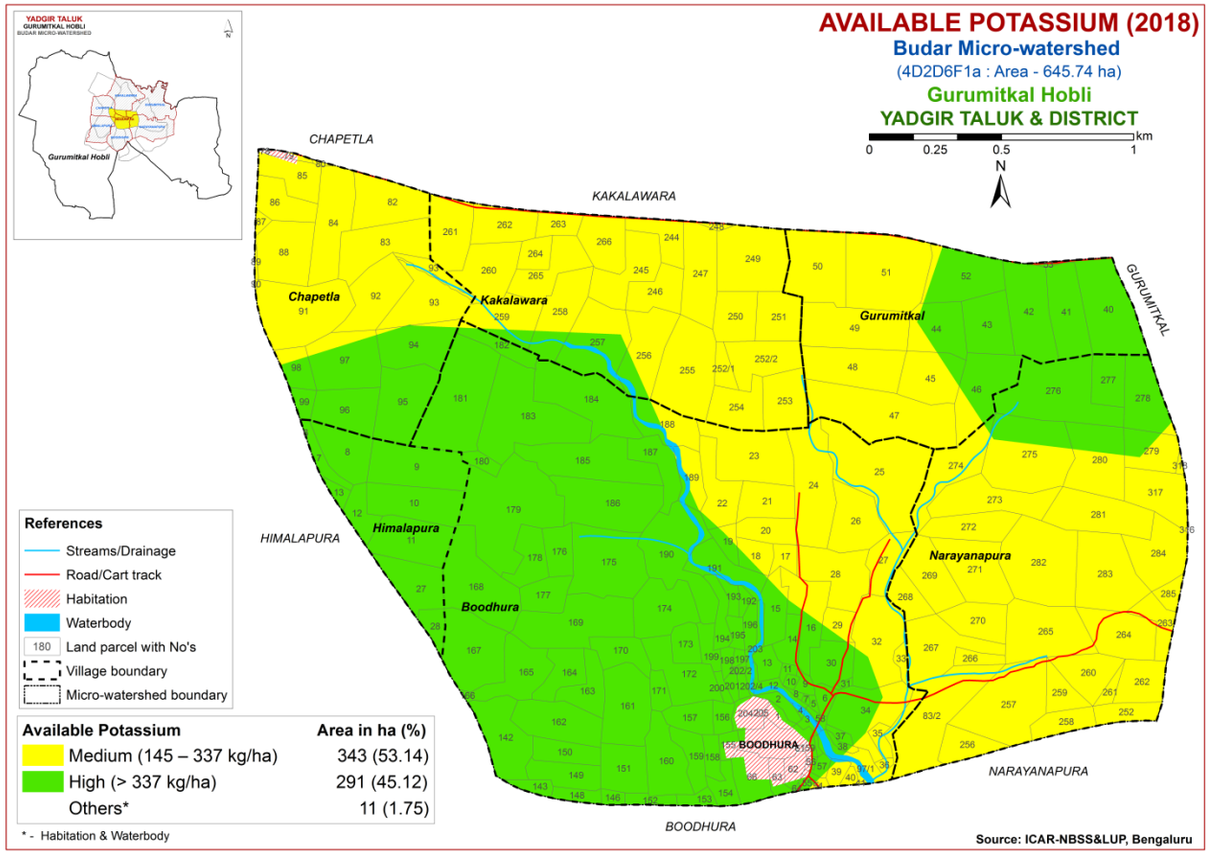
References
Streams/Drainage
Road/Cart track
Habitation
Waterbody
180 Land parcel with No's
Village boundary
Micro-watershed boundary
Available Phosphorus
Area in ha (%)
Low (< 23 kg/ha)
324 (50.15)
Medium (23 – 57 kg/ha)
221 (34.23)
High (> 57 kg/ha)
90 (13.87)
Others*
11 (1.75)
* - Habitation & Waterbody
Source: ICAR-NBSS&LUP, Bengaluru


AVAILABLE POTASSIUM (2018)
Budar Micro-watershed
(4D2D6F1a : Area - 645.74 ha)
Gurumitkal Hobli
YADGIR TALUK & DISTRICT
YADGIR TALUK
GURUMITKAL HOBLI
BUDAR MICRO-WATERSHED
Gurumitkal Hobli
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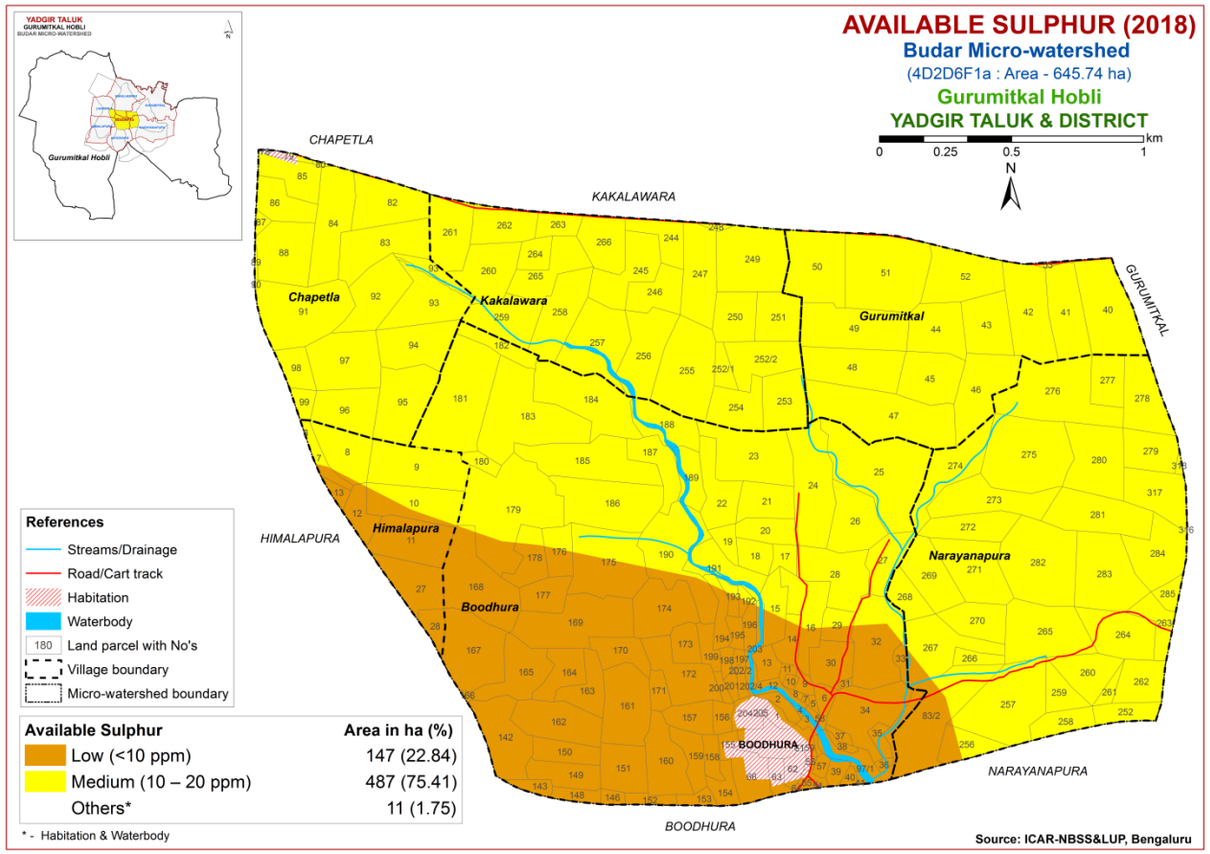
BOODHURA
References
Streams/Drainage
Road/Cart track
Habitation
Waterbody
180 Land parcel with No's
Village boundary
Micro-watershed boundary
Available Potassium
Area in ha (%)
Medium (145 – 337 kg/ha)
343 (53.14)
High (> 337 kg/ha)
291 (45.12)
Others*
11 (1.75)
* - Habitation & Waterbody
Source: ICAR-NBSS&LUP, Bengaluru


AVAILABLE SULPHUR (2018)
Budar Micro-watershed
(4D2D6F1a : Area - 645.74 ha)
Gurumitkal Hobli
YADGIR TALUK & DISTRICT
0 0.25 0.5 1 km
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GURUMITKAL HOBLI
BUDAR MICRO-WATERSHED
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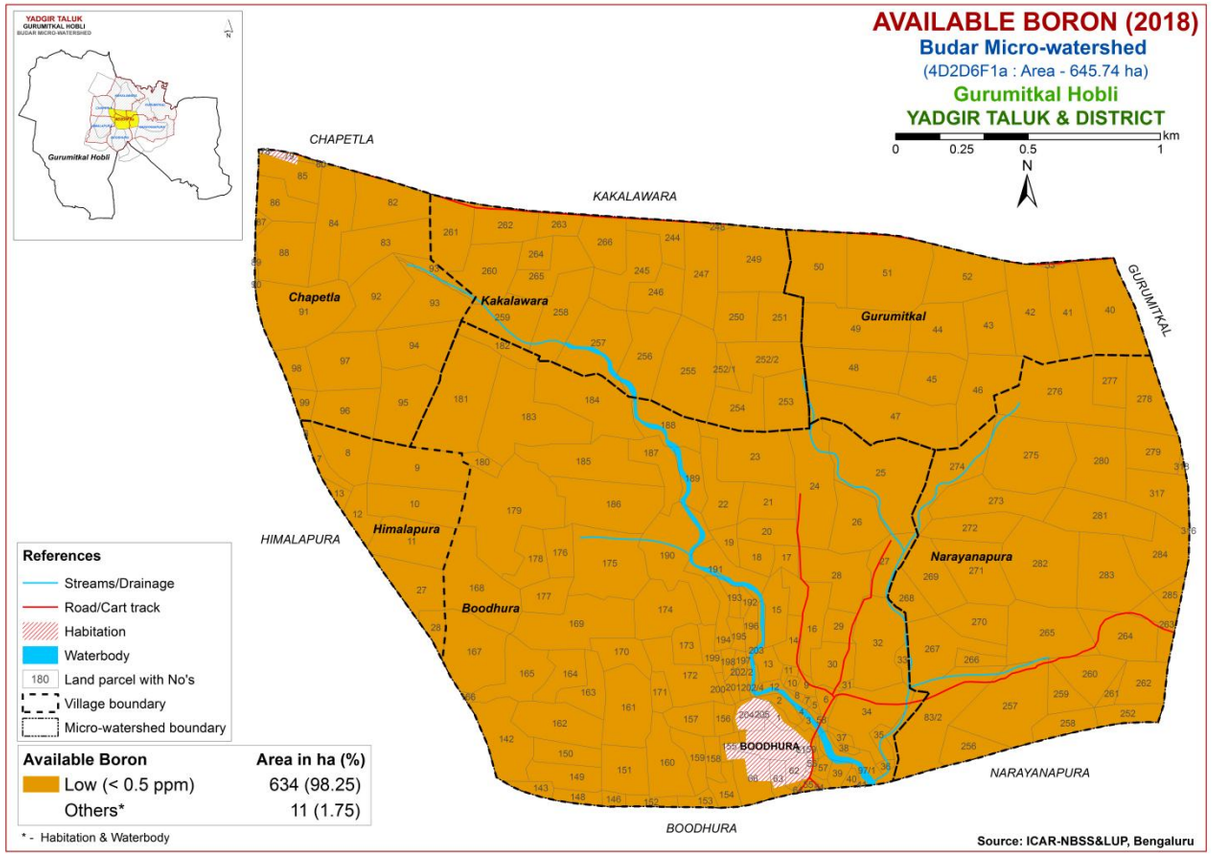
Gurumitkal
Himalapura
Boodhura
Narayanapura
References
Streams/Drainage
Road/Cart track
Habitation
Waterbody
180 Land parcel with No's
Village boundary
Micro-watershed boundary
Available Sulphur | Area in ha (%)
Low (<10 ppm) | 147 (22.84)
Medium (10 – 20 ppm) | 487 (75.41)
Others* | 11 (1.75)
* - Habitation & Waterbody
Source: ICAR-NBSS&LUP, Bengaluru


AVAILABLE BORON (2018)
Budar Micro-watershed
(4D2D6F1a : Area - 645.74 ha)
Gurumitkal Hobli
YADGIR TALUK & DISTRICT
0 0.25 0.5 1 km
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YADGIR TALUK
GURUMITKAL HOBLI
BUDAR MICRO-WATERSHED
Gurumitkal Hobli
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Chapetla
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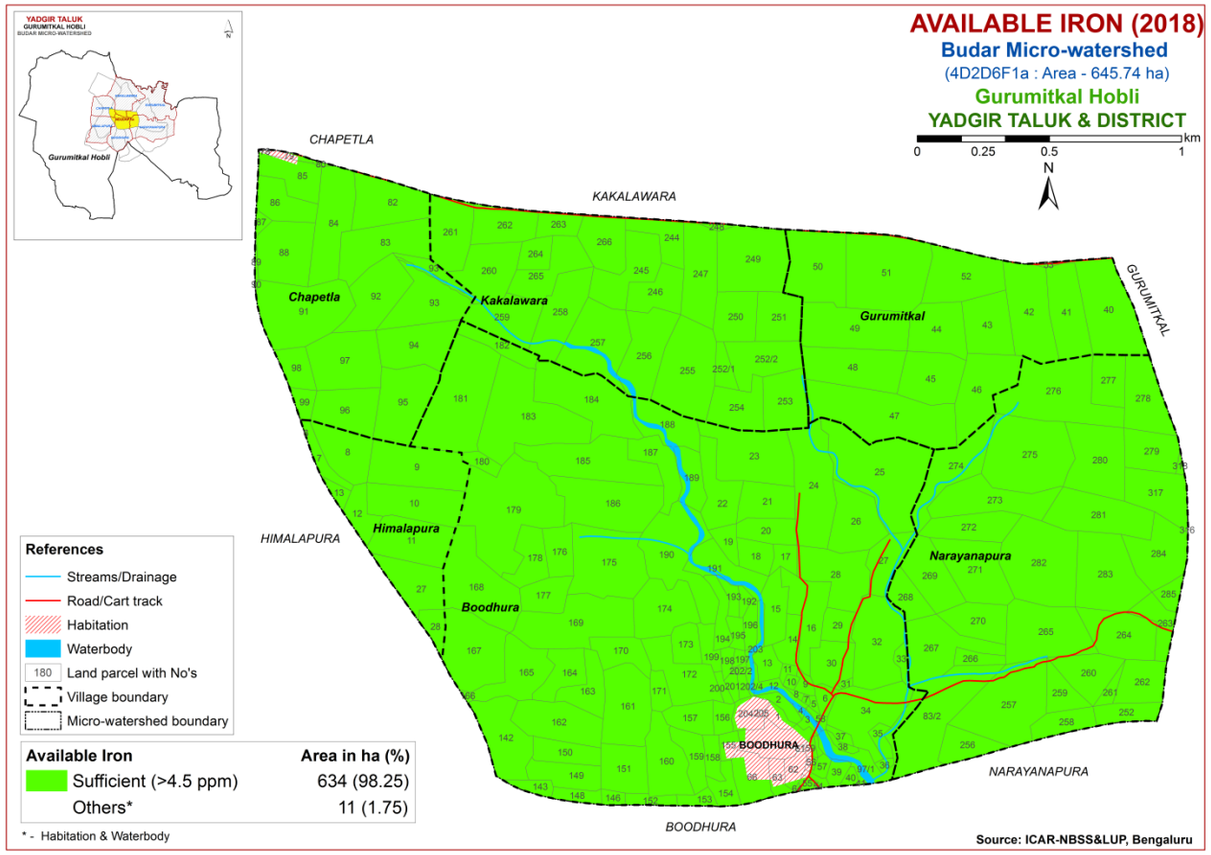
Gurumitkal
Himalapura
Boodhura
Narayanapura
References
Streams/Drainage
Road/Cart track
Habitation
Waterbody
180 Land parcel with No's
Village boundary
Micro-watershed boundary
Available Boron | Area in ha (%)
Low (< 0.5 ppm) | 634 (98.25)
Others* | 11 (1.75)
* - Habitation & Waterbody
Source: ICAR-NBSS&LUP, Bengaluru


AVAILABLE IRON (2018)
Budar Micro-watershed
(4D2D6F1a : Area - 645.74 ha)
Gurumitkal Hobli
YADGIR TALUK & DISTRICT
0 0.25 0.5 1 km
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YADGIR TALUK
GURUMITKAL HOBLI
BUDAR MICRO-WATERSHED
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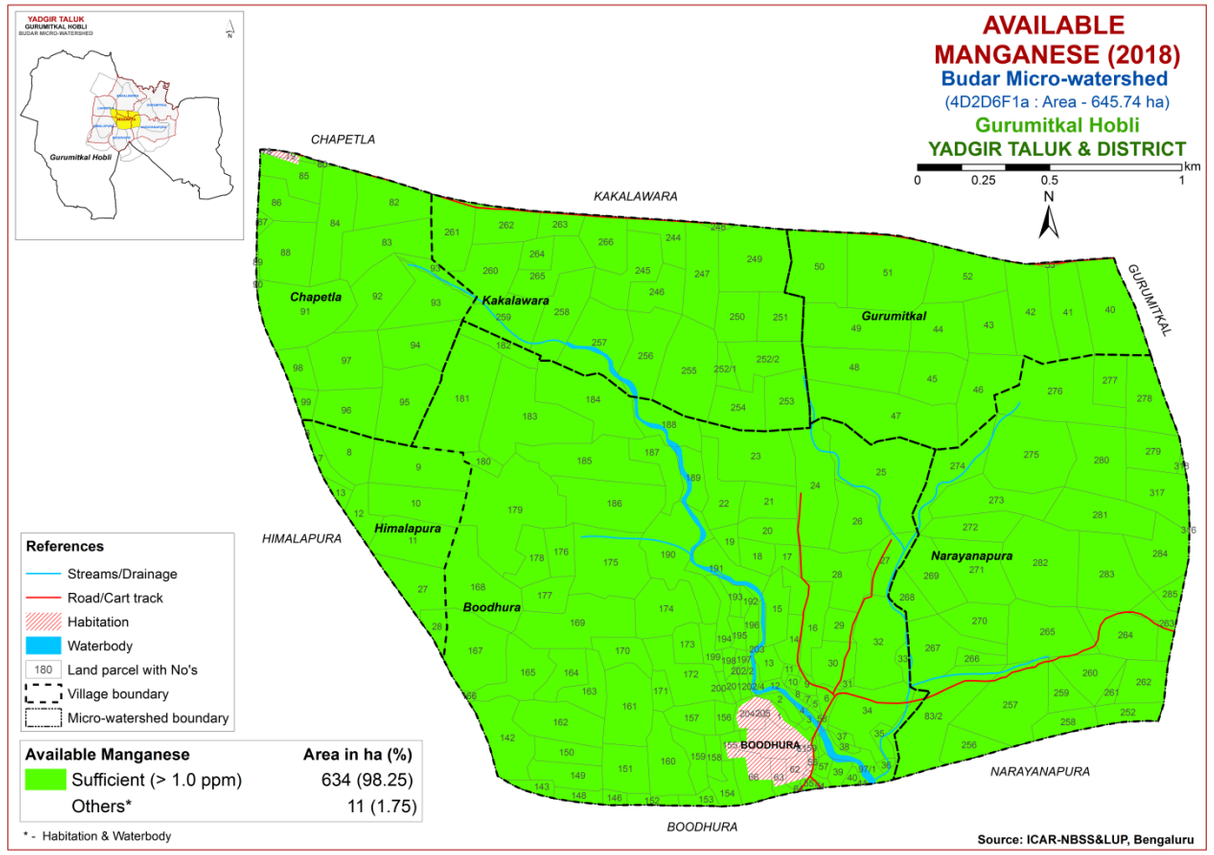
Himalapura
Boodhura
Narayanapura
References
Streams/Drainage
Road/Cart track
Habitation
Waterbody
180 Land parcel with No's
Village boundary
Micro-watershed boundary
Available Iron | Area in ha (%)
Sufficient (>4.5 ppm) | 634 (98.25)
Others* | 11 (1.75)
* - Habitation & Waterbody
Source: ICAR-NBSS&LUP, Bengaluru


AVAILABLE MANGANESE (2018)
Budar Micro-watershed
(4D2D6F1a : Area - 645.74 ha)
Gurumitkal Hobli
YADGIR TALUK & DISTRICT
0 0.25 0.5 1 km
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GURUMITKAL HOBLI
BUDAR MICRO-WATERSHED
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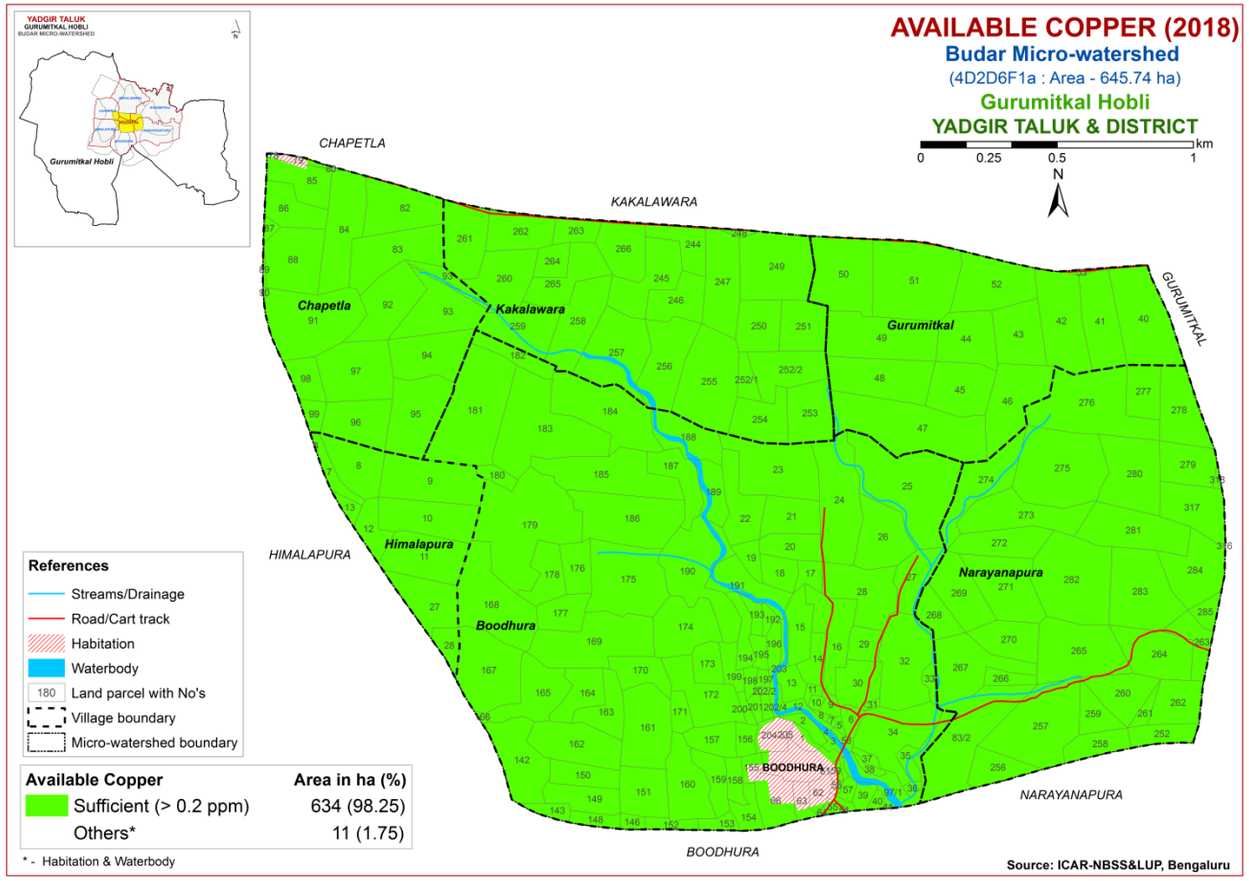
Himalapura
Boodhura
Narayanapura
References
Streams/Drainage
Road/Cart track
Habitation
Waterbody
180 Land parcel with No's
Village boundary
Micro-watershed boundary
Available Manganese | Area in ha (%)
Sufficient (> 1.0 ppm) | 634 (98.25)
Others* | 11 (1.75)
* - Habitation & Waterbody
Source: ICAR-NBSS&LUP, Bengaluru


AVAILABLE COPPER (2018)
Budar Micro-watershed
(4D2D6F1a : Area - 645.74 ha)
Gurumitkal Hobli
YADGIR TALUK & DISTRICT
0 0.25 0.5 1 km
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BUDAR MICRO-WATERSHED
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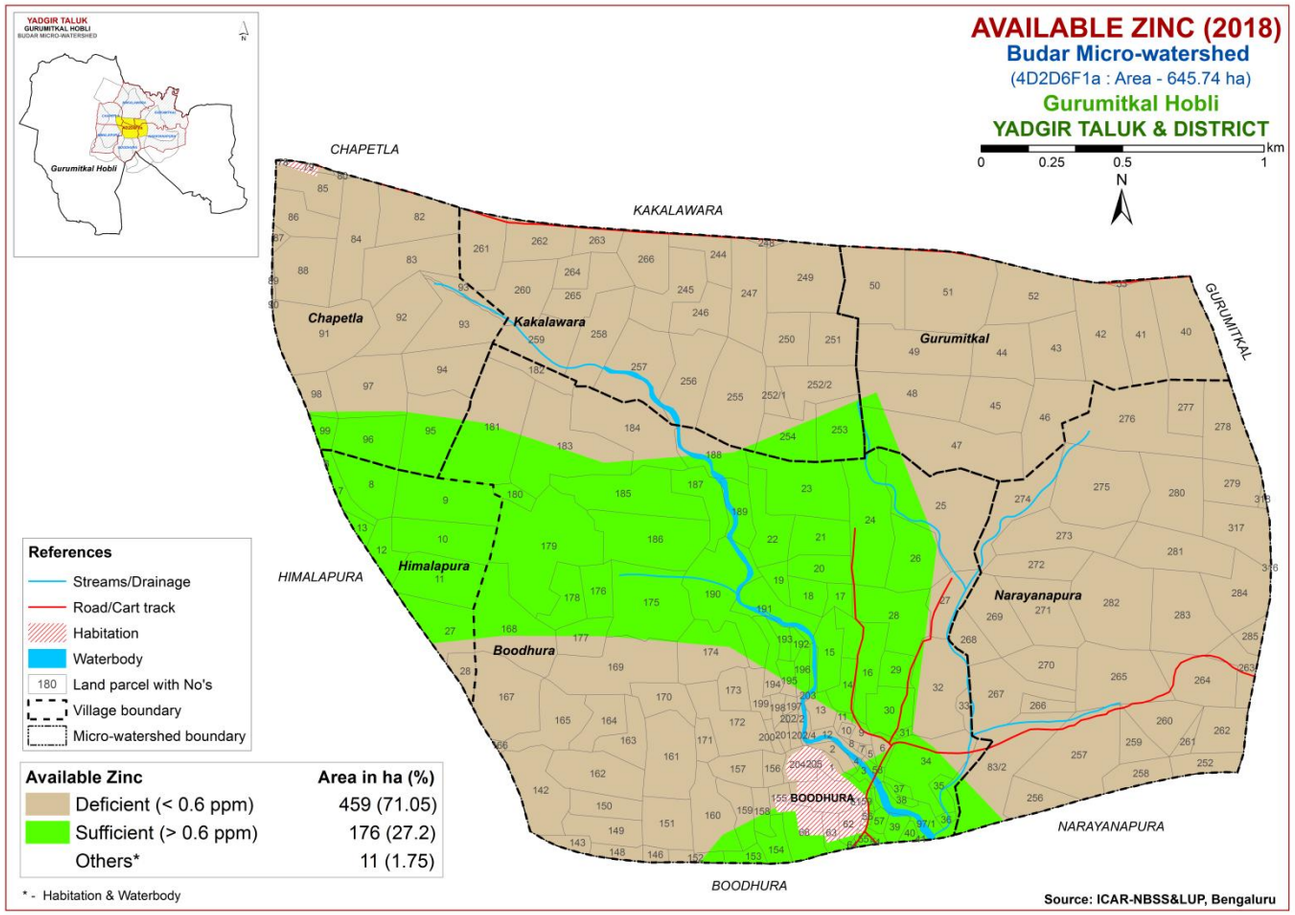
Himalapura
Boodhura
Narayanapura
References
Streams/Drainage
Road/Cart track
Habitation
Waterbody
180 Land parcel with No's
Village boundary
Micro-watershed boundary
Available Copper
Area in ha (%)
Sufficient (> 0.2 ppm) 634 (98.25)
Others* 11 (1.75)
* - Habitation & Waterbody
Source: ICAR-NBSS&LUP, Bengaluru


AVAILABLE ZINC (2018)
Budar Micro-watershed
(4D2D6F1a : Area - 645.74 ha)
Gurumitkal Hobli
YADGIR TALUK & DISTRICT
0 0.25 0.5 1 km
N
YADGIR TALUK
GURUMITKAL HOBLI
BUDAR MICRO-WATERSHED
Gurumitkal Hobli
CHAPETLA
KAKALAWARA
GURUMITKAL
HIMALAPURA
NARAYANAPURA
BOODHURA
Chapetla
Kakalawara
Gurumitkal
Himalapura
Boodhura
Narayanapura
References
Streams/Drainage
Road/Cart track
Habitation
Waterbody
180 Land parcel with No's
Village boundary
Micro-watershed boundary
Available Zinc
Area in ha (%)
Deficient (< 0.6 ppm) 459 (71.05)
Sufficient (> 0.6 ppm) 176 (27.2)
Others* 11 (1.75)
* - Habitation & Waterbody
Source: ICAR-NBSS&LUP, Bengaluru

7. LAND SUITABILITY FOR MAJOR CROPS

LAND SUITABILITY FOR SORGHUM

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT

0 0.25 0.5 1 km

N

CHAPETLA

KAKALAWARA

GURUMITKAL

HIMALAPURA

BOODHURA

NARAYANAPURA

S2rt

S3rt

S2z

N1r

Chapetla

Kakalawara

Gurumitkal

Himalapura

Boodhura

Narayanapura

BOODHURA

References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2z	172 (26.71)
S2rt	15 (2.29)
S3rt	318 (49.18)
N1r	130 (20.07)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

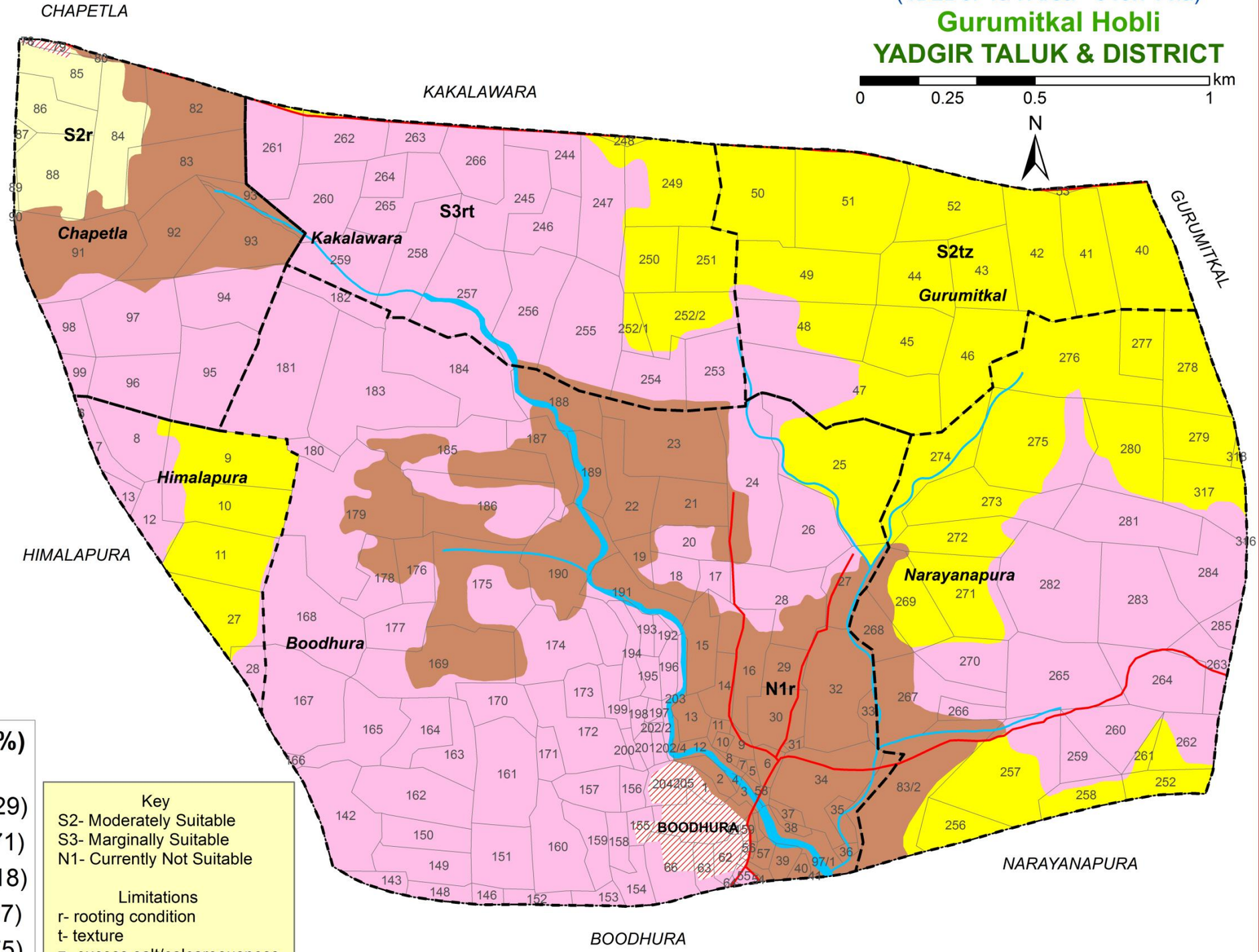
LAND SUITABILITY FOR MAIZE

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2r	15 (2.29)
S2tz	172 (26.71)
S3rt	318 (49.18)
N1r	130 (20.07)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

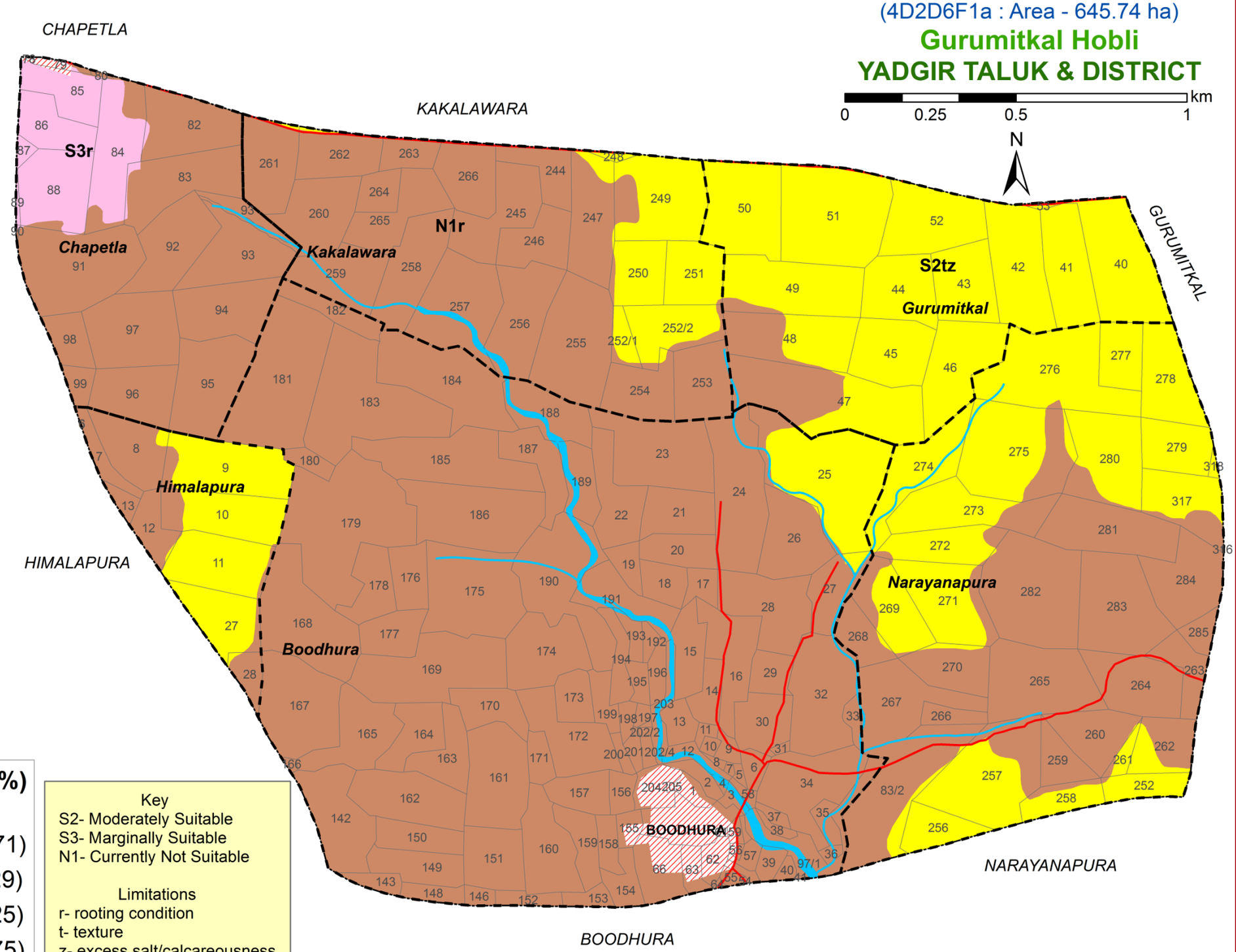
LAND SUITABILITY FOR REDGRAM

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2tz	172 (26.71)
S3r	15 (2.29)
N1r	447 (69.25)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

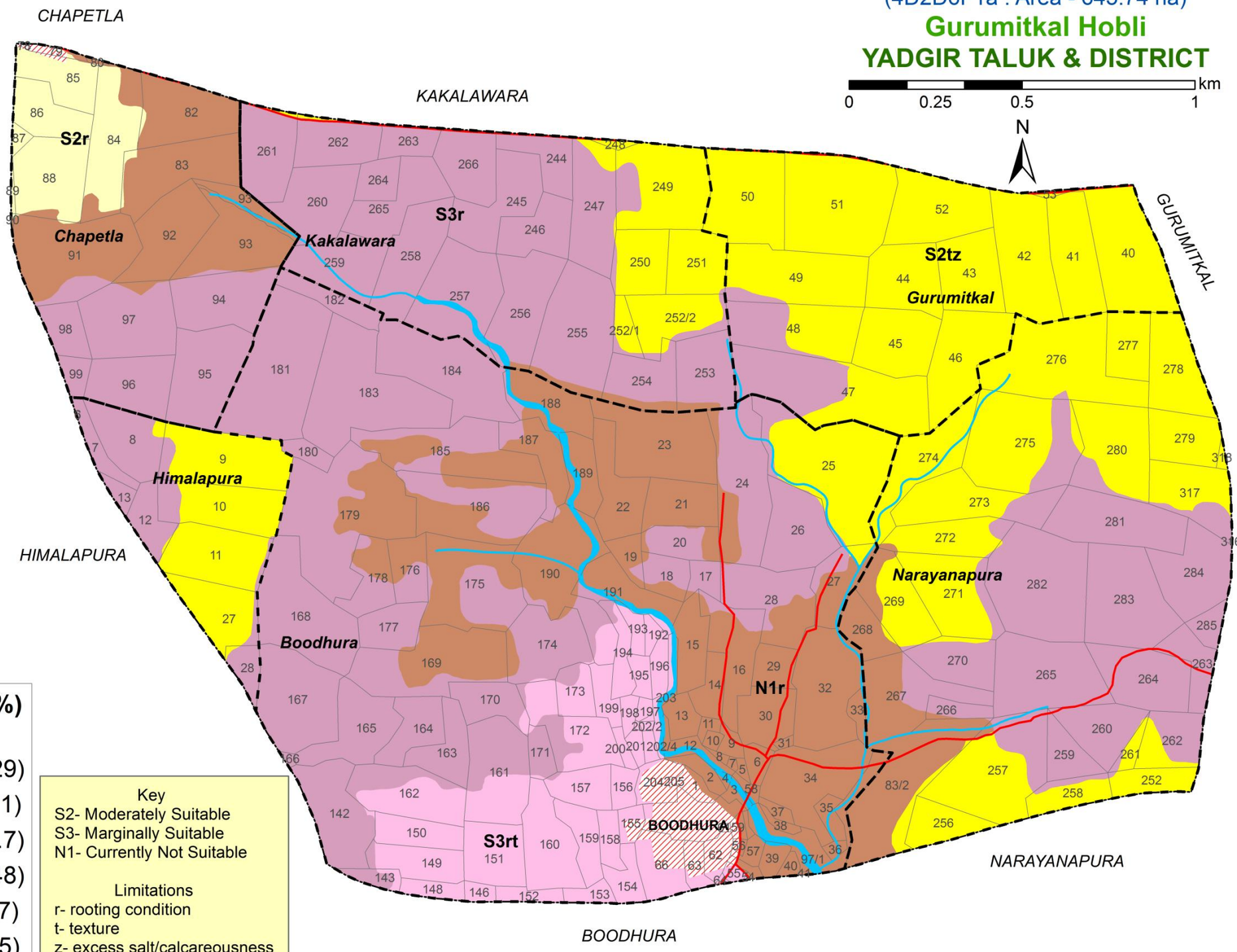
LAND SUITABILITY FOR BAJRA

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2r	15 (2.29)
S2tz	172 (26.71)
S3r	276 (42.7)
S3rt	42 (6.48)
N1r	130 (20.07)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

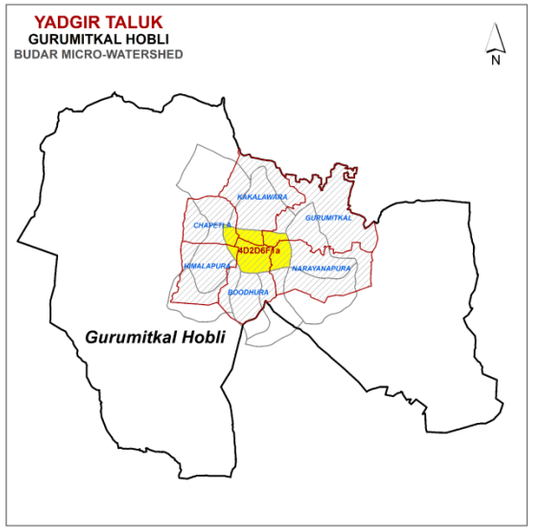
LAND SUITABILITY FOR DRUMSTICK

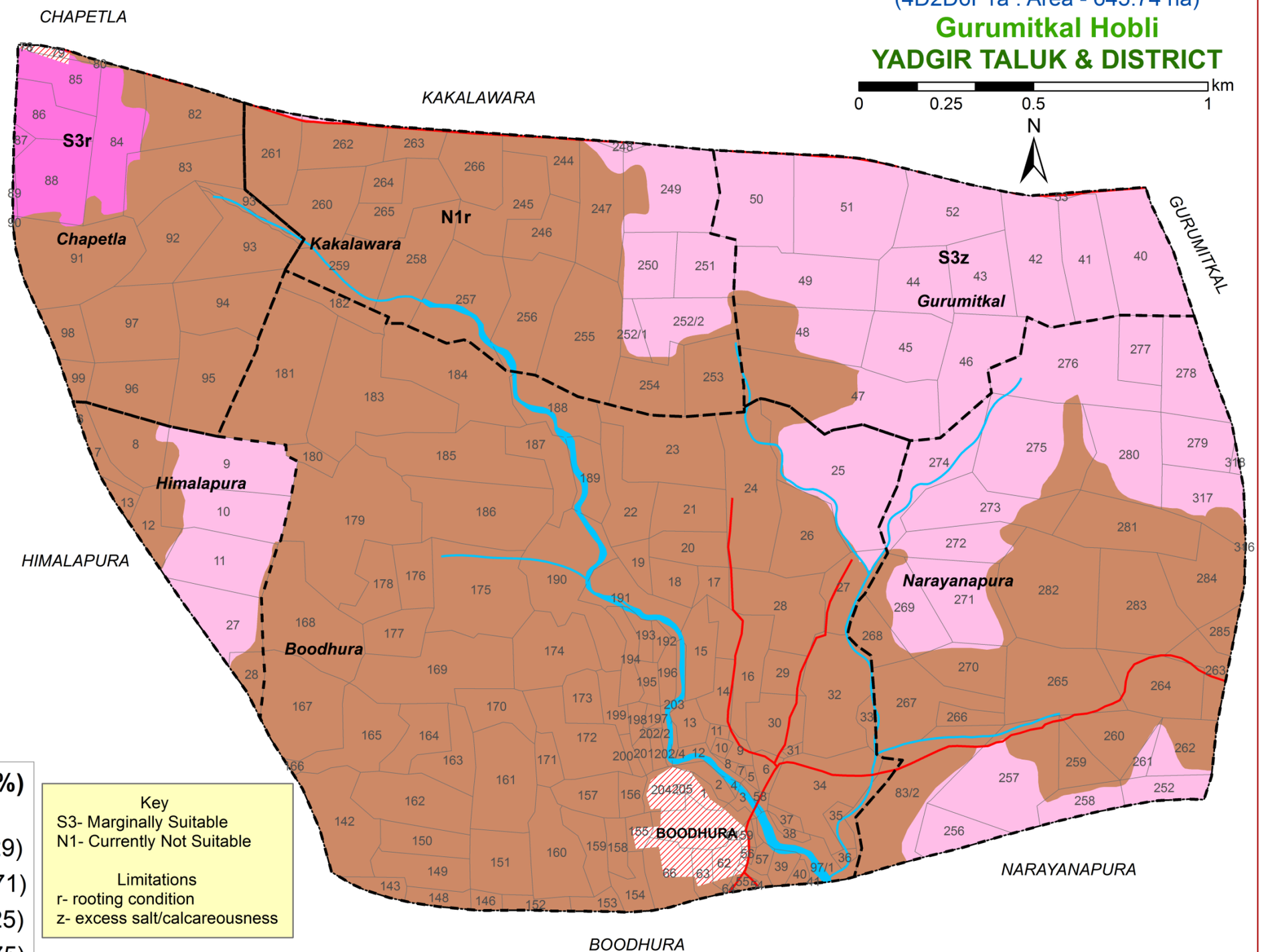
Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT





References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S3r	15 (2.29)
S3z	172 (26.71)
N1r	447 (69.25)
Others*	11 (1.75)

Key
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

LAND SUITABILITY FOR SUNFLOWER

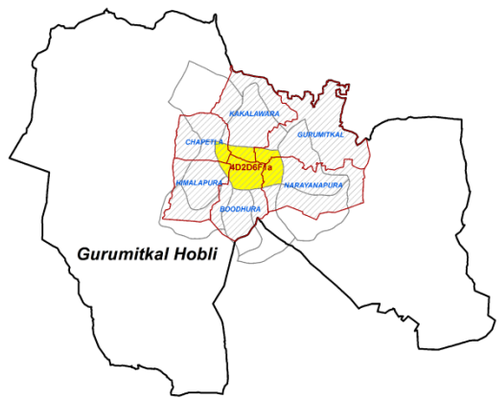
Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT

YADGIR TALUK
GURUMITKAL HOBLI
BUDAR MICRO-WATERSHED



0 0.25 0.5 1 km

N

CHAPETLA

KAKALAWARA

GURUMITKAL

HIMALAPURA

NARAYANAPURA

BOODHURA

S3r

N1r

S2z

Chapetla

Kakalawara

Gurumitkal

Himalapura

Boodhura

Narayanapura

BOODHURA

References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2z	172 (26.71)
S3r	15 (2.29)
N1r	447 (69.25)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

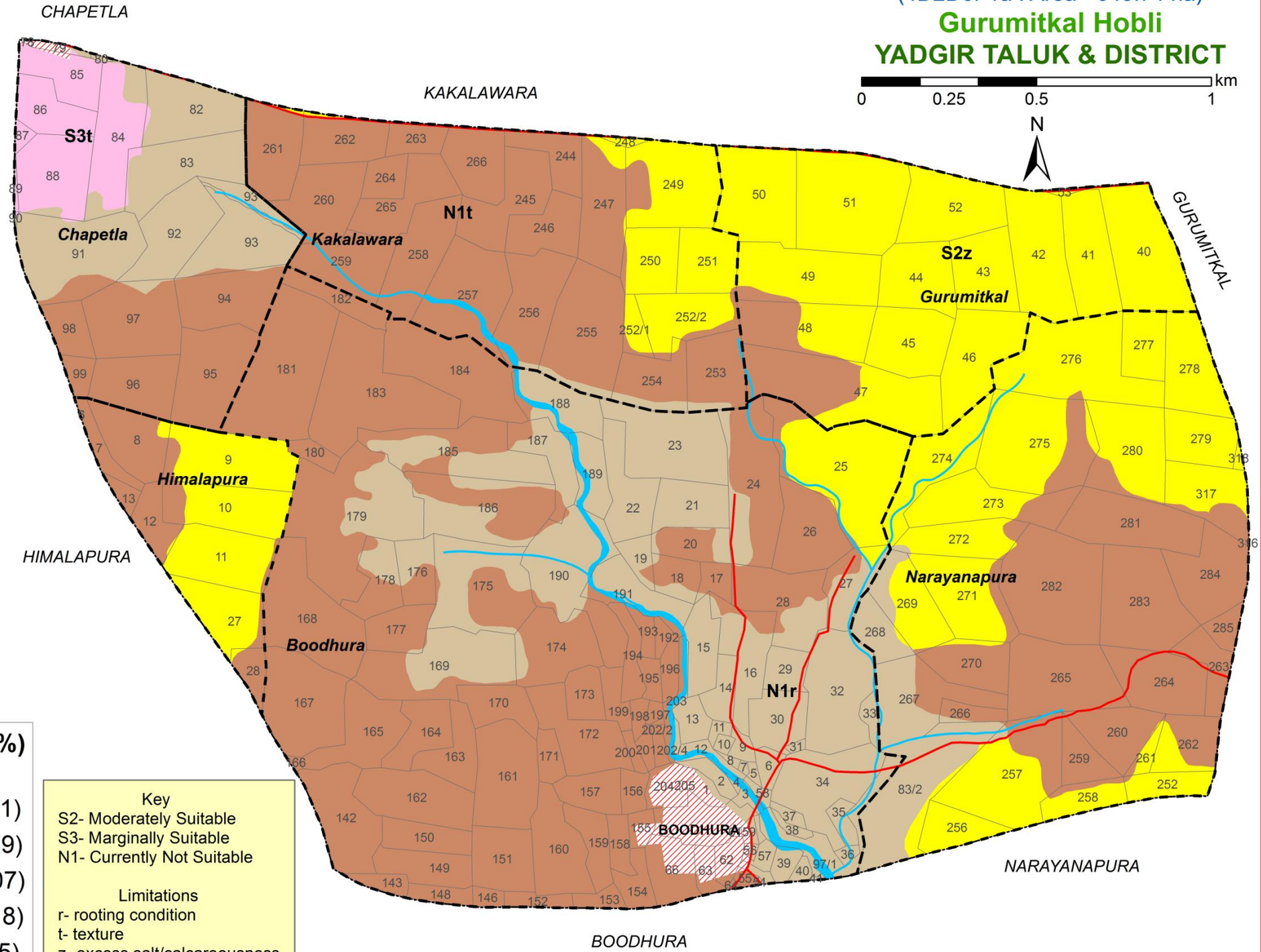
LAND SUITABILITY FOR COTTON

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2z	172 (26.71)
S3t	15 (2.29)
N1r	130 (20.07)
N1t	318 (49.18)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

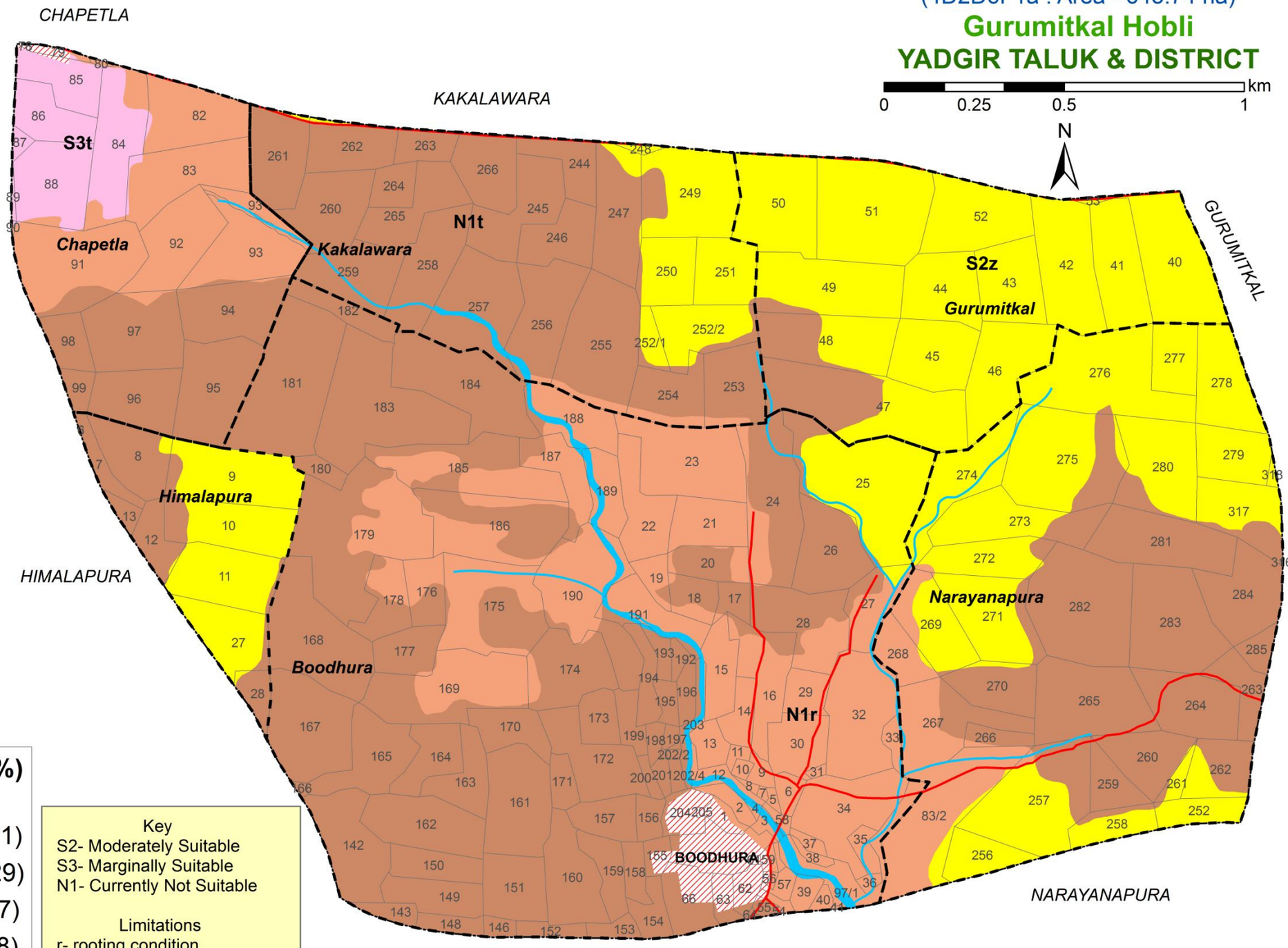
LAND SUITABILITY FOR BENGALGRAM

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2z	172 (26.71)
S3t	15 (2.29)
N1r	130 (20.07)
N1t	318 (49.18)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

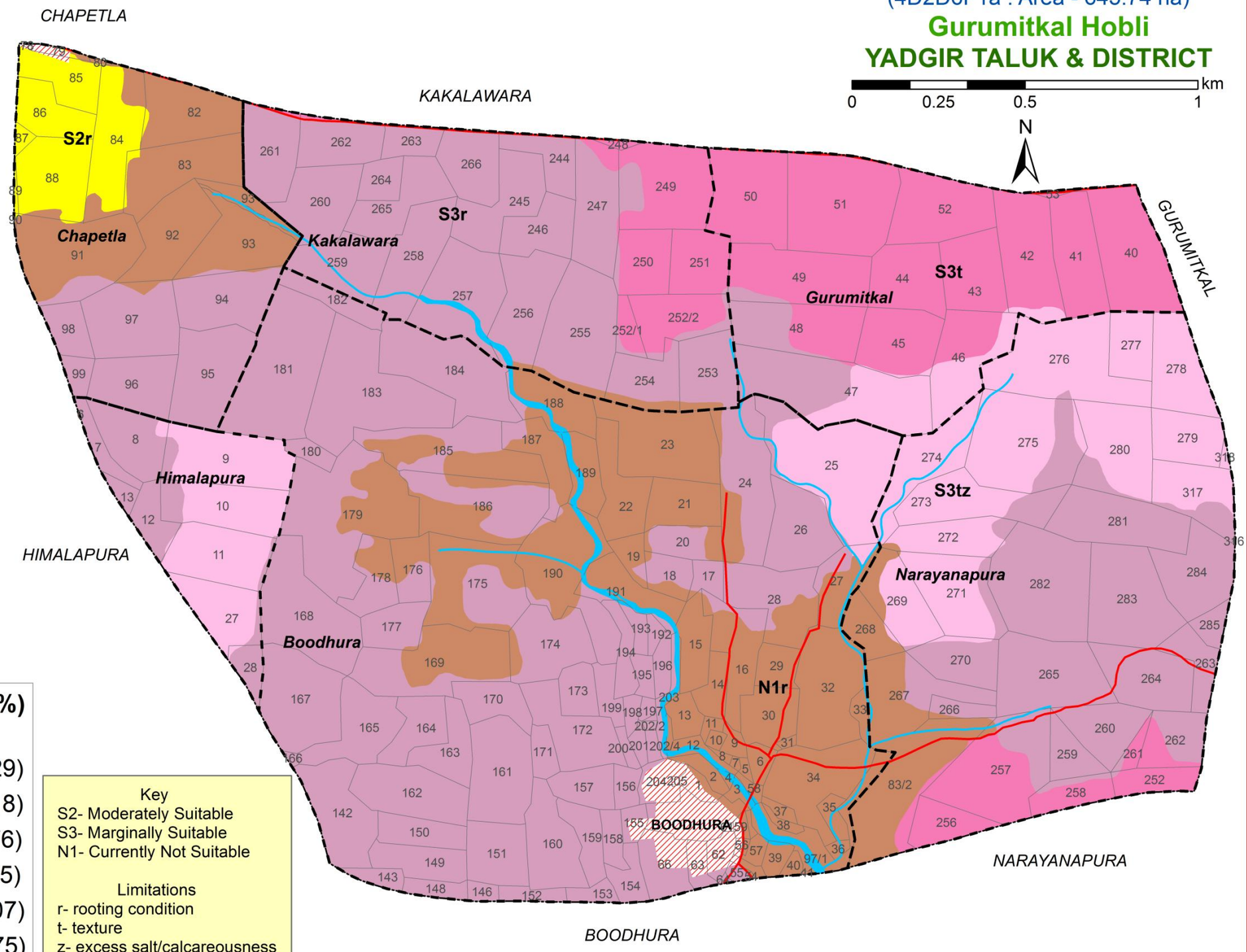
LAND SUITABILITY FOR GROUNDNUT

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2r	15 (2.29)
S3r	318 (49.18)
S3t	89 (13.76)
S3tz	84 (12.95)
N1r	130 (20.07)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

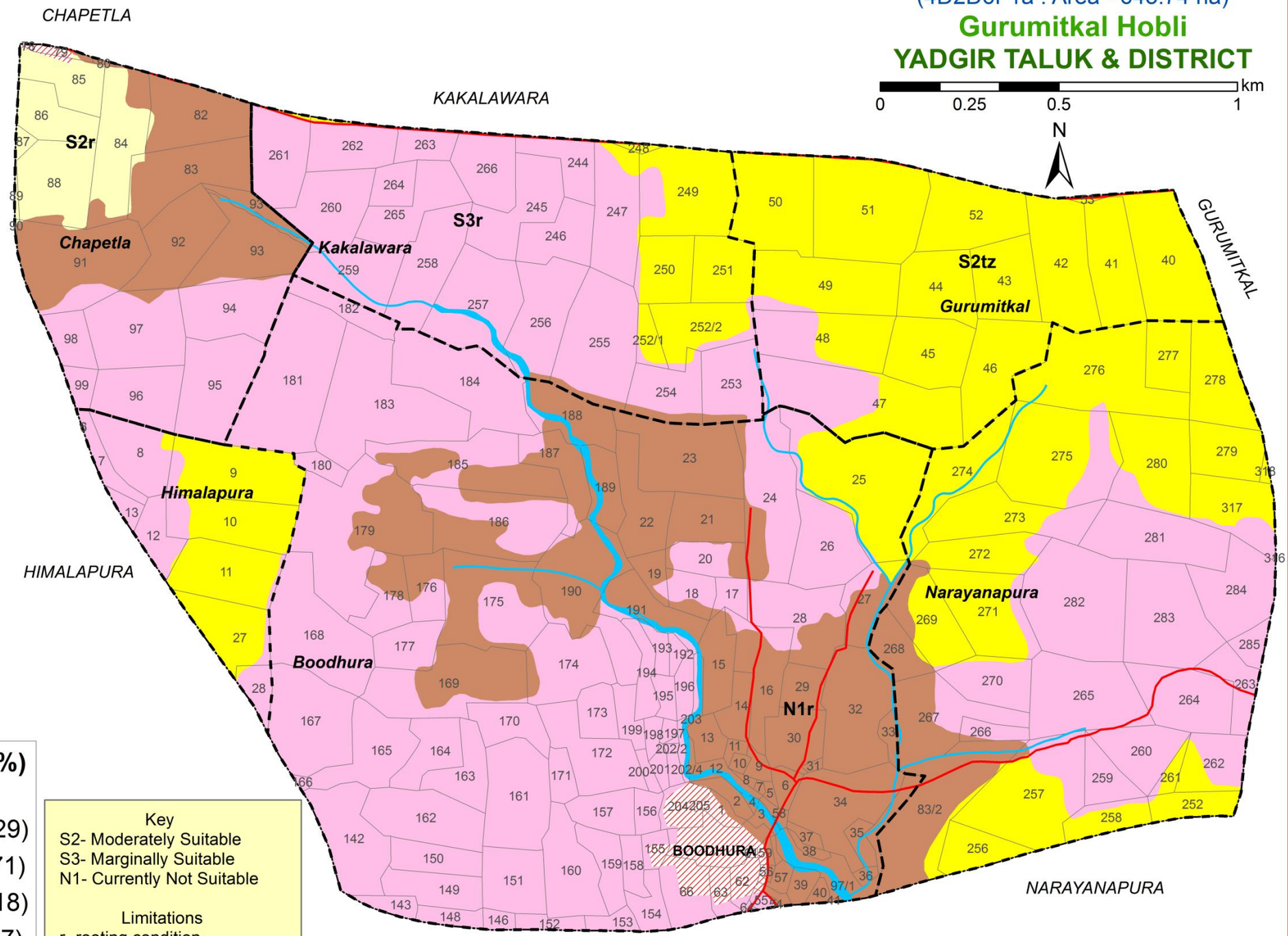
LAND SUITABILITY FOR CHILLI

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2r	15 (2.29)
S2tz	172 (26.71)
S3r	318 (49.18)
N1r	130 (20.07)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

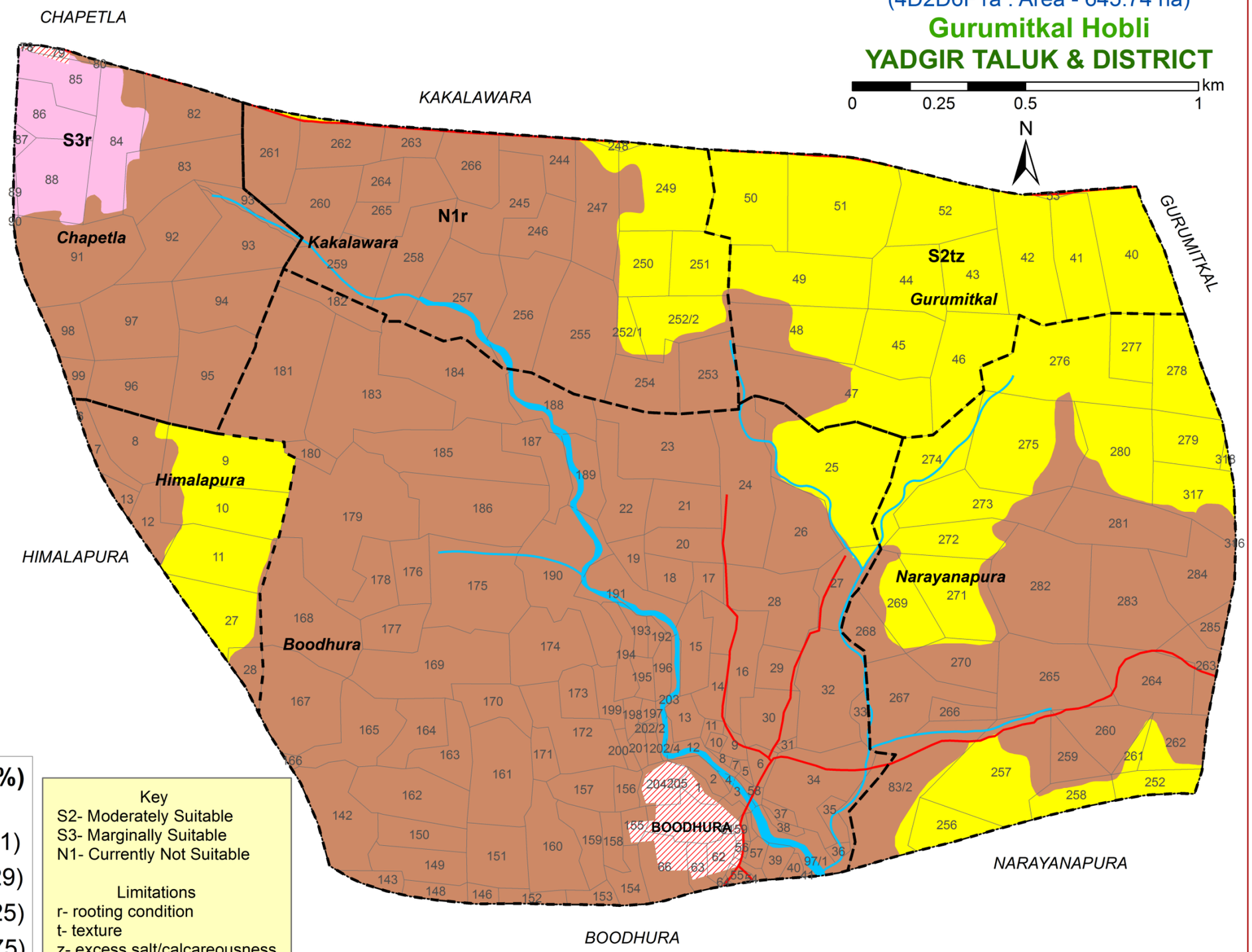
LAND SUITABILITY FOR POMEGRANATE

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2tz	172 (26.71)
S3r	15 (2.29)
N1r	447 (69.25)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

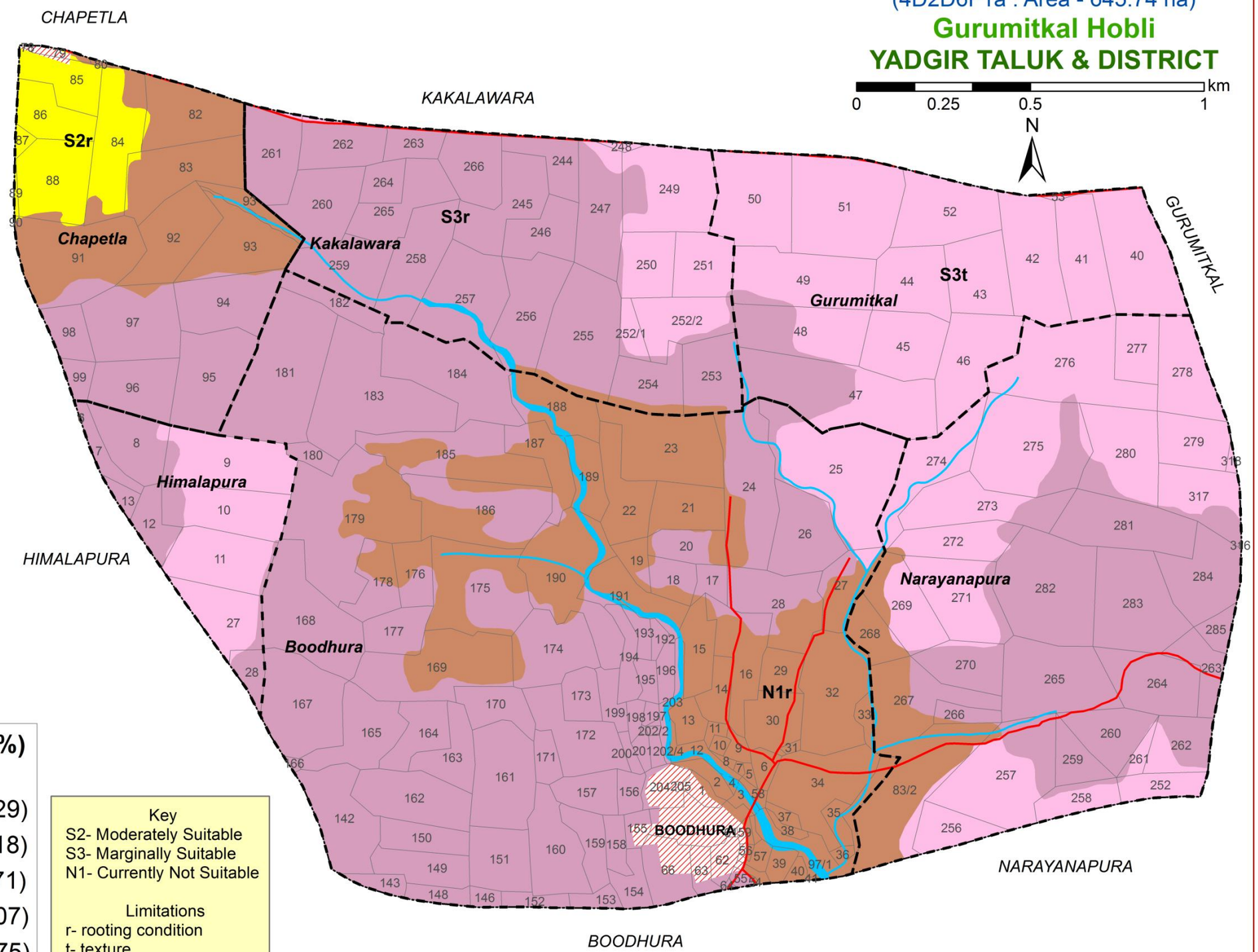
LAND SUITABILITY FOR TOMATO

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2r	15 (2.29)
S3r	318 (49.18)
S3t	172 (26.71)
N1r	130 (20.07)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

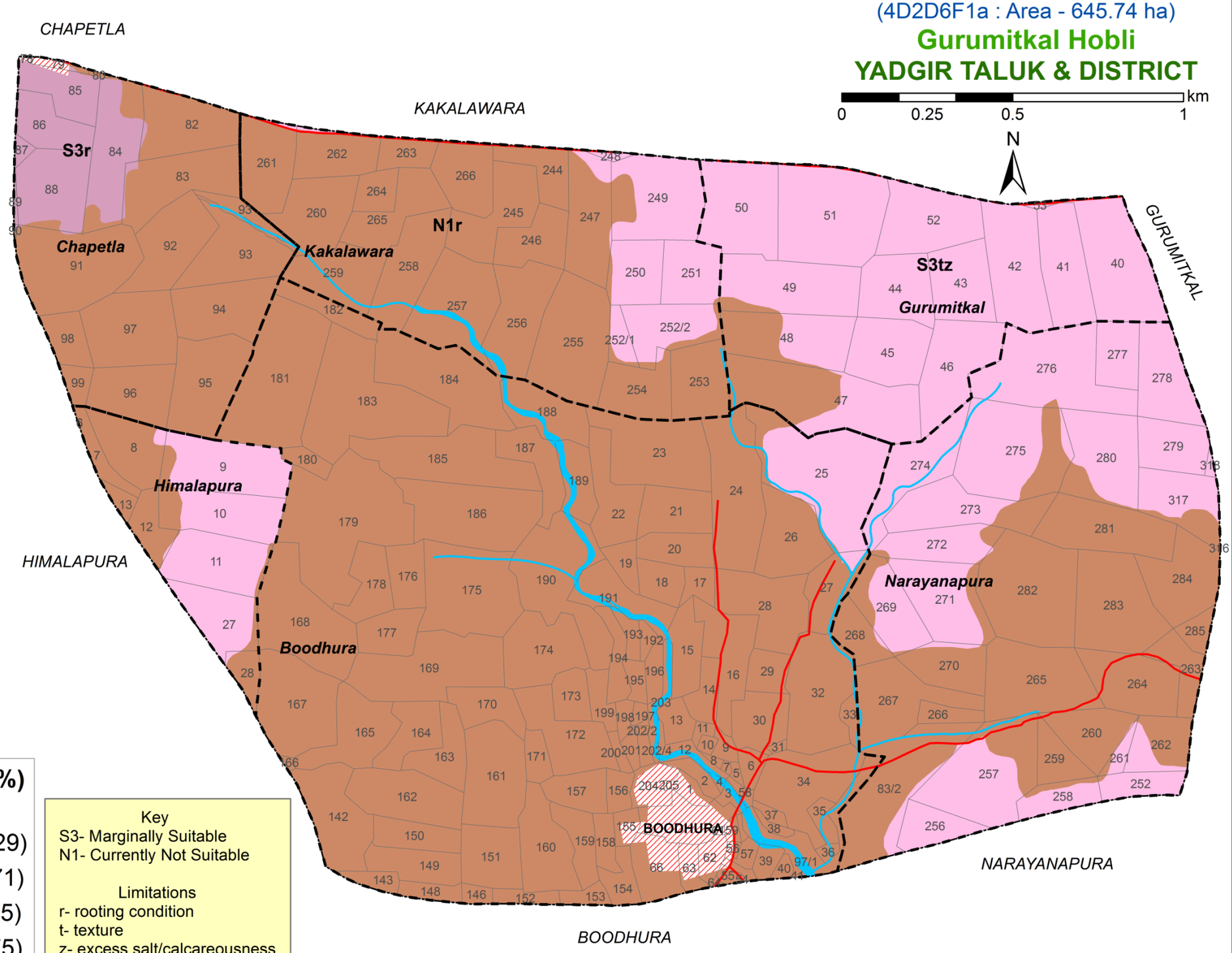
LAND SUITABILITY FOR MULBERRY

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S3r	15 (2.29)
S3tz	172 (26.71)
N1r	447 (69.25)
Others*	11 (1.75)

Key
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

NOTE: Mulberry suitability evaluation only for mulberry leaf, not for silkworm rearing

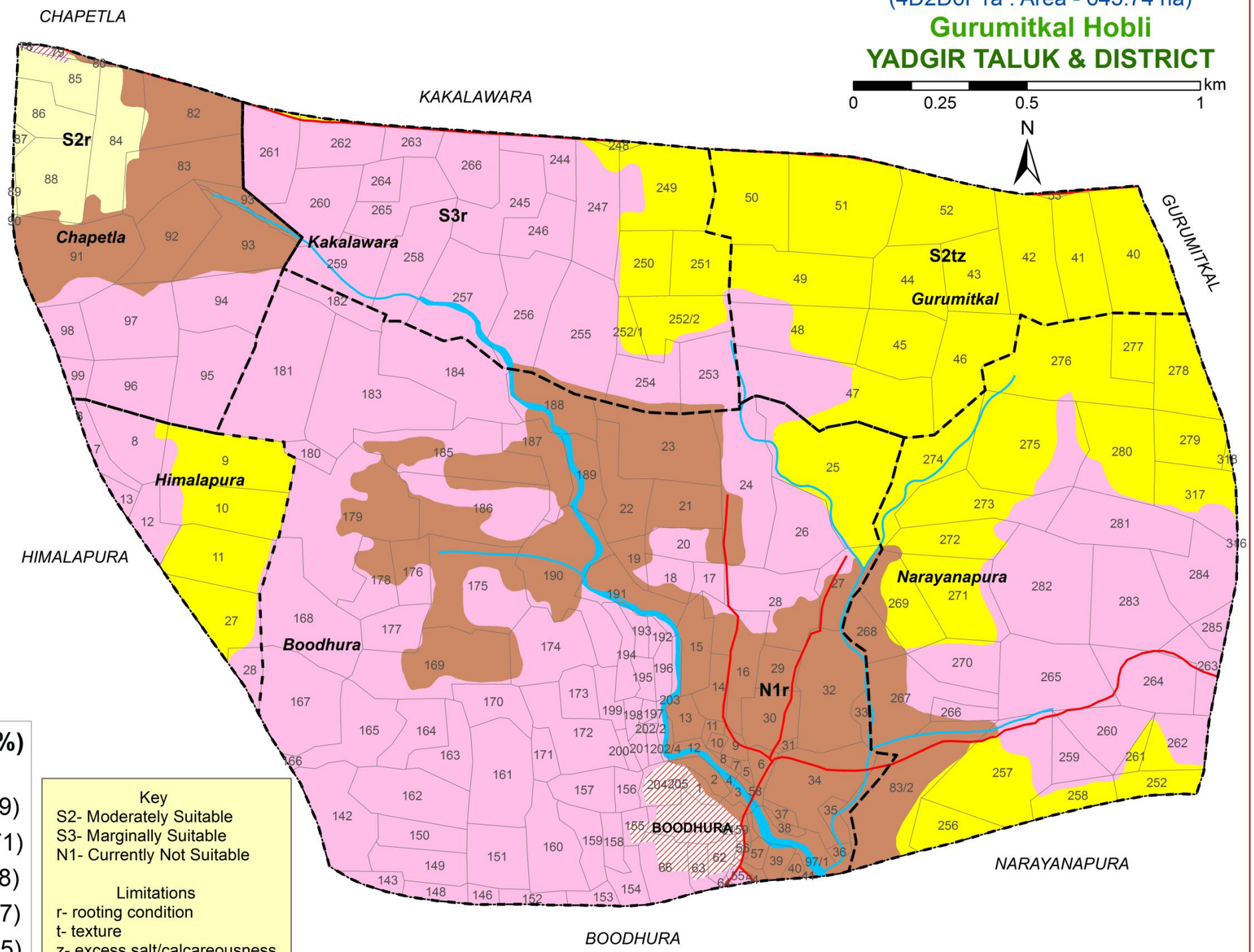
LAND SUITABILITY FOR BHENDI

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2r	15 (2.29)
S2tz	172 (26.71)
S3r	318 (49.18)
N1r	130 (20.07)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

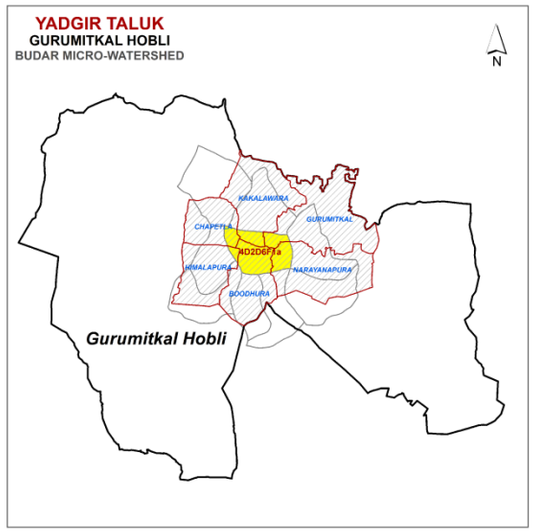
LAND SUITABILITY FOR GUAVA

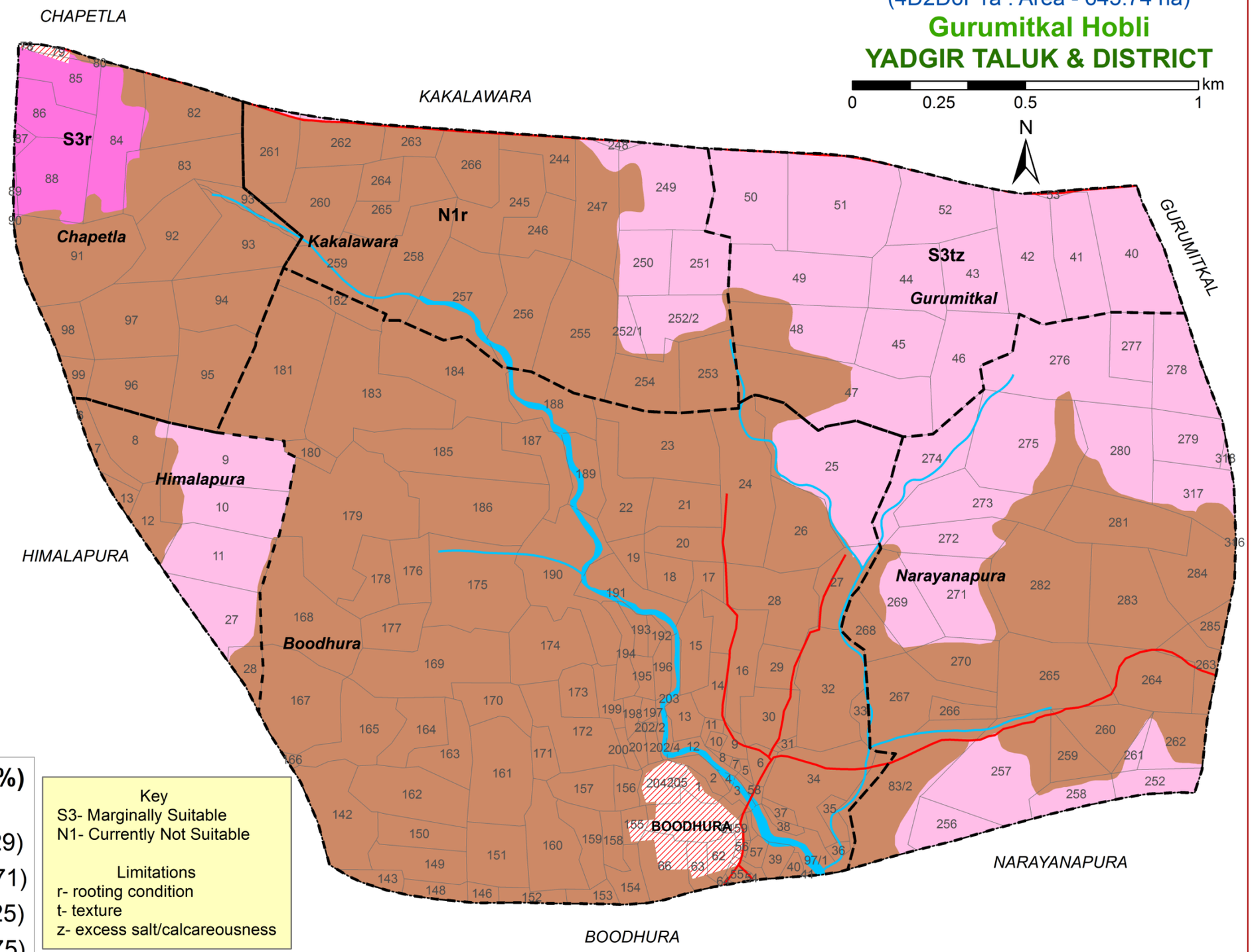
Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT





References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S3r	15 (2.29)
S3tz	172 (26.71)
N1r	447 (69.25)
Others*	11 (1.75)

Key
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

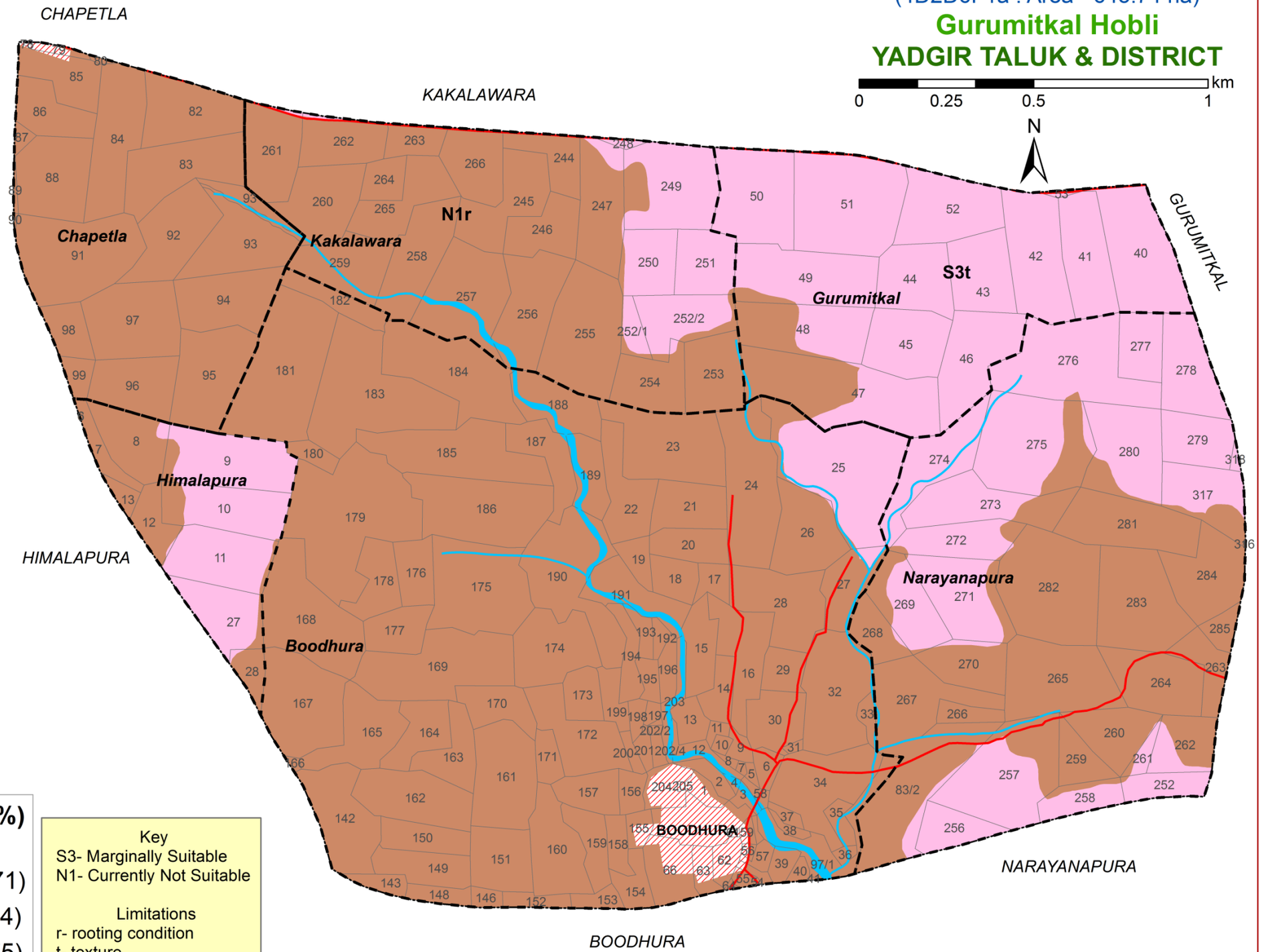
LAND SUITABILITY FOR MANGO

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S3t	172 (26.71)
N1r	462 (71.54)
Others*	11 (1.75)

Key
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

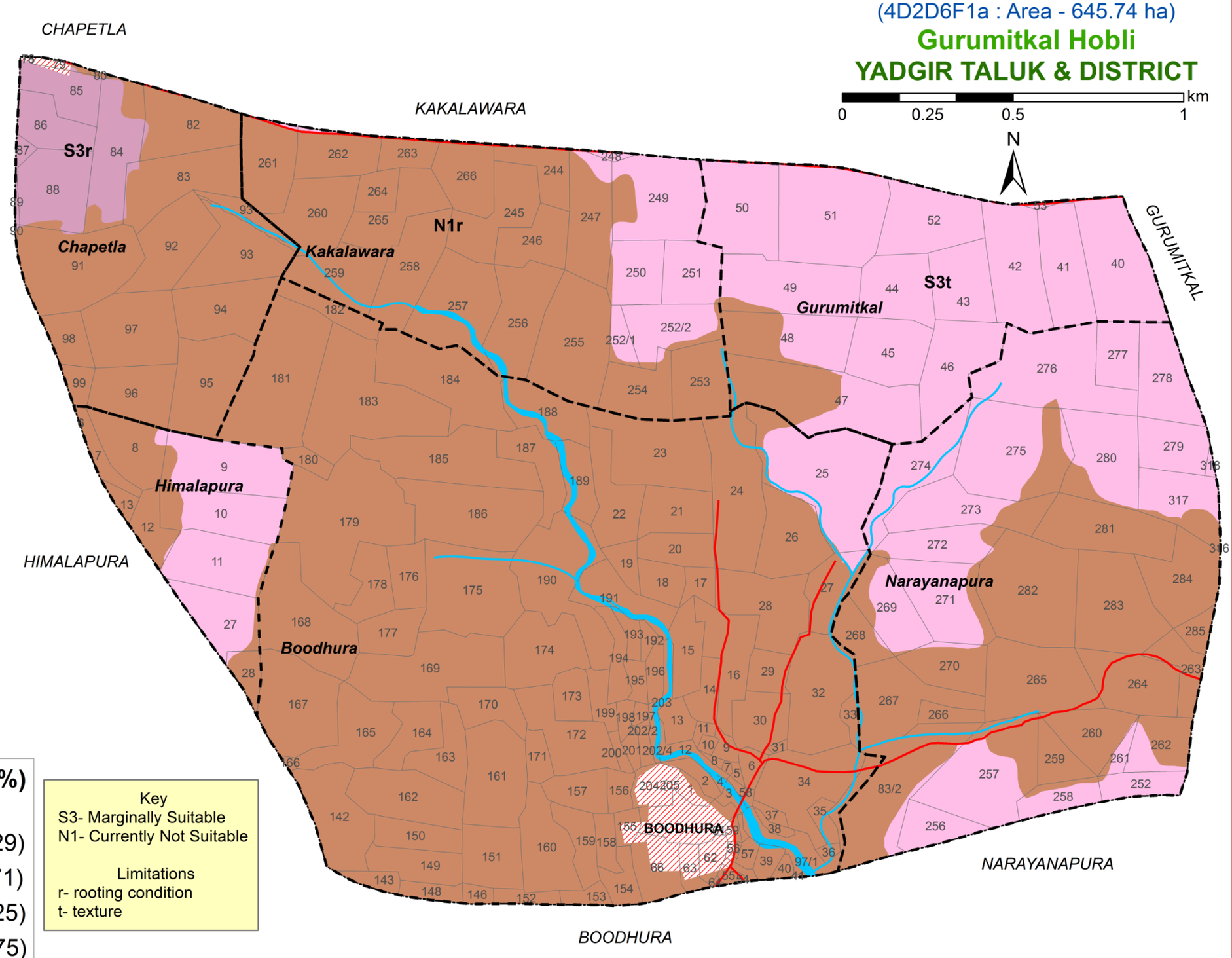
LAND SUITABILITY FOR SAPOTA

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S3r	15 (2.29)
S3t	172 (26.71)
N1r	447 (69.25)
Others*	11 (1.75)

Key
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

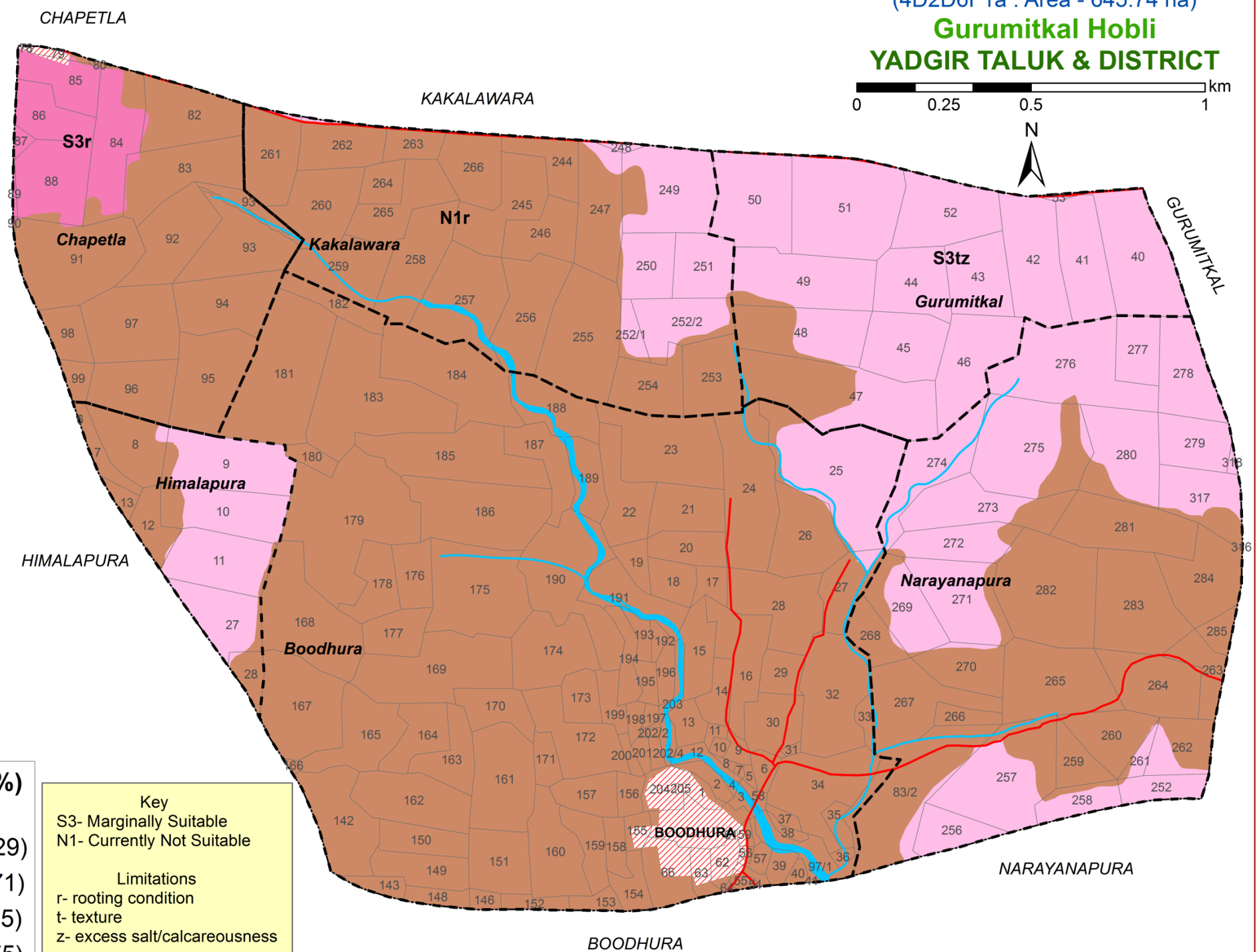
LAND SUITABILITY FOR JACKFRUIT

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S3r	15 (2.29)
S3tz	172 (26.71)
N1r	447 (69.25)
Others*	11 (1.75)

Key
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

LAND SUITABILITY FOR JAMUN

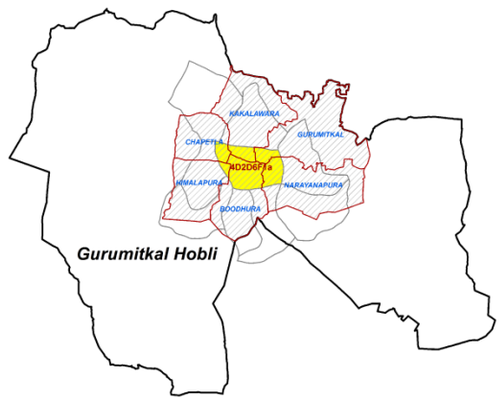
Budar Micro-watershed

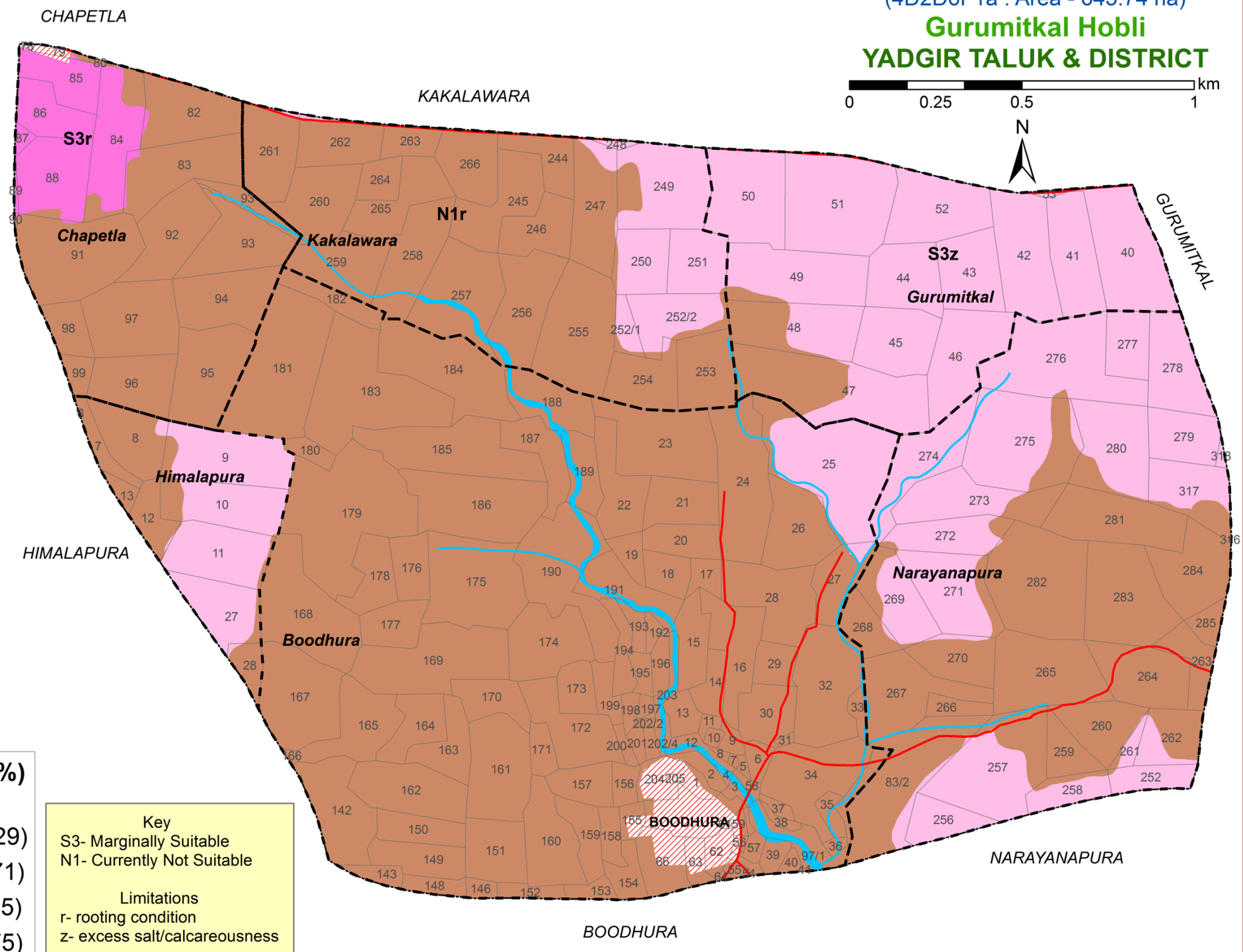
(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT

YADGIR TALUK
GURUMITKAL HOBLI
BUDAR MICRO-WATERSHED





References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S3r	15 (2.29)
S3z	172 (26.71)
N1r	447 (69.25)
Others*	11 (1.75)

Key
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

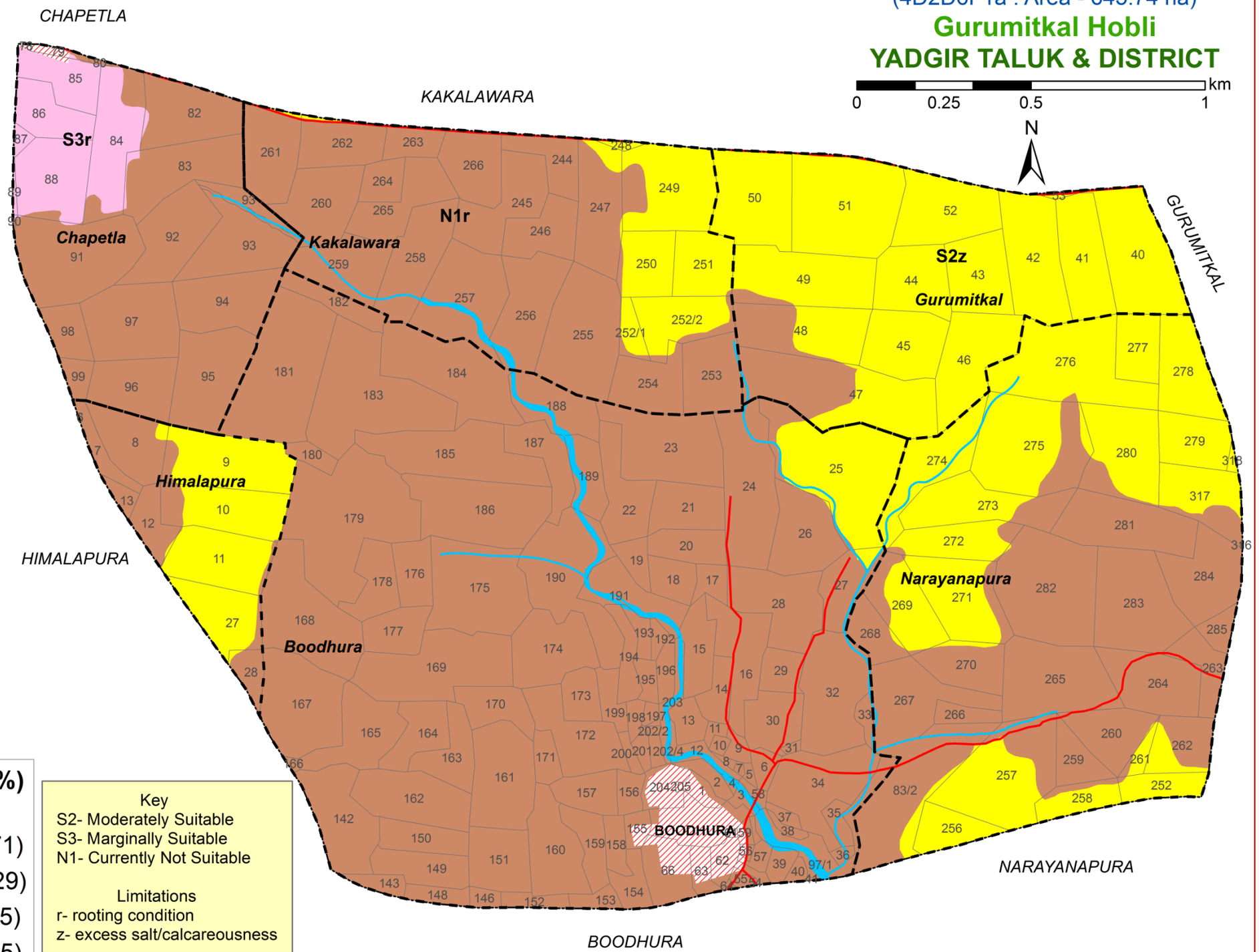
LAND SUITABILITY FOR MUSAMBI

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2z	172 (26.71)
S3r	15 (2.29)
N1r	447 (69.25)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

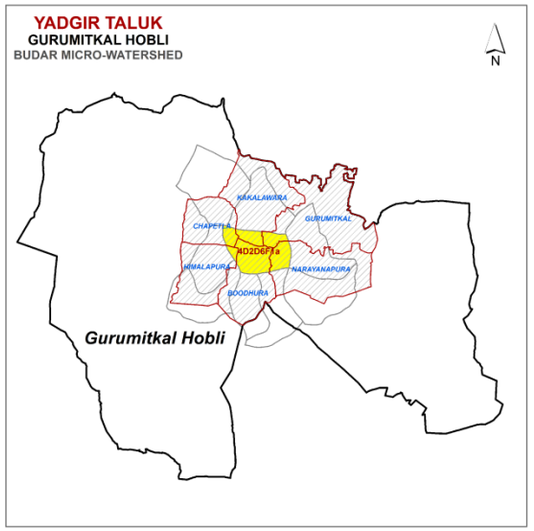
LAND SUITABILITY FOR LIME

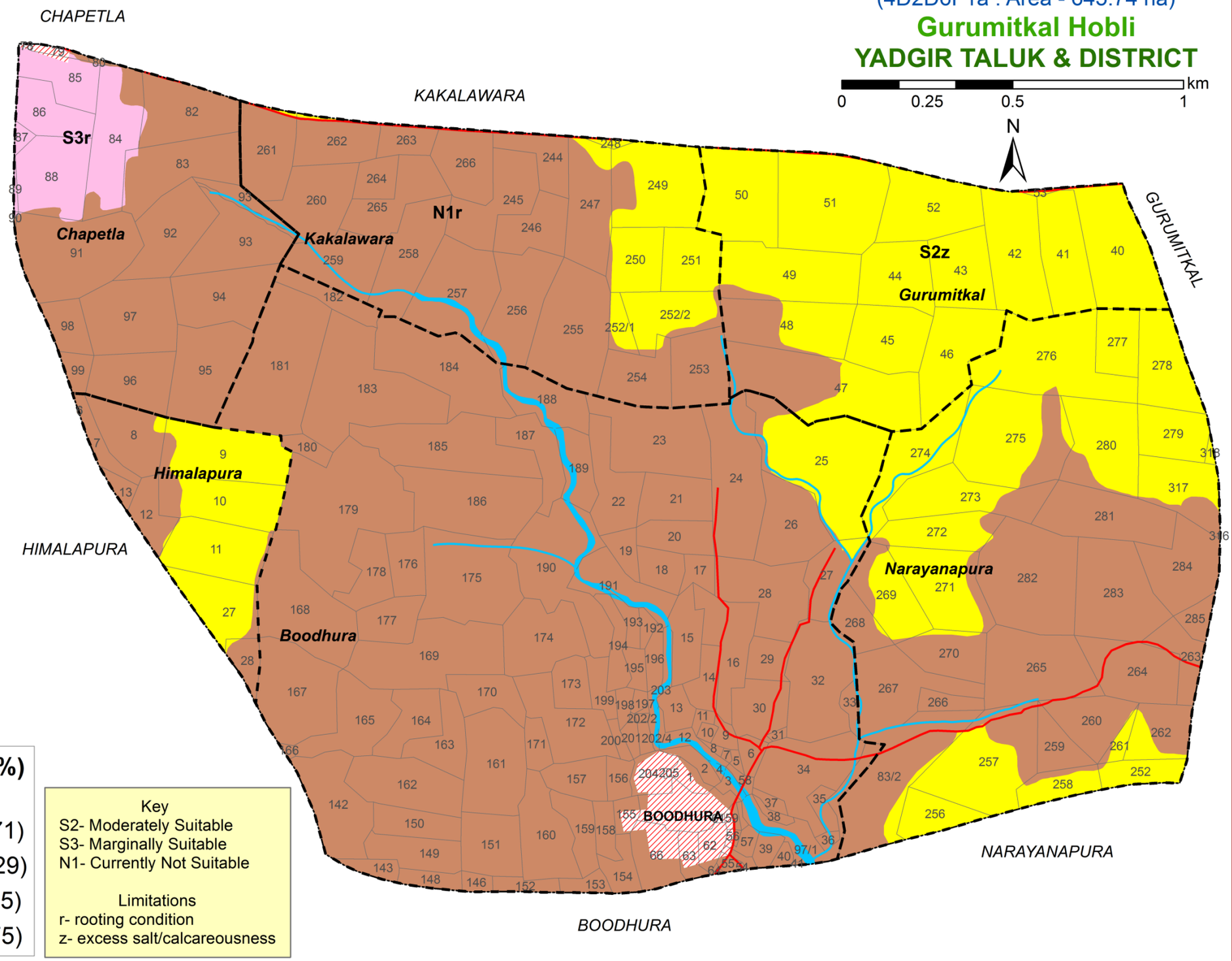
Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT





References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2z	172 (26.71)
S3r	15 (2.29)
N1r	447 (69.25)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

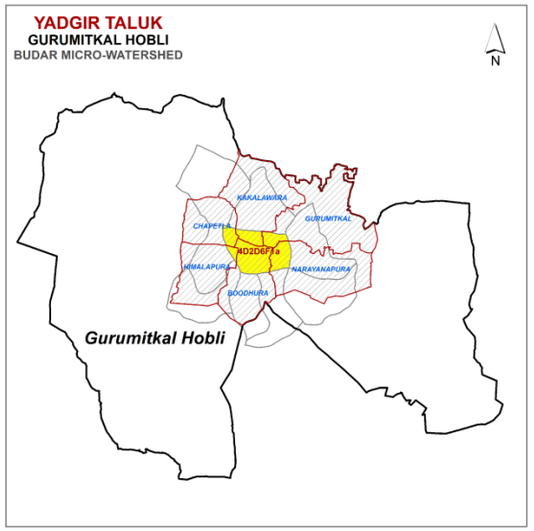
LAND SUITABILITY FOR CASHEW

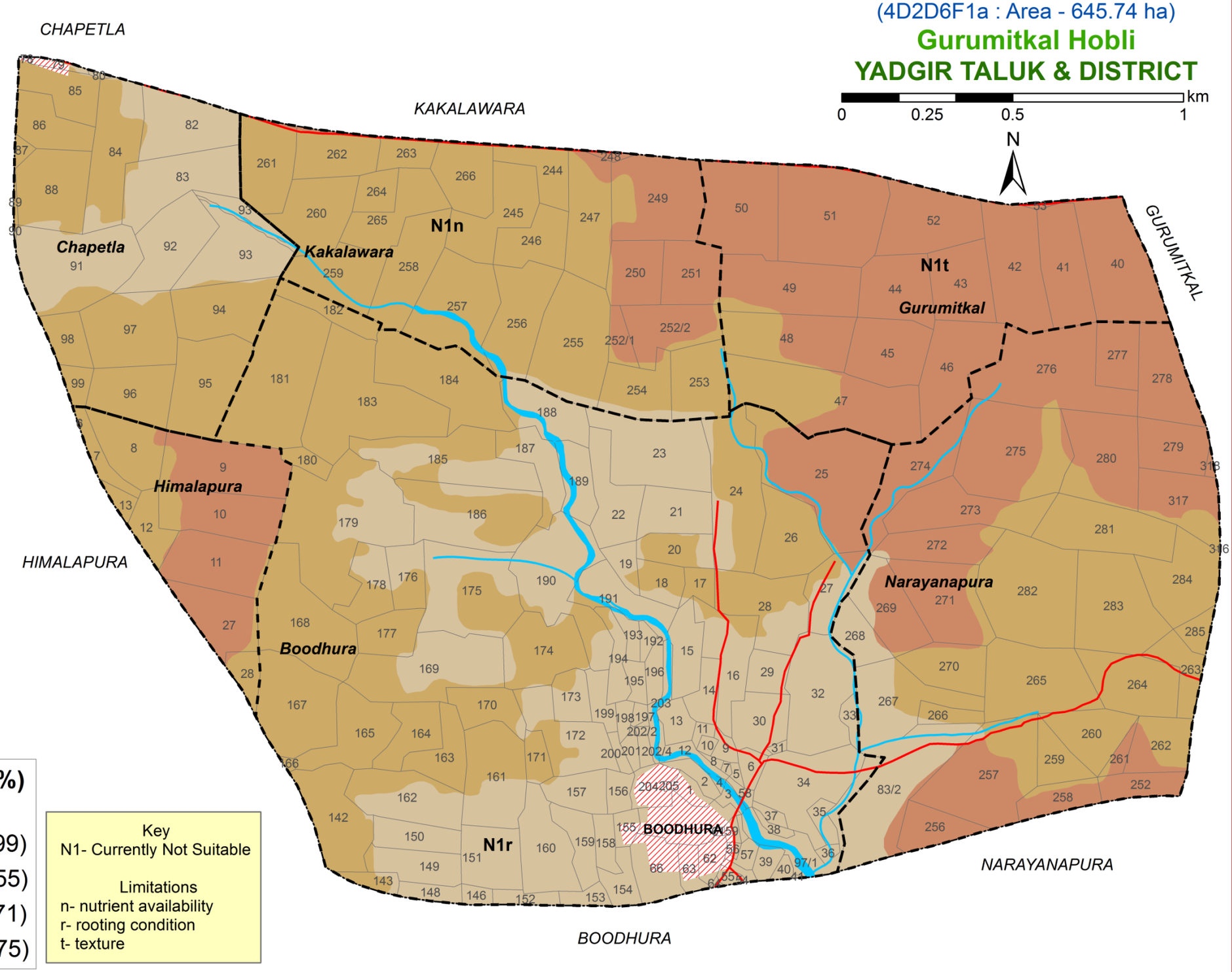
Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT





References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
N1n	291 (44.99)
N1r	171 (26.55)
N1t	172 (26.71)
Others*	11 (1.75)

Key
N1- Currently Not Suitable

Limitations
n- nutrient availability
r- rooting condition
t- texture

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

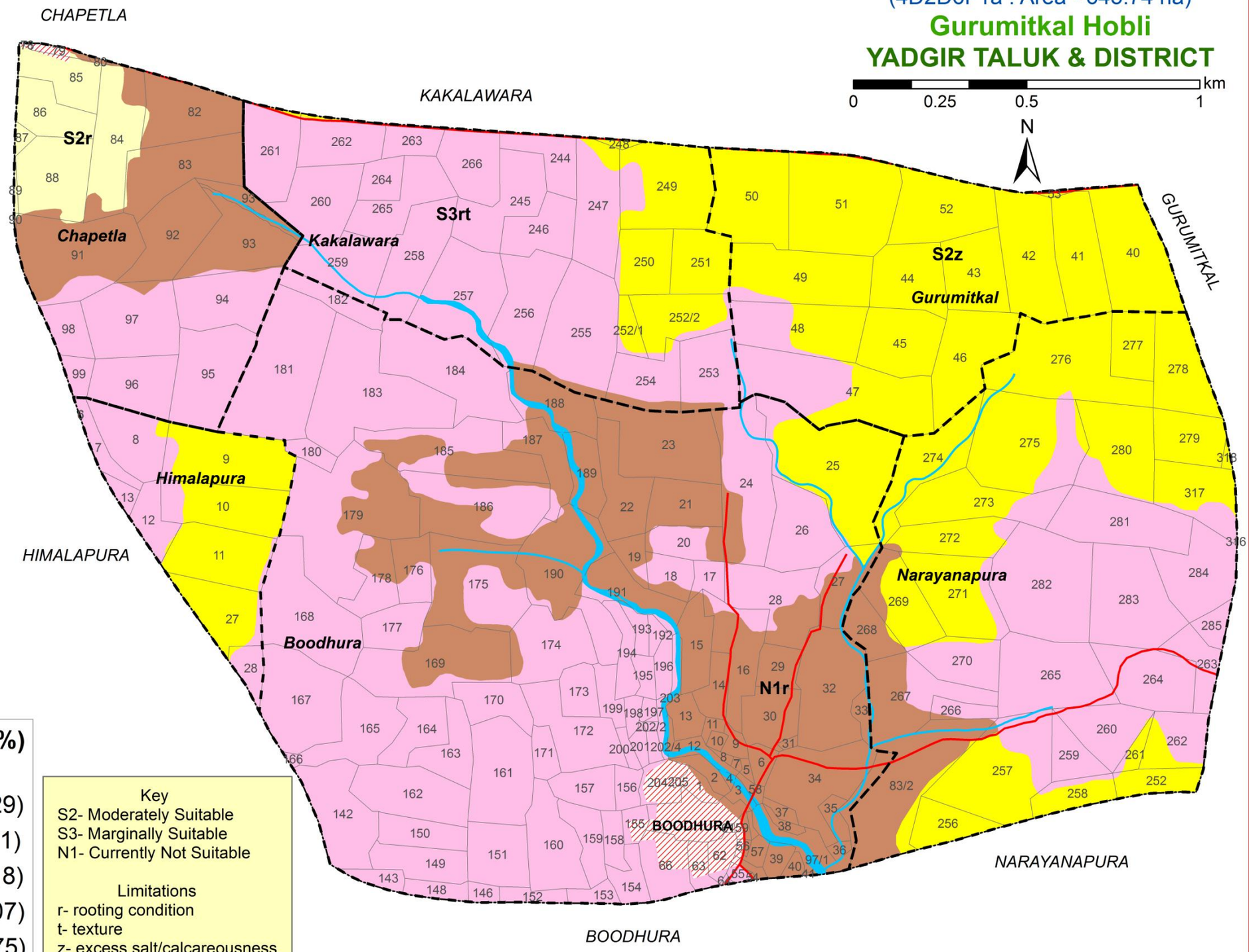
LAND SUITABILITY FOR CUSTARD APPLE

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2r	15 (2.29)
S2z	172 (26.71)
S3rt	318 (49.18)
N1r	130 (20.07)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

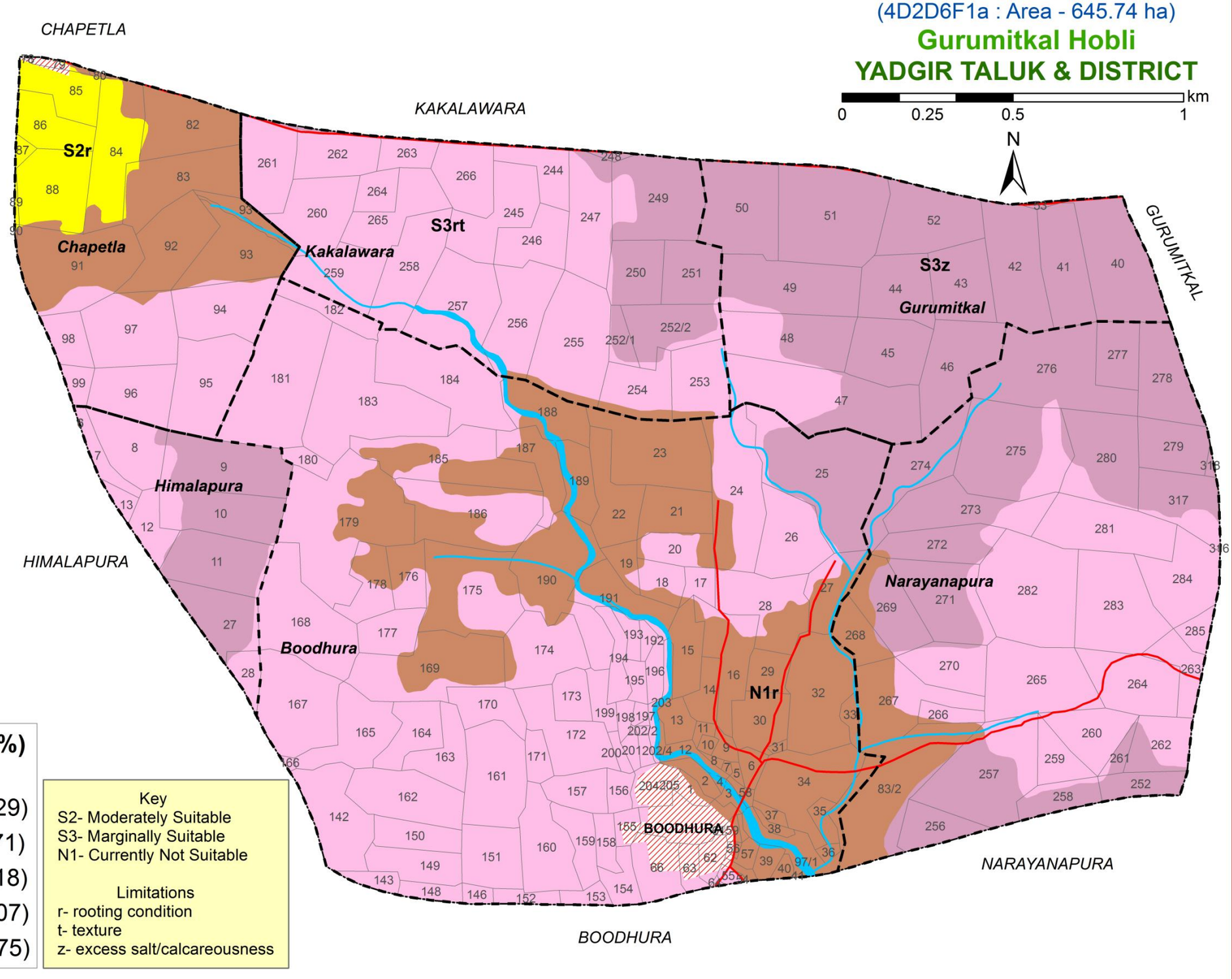
LAND SUITABILITY FOR AMLA

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2r	15 (2.29)
S3z	172 (26.71)
S3rt	318 (49.18)
N1r	130 (20.07)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

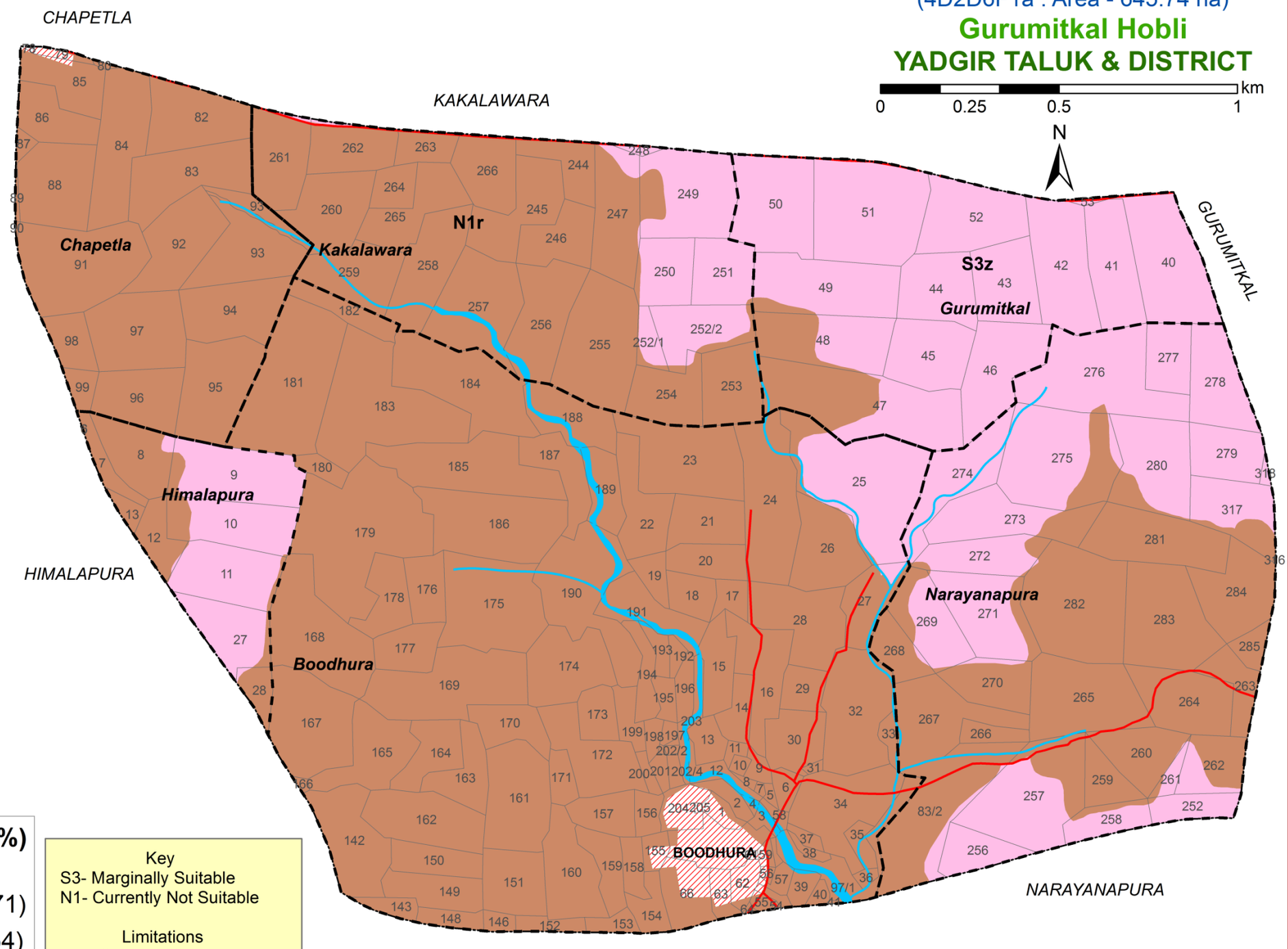
LAND SUITABILITY FOR TAMARIND

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S3z	172 (26.71)
N1r	462 (71.54)
Others*	11 (1.75)

Key
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

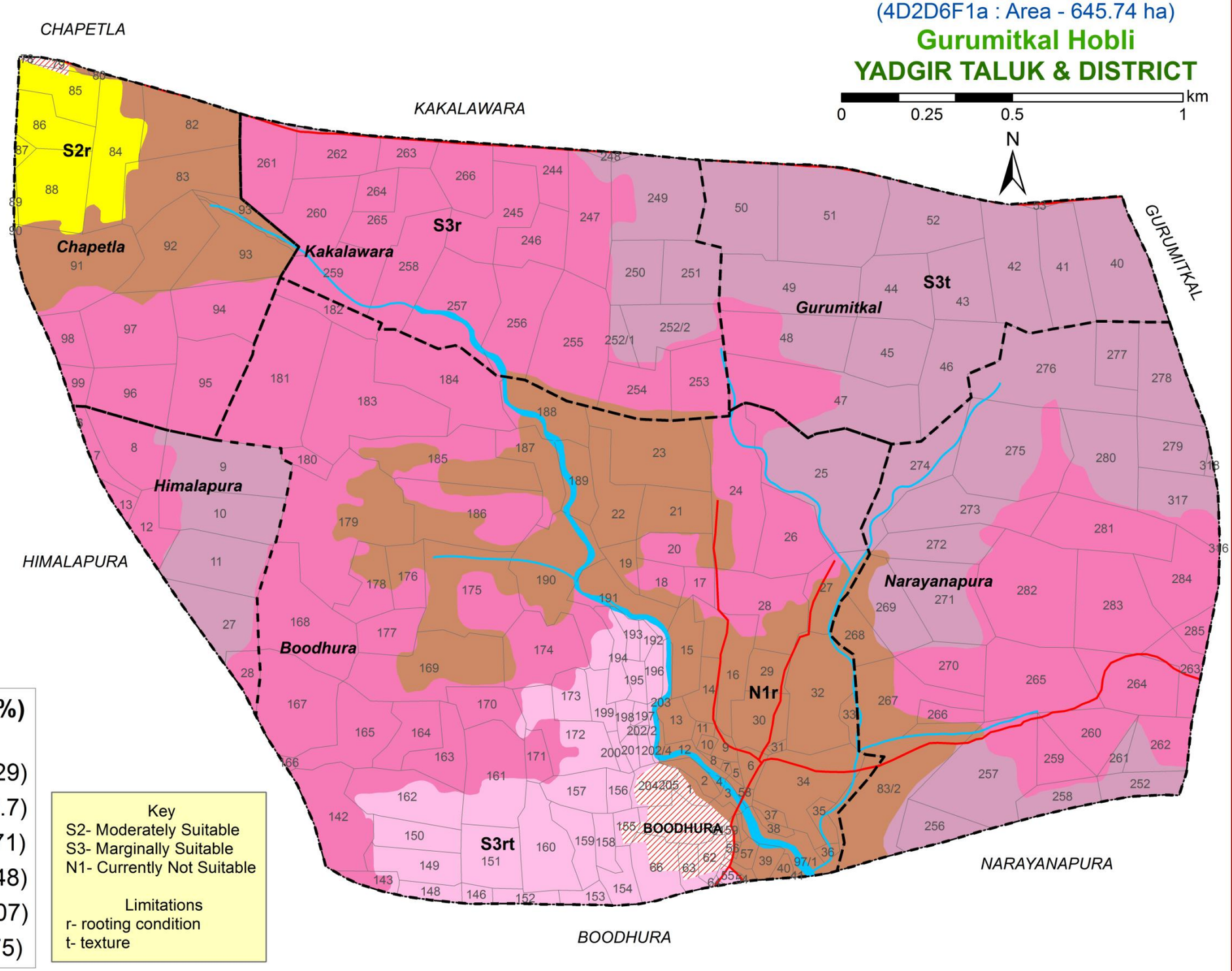
LAND SUITABILITY FOR BRINJAL

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2r	15 (2.29)
S3r	276 (42.7)
S3t	172 (26.71)
S3rt	42 (6.48)
N1r	130 (20.07)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

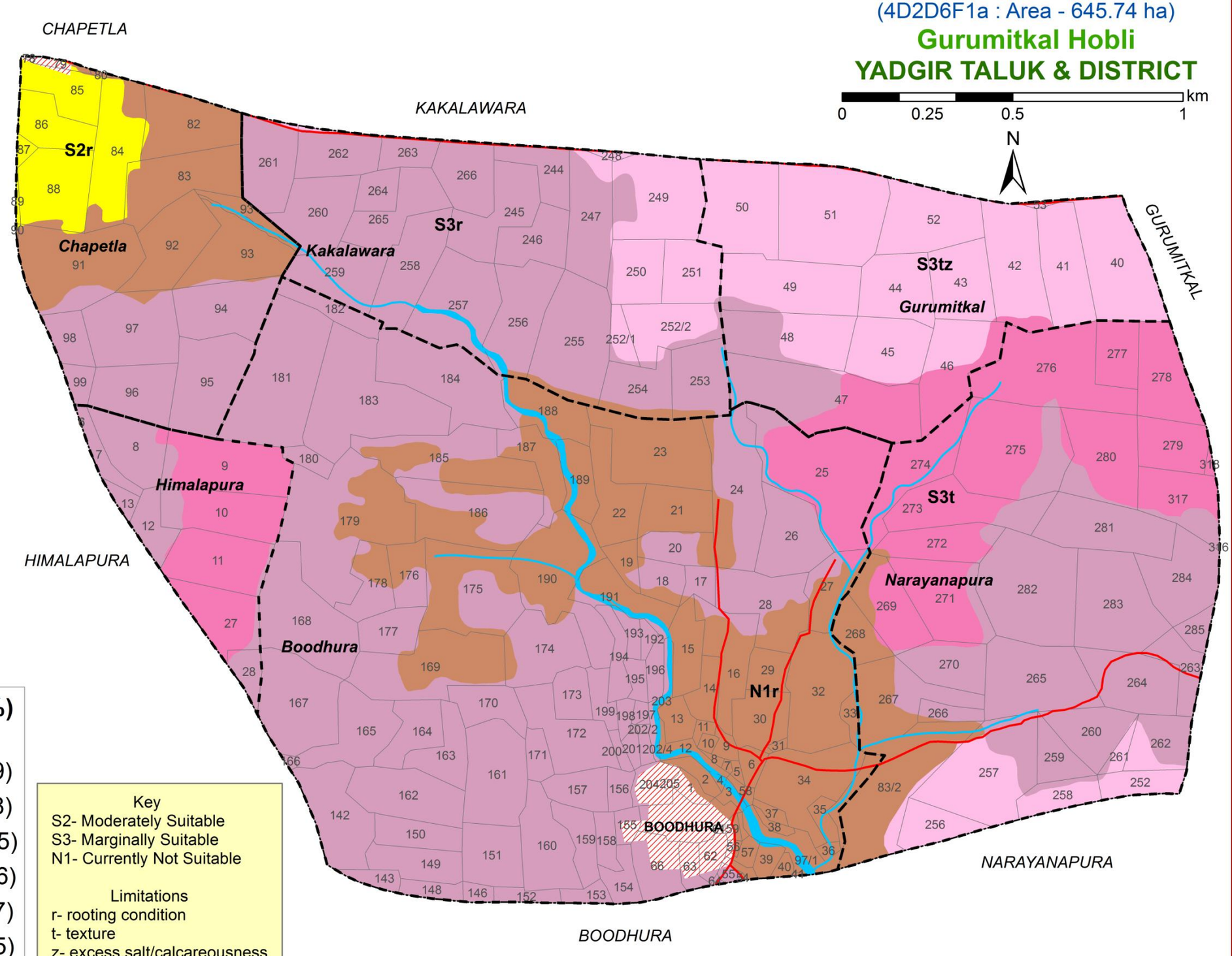
LAND SUITABILITY FOR ONION

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2r	15 (2.29)
S3r	318 (49.18)
S3t	84 (12.95)
S3tz	89 (13.76)
N1r	130 (20.07)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

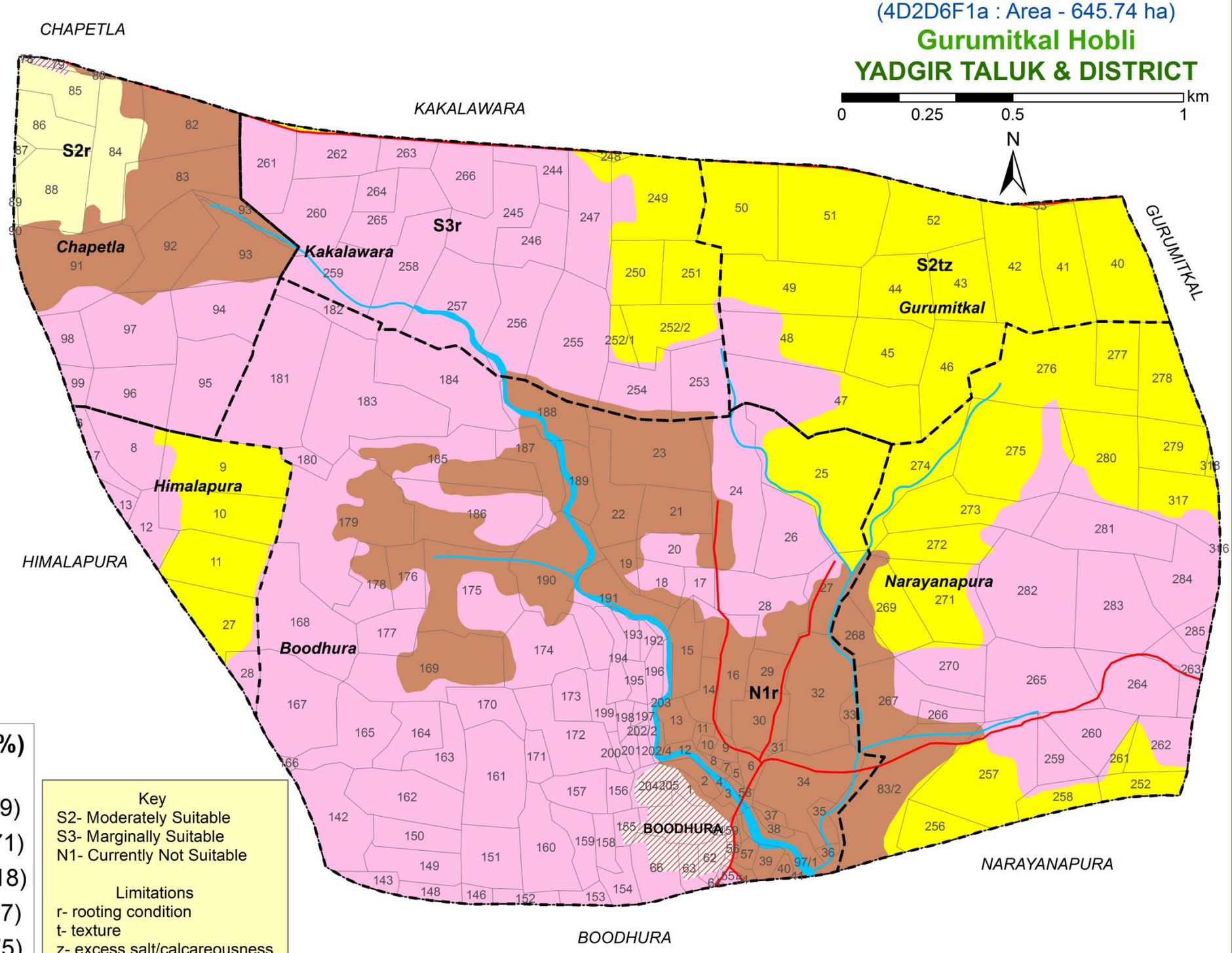
LAND SUITABILITY FOR MARIGOLD

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2r	15 (2.29)
S2tz	172 (26.71)
S3r	318 (49.18)
N1r	130 (20.07)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

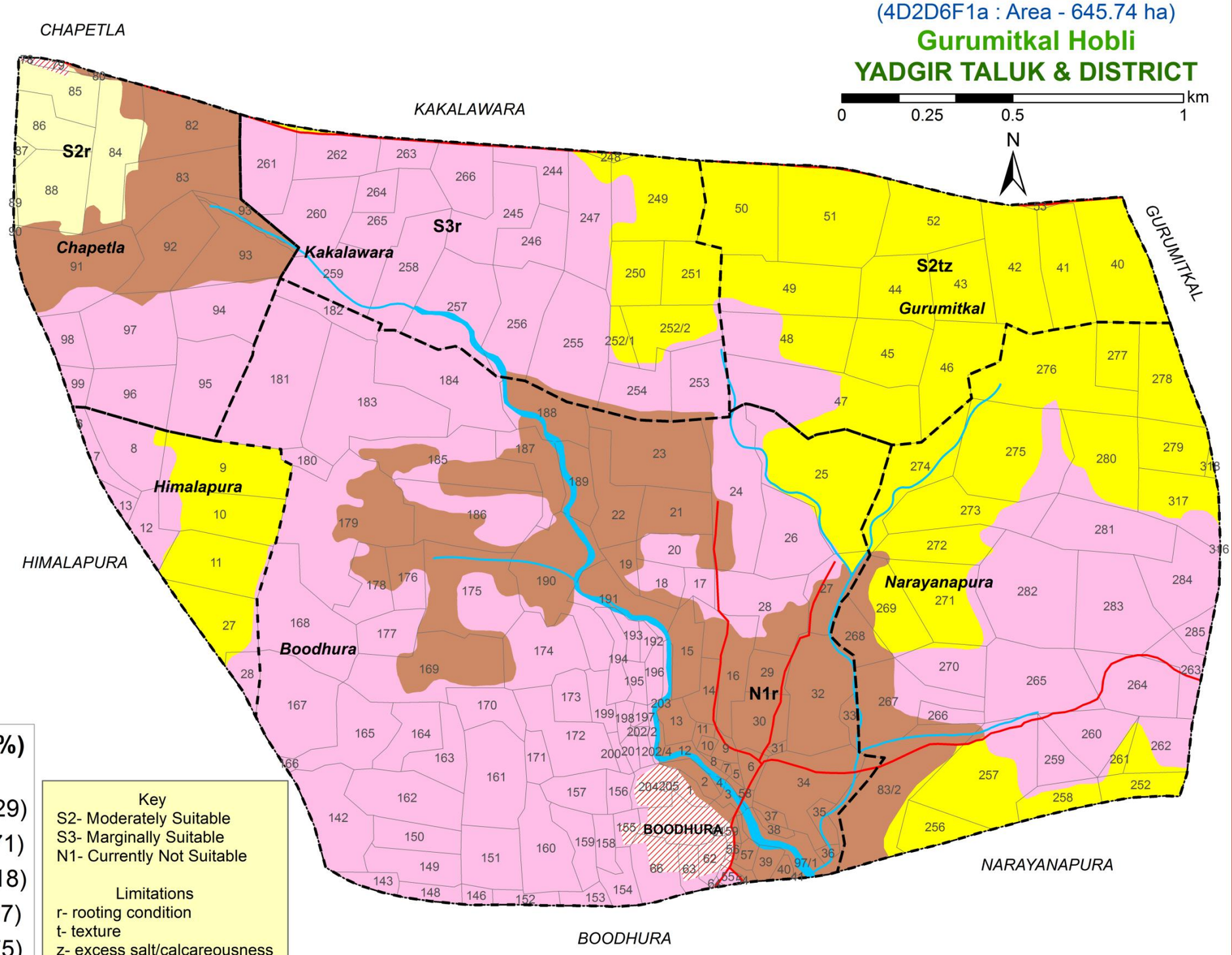
LAND SUITABILITY FOR CHRYSANTHEMUM

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT



References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Suitability subclass	Area in ha (%)
S2r	15 (2.29)
S2tz	172 (26.71)
S3r	318 (49.18)
N1r	130 (20.07)
Others*	11 (1.75)

Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable

Limitations
r- rooting condition
t- texture
z- excess salt/calcareousness

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

8. SOIL AND WATER CONSERVATION PLAN

SOIL & WATER CONSERVATION PLAN

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT

0 0.25 0.5 1 km

N

CHAPETLA

KAKALAWARA

GURUMITKAL

HIMALAPURA

BOODHURA

NARAYANAPURA

Chapetla

Kakalawara

Gurumitkal

Himalapura

Boodhura

Narayanapura

BOODHURA

References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

Legend	Area in ha (%)
Trench cum bunding	130 (20.07)
Graded bunding	484 (74.89)
Strengthening of existing bunds	21 (3.29)
Others*	11 (1.75)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

9. LAND MANAGEMENT UNITS

LAND MANAGEMENT UNITS

Budar Micro-watershed

(4D2D6F1a : Area - 645.74 ha)

Gurumitkal Hobli

YADGIR TALUK & DISTRICT

0 0.25 0.5 1 km

N

CHAPETLA

KAKALAWARA

HIMALAPURA

BOODHURA

NARAYANAPURA

GURUMITKAL

LMU-1

LMU-2

LMU-3

Chapetla

Kakalawara

Gurumitkal

Himalapura

Boodhura

Narayanapura

BOODHURA

References

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- 180 Land parcel with No's
- Village boundary
- Micro-watershed boundary

LMU	Area in ha (%)
LMU-1	172 (26.71)
LMU-2	15 (2.29)
LMU-3	447 (69.25)
Others*	11 (1.75)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

NOTE: *Proposed Crop Plan for LMUs are given in Table*

10.Table. Proposed Crop Plan for Budar Micro-watershed, Gurumitkal Hobli, Yadgir Taluk, Yadgir District based on soil-site–crop suitability Assessment

LMU No	Soil Map Units	Survey Number	Field Crops/ Commercial crops	Horticulture Crops (Rainfed/Irrigated)	Suitable Interventions
1	159.BMNmA1 62.BMNmB2 49.NGPmB2 146.NGPmB2g1 (Deep to very deep, black calcareous clay soils)	**Boodhura :** 25 **Gurumitkal :** 40,41,42,43,44,45,46,48,49, 50,51,52,53 **Himalapura :** 9,10,11,27 **Kakalawara :** 248,249,250,251, 252/1,252/2 **Narayanapura :** 252,256,257,258,261,269,271, 272,273,274,275,276,277,278, 279,280, 317,318	Maize, Sorghum, Sunflower, Cotton, Red gram, Bengalgram, Bajra	**Fruit crops:** Lime, Musambi, Custard apple, Pomegranate **Vegetables:** Chilli, Bhendi **Flowers:** Marigold, Chrysanthemum	Application of FYM, Bio-fertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
2	152.JNKmB2 (Moderately shallow, sandy clay loam soils)	**Chapetla :** 84,85,86,87,88,89	Maize, Sorghum Groundnut, Bajra	**Fruit crops:** Amla, Custard apple **Vegetables:** Tomato, Chilli, Brinjal, Bhendi, Onion **Flowers:** Marigold, Chrysanthemum	Application of FYM, Bio-fertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices

To be continued..

LMU No	Soil Map Units	Survey Number	Field Crops/ Commercial crops	Horticulture Crops (Rainfed/ Irrigated)	Suitable Interventions
3	162.BDLhB2g1 5.BDLiB2 6.BDLiB3 118.BDPcB2 1.BDPiB2 119.BDPiB3 161.HTKbB2g1 (Shallow, sandy loam soils)	**Boodhura :** 2,3,5,6,7,8,9,10,11,12,13,14,15,16, 17,18,19,20,21,22,23,24,26,27,28, 29,30,31,32,33,34,35,36,37,38,39, 40,41,54,55,56,57,58,59,64,66,97/1, 142,143,146,148,149,150,151,152, 153,154,155,156,157,158,159,160, 161,162,163,164,165,166,167,168, 169,170,171,172,173,174,175,176, 177,178, 179,180,181,182,183,184, 185,186,187,188,189,190,191,192, 193,194,195,196,197,198,199,200, 201,202/1,202/2,202/3,202/4 **Chapetla :** 80,82,83,90,91,92,93,94,95,96,97, 98,99 **Gurumitkal :** 47 **Himalapura:** 6,7,8,12,13,28 **Kakalawara :** 244,245,246,247,253,254,255,256, 257,258,259,260,261,262,263,264, 265,266 **Narayanapura :** 83/2,259,260,262,263,264,265,266, 267,268,270,281,282,283,284,285, 316	-	**Agri-Silvi-Pasture:** Hybrid Napier, *Styloxanthes hamata, Styloxanthes scabra*	Use of short duration varieties, sowing across the slope, drip irrigation and mulching is recommended

PART - B

Hydrological Inventory of Dharmapur Sub-watershed, Yadgir Taluk, Yadgir District, Karnataka for Watershed Planning and Development

Sujala - III
Karnataka Watershed Development Project-II
Watershed Development Department
Government of Karnataka

THE WORLD BANK

Hydrological Inventory of Dharmapur Sub-watershed, Yadgir Taluk, Yadgir District, Karnataka for Watershed Planning and Development

Prepared by
ICAR-National Bureau of Soil Survey and Land Use Planning
Regional Centre, Hebbal, Bangalore - 560 024

ICAR - NBSS & LUP

Phone:080-23412242

E-mail: hd_rcb.nbsslup@icar.gov.in
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Dr. K .V. Niranjana	Chief Technical Officer
Sh. R.S.Reddy	Consultant
Sh. A.G.Devendra Prasad	Consultant
Smt. K.Karunya Lakshmi	Research Associate
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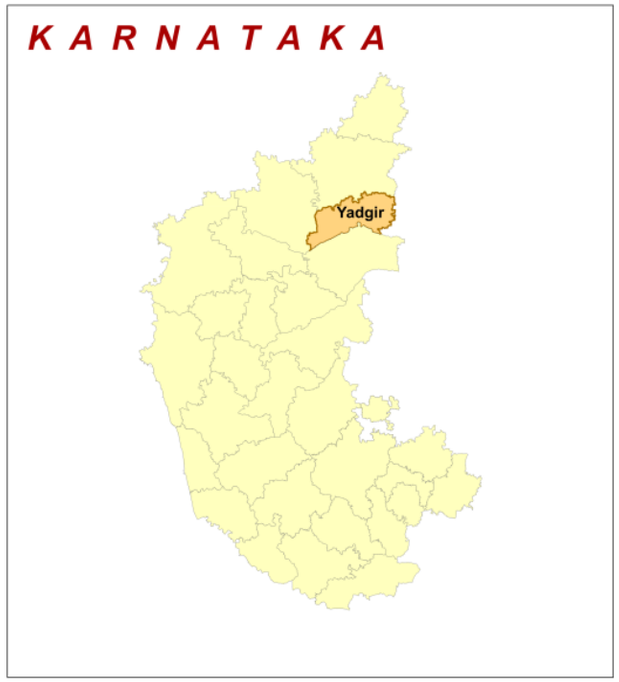
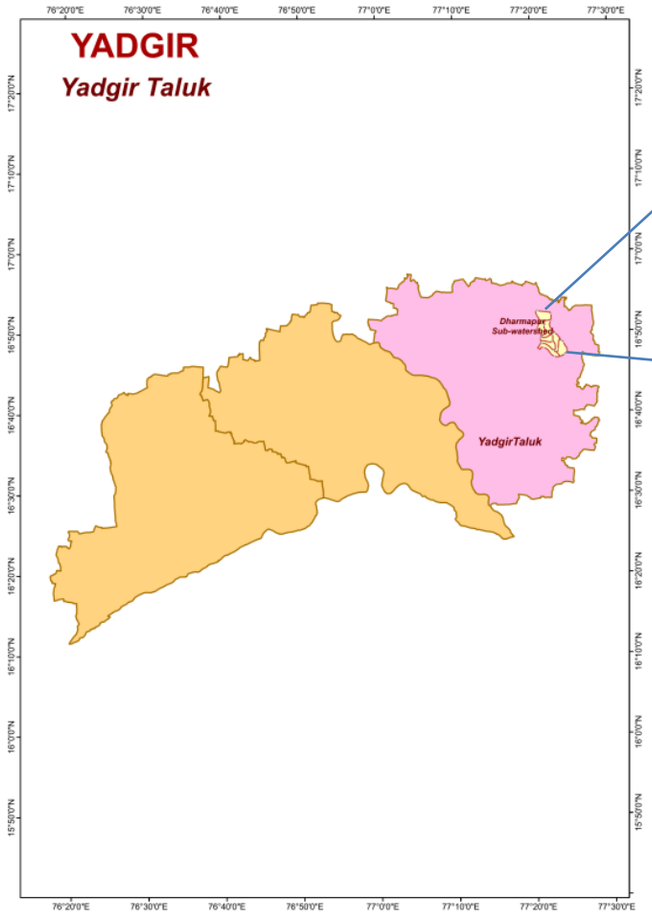
Dr. Sekhar Muddu (Reviewed and approved)	Professor & Lead Scientist, Dept. of Civil Engineering & ICWaR, IISc, Bangalore
	Email: hd_rcb.nbsslup@icar.gov.in nbssrcb@gmail.com **Phone: Office:** 080-23412242,23410993 **Fax:** 080-23510350

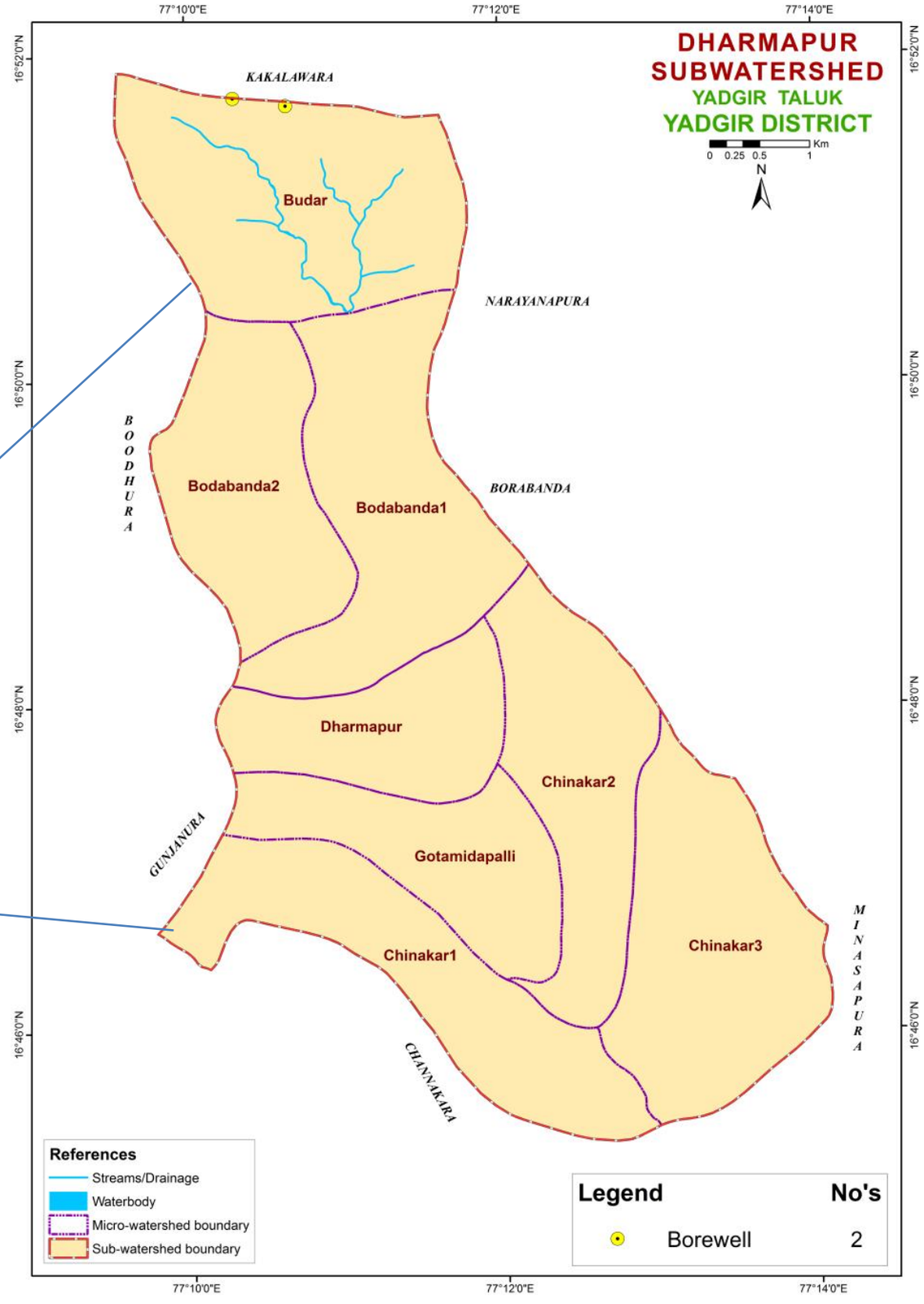
INTRODUCTION

- The inventory and documentation of spatial and temporal changes in hydrological components of Dharmapur sub-watershed (4D2D6F) in Yadgir taluk, Yadgir district, has been undertaken for integrated planning, development and management at the level of soil mapping units.
- Dharmapur sub-watershed (Yadgir taluk, Yadgir district) is located between $16^0$50'52''–16^0 52'40'' North latitudes and 77^0 20'37''– 77^0 22'21'' East longitudes, covering an area of about 3825 ha.
- This sub-watershed encompasses of 8 MWs namely, Bodabanda-2 (4D2D6F1b), Budar (4D2D6F1a), Bodabanda-1 (4D2D6F1c), Chinakar-2 (4D2D6F2c), Dharmapur (4D2D6F2a), Chinakar-3 (4D2D6F2e), Gotamidapalli (4D2D6F2b) and Chinakar-1 (4D2D6F2d) micro watersheds. Land Resource Inventory (LRI) was generated for one among eight micro-watersheds.
- Average annual rainfall (1960-2014) of the Hobli (Block) pertaining to the sub-watershed is 887 mm.
- In this sub-watershed major *kharif* crops grown are Maize, Cotton, Sunflower, Groundnut, Redgram, Chilli, Soybean , Paddy and major *rabi* crops are Sorghum, Bengal gram and Bajra.
- Hydrological components namely rainfall (annual, *kharif*, *rabi* and summer), PET, AET, runoff, surface soil moisture, ground water status and water balance are presented.

LOCATION MAP OF DHARMAPUR SUB-WATERSHED

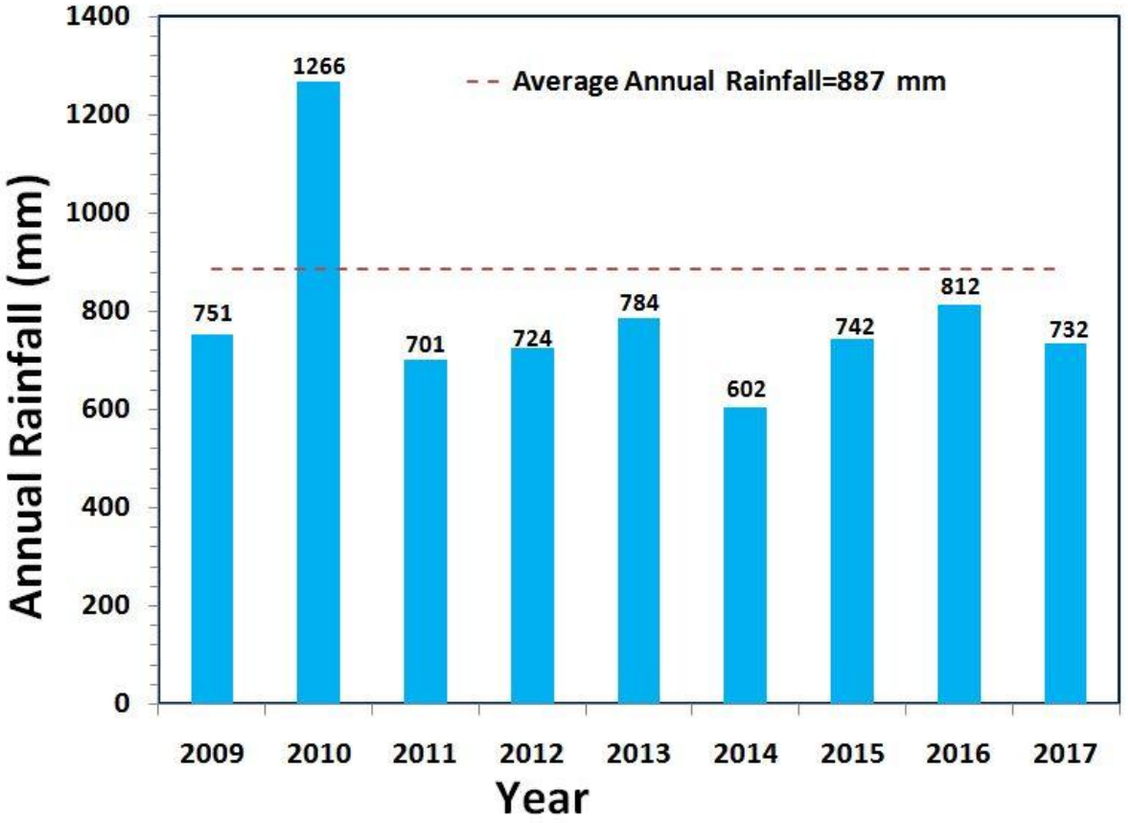






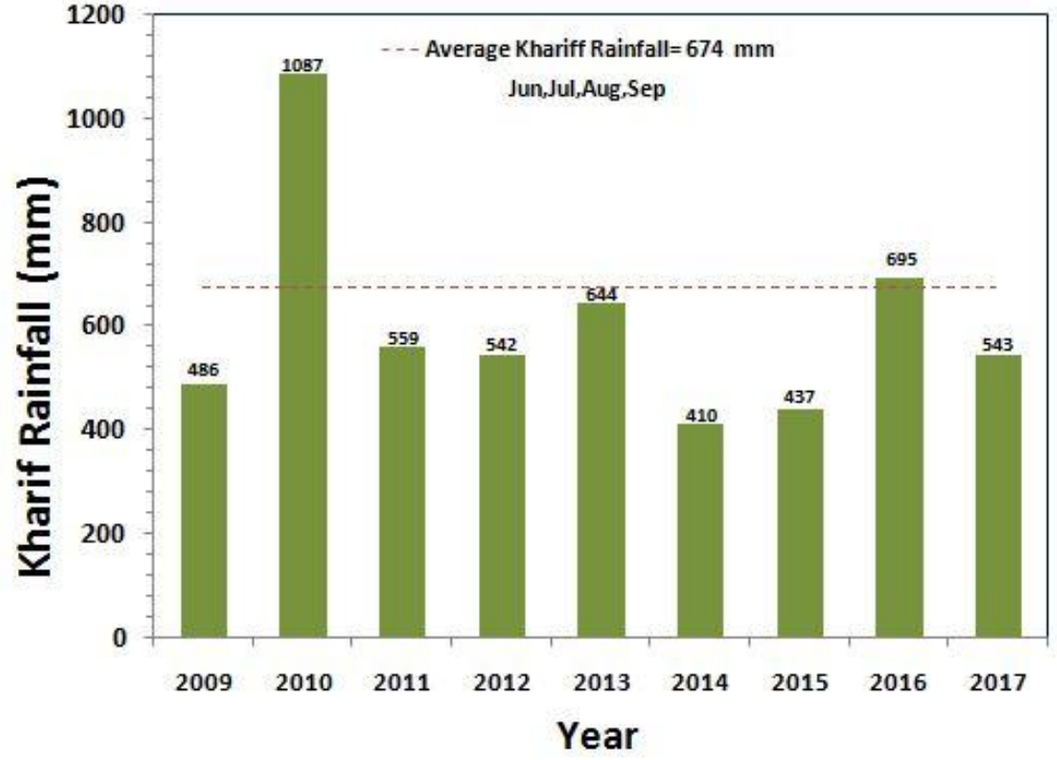
Soil & Water Conservation Structures in Dharmapur Sub-watershed, Yadgir taluk, Yadgir district

RAINFALL INDEX

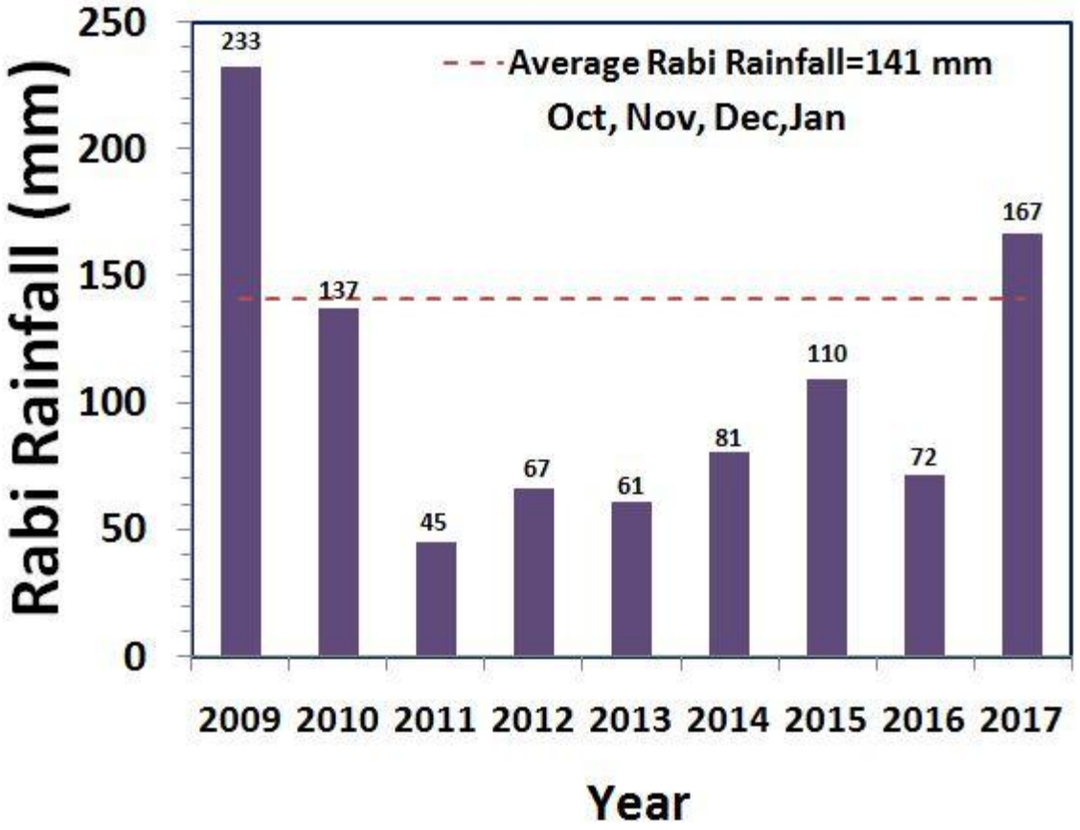


The average annual rainfall (1960-2014) recorded at the Yadgir Station in Yadgir Taluk of Yadgir District is 887 mm. The annual rainfall at Konkala station (Hobli H.Q.) is presented. During the years 2009, 2011, 2012, 2013, 2014, 2015, 2016 and 2017 the annual rainfall was deficient by 15%, 21%, 18%, 12%, 32%, 16%, 8% and 17% respectively.

The *kharif* rainfall (Jun–Sep) is an average about 75% of the annual rainfall and it typically follows the annual rainfall patterns. During the years 2009, 2011, 2012, 2013, 2014, 2015 and 2017 the *kharif* rainfall was deficient by 28%, 17%, 20%, 39%, 32%, 35% and 19% respectively.

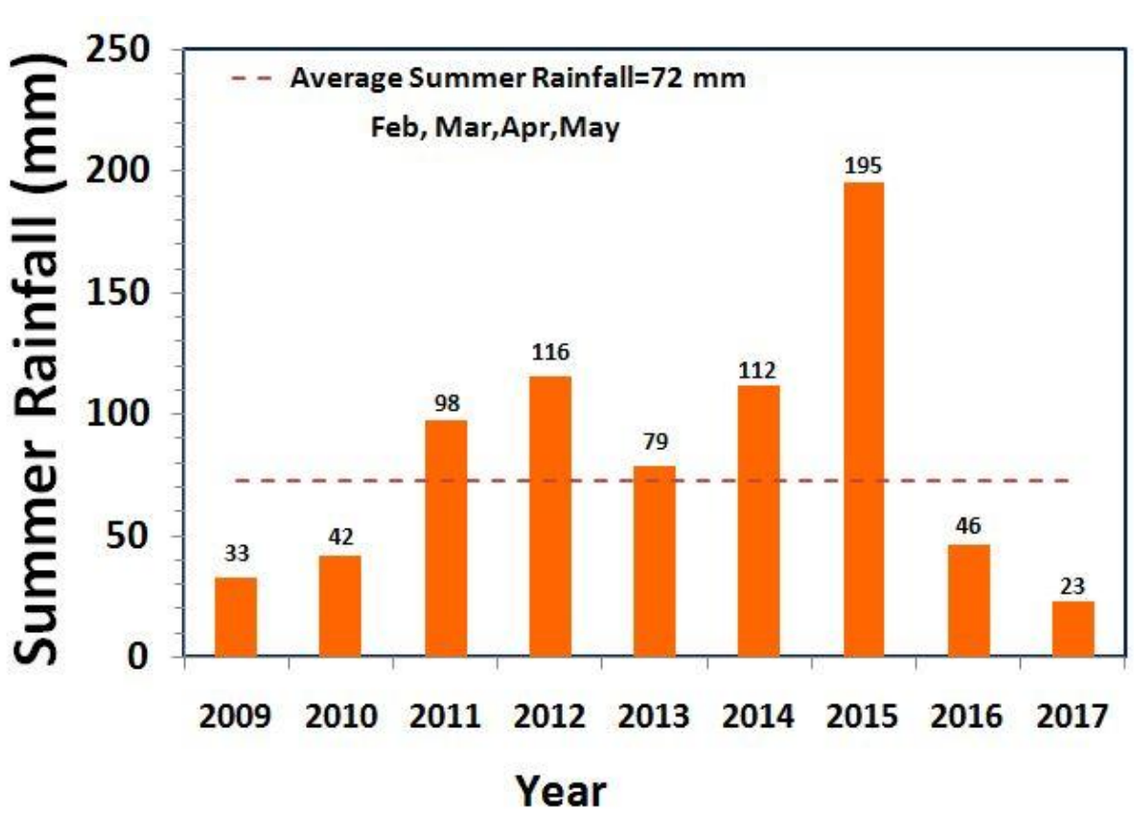


RAINFALL INDEX

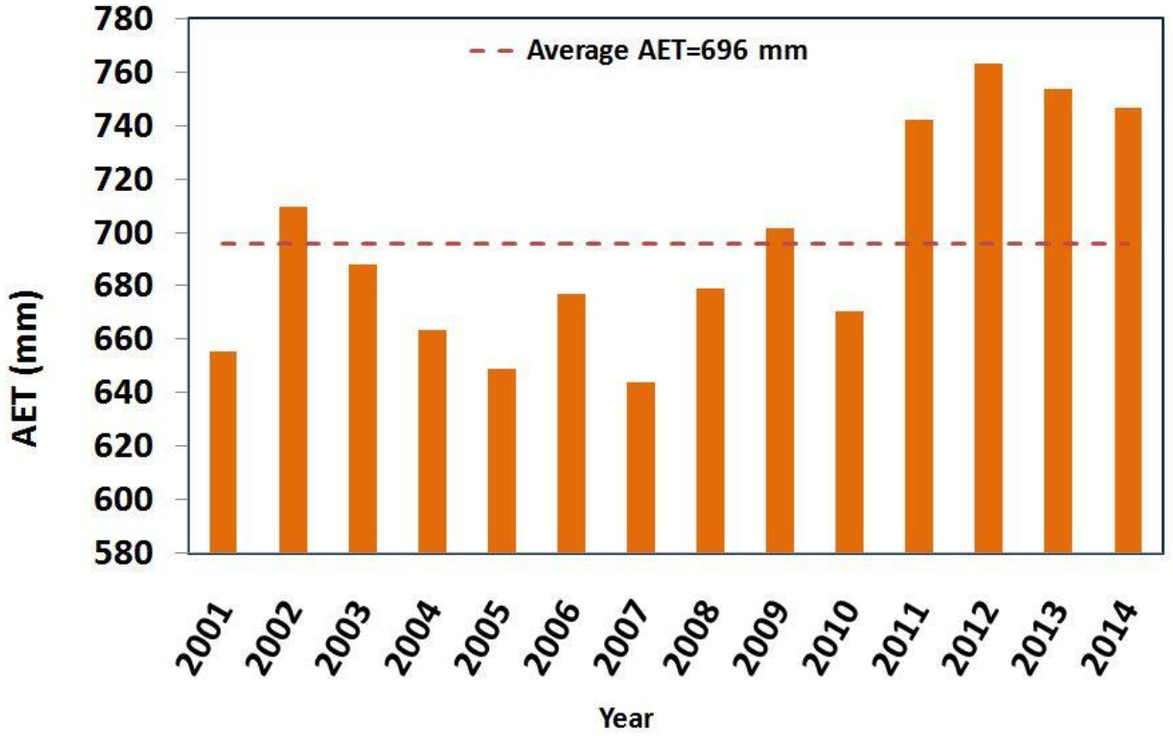


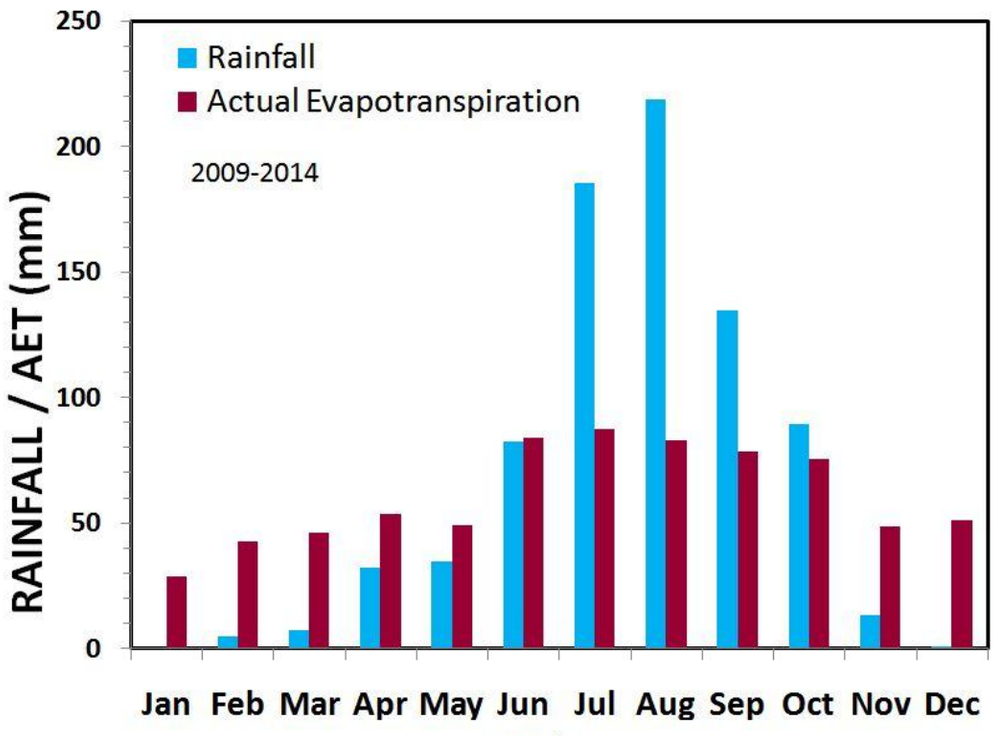
The average *rabi* rainfall (Oct-Jan) is about 14% of the average annual rainfall. During the years 2009 and 2017 high *rabi* rainfall was received, where as other years showed deficient rainfall.

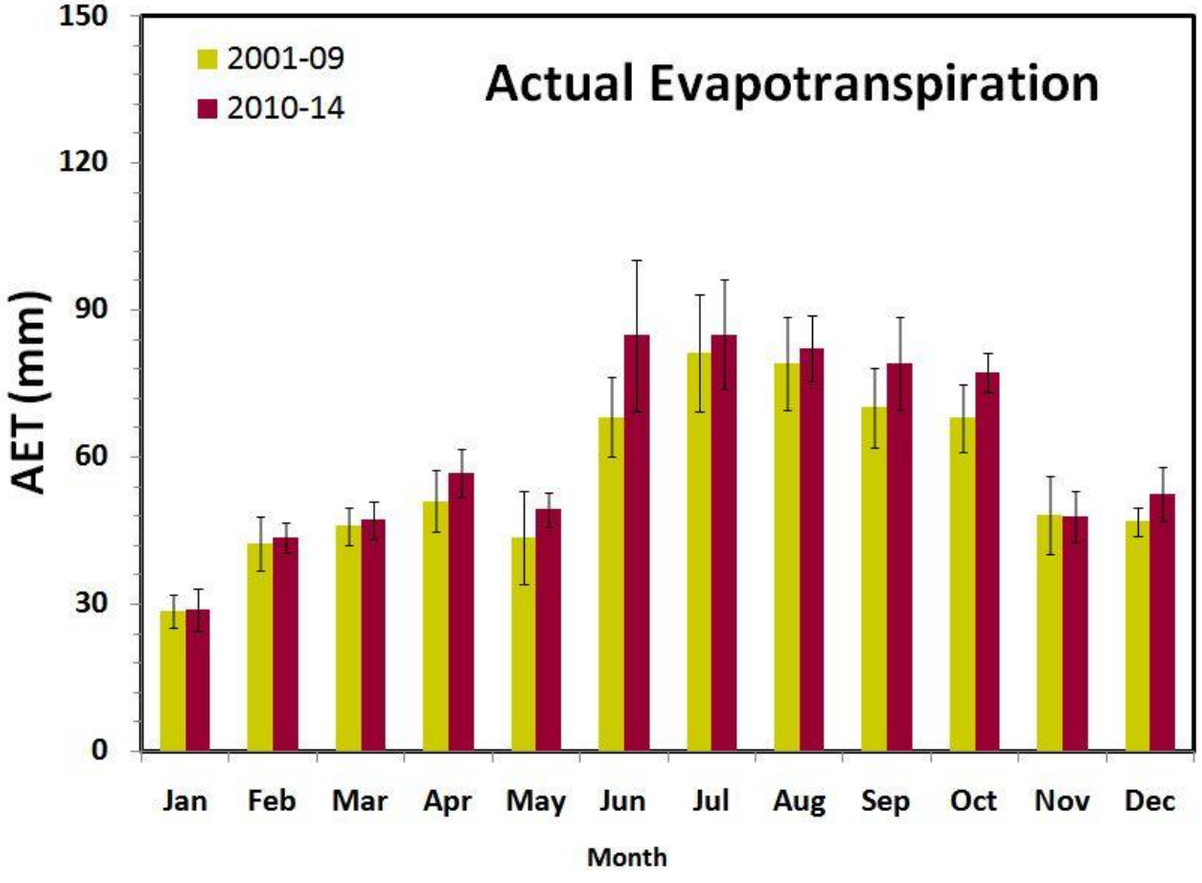
The average summer rainfall (Feb-May) is about 11% of the average annual rainfall.



EVAPOTRANSPIRATION

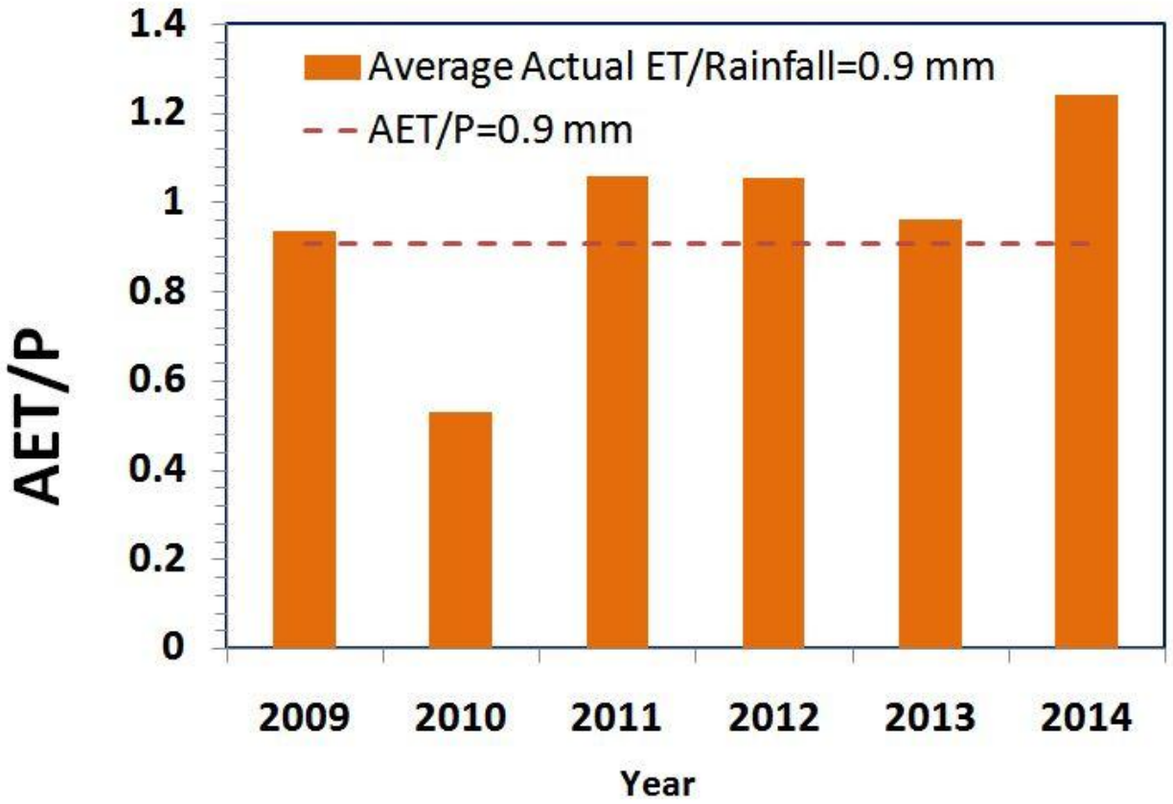


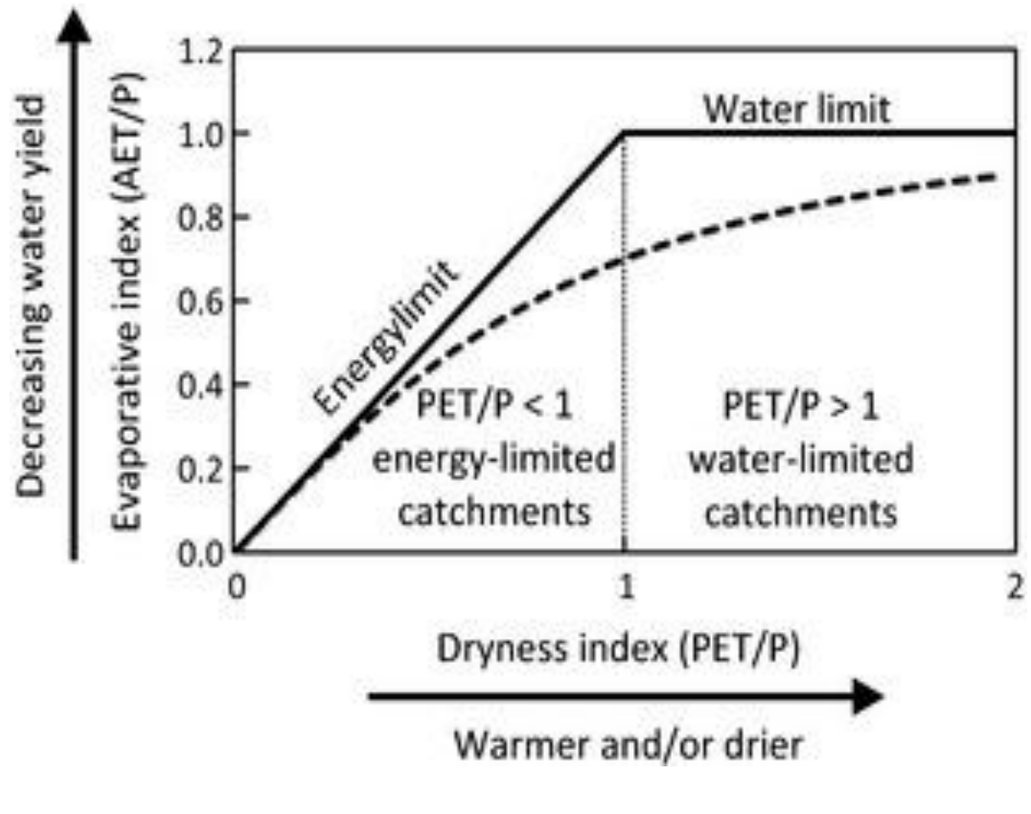




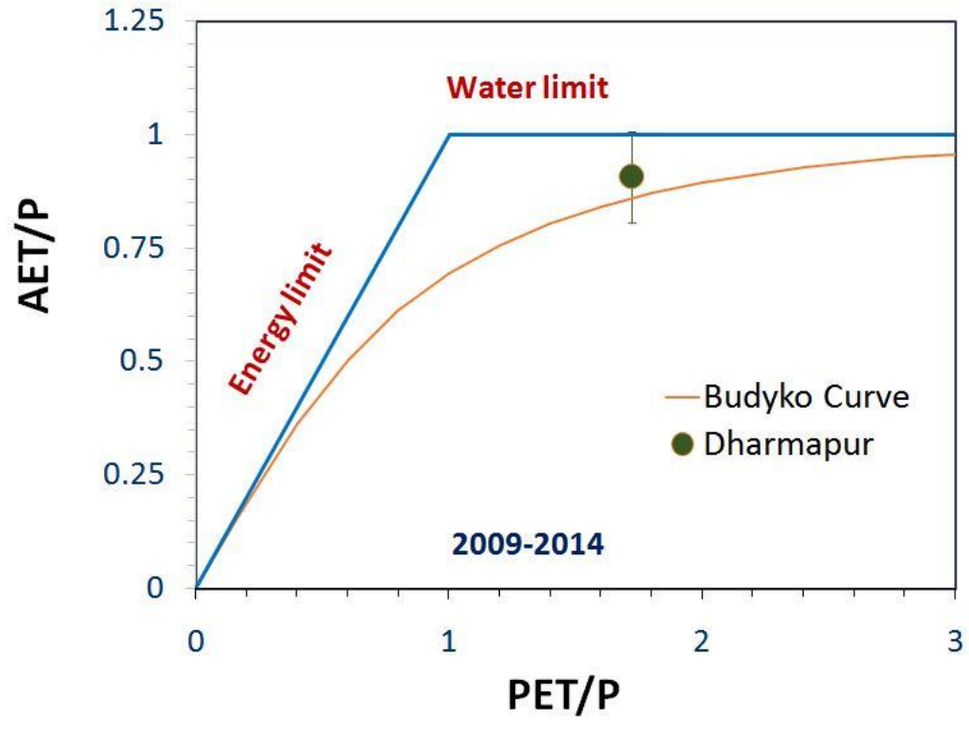
The average annual actual ET is lower than the average rainfall. During *kharif*, average rainfall and ET was found to be 600 mm and 333 mm respectively, whereas in *rabi* it was about 108 mm and 204 mm. In comparison to the 2001-2009, the annual ET increased by 8% during 2010-2014.

EVAPOTRANSPIRATION INDEX

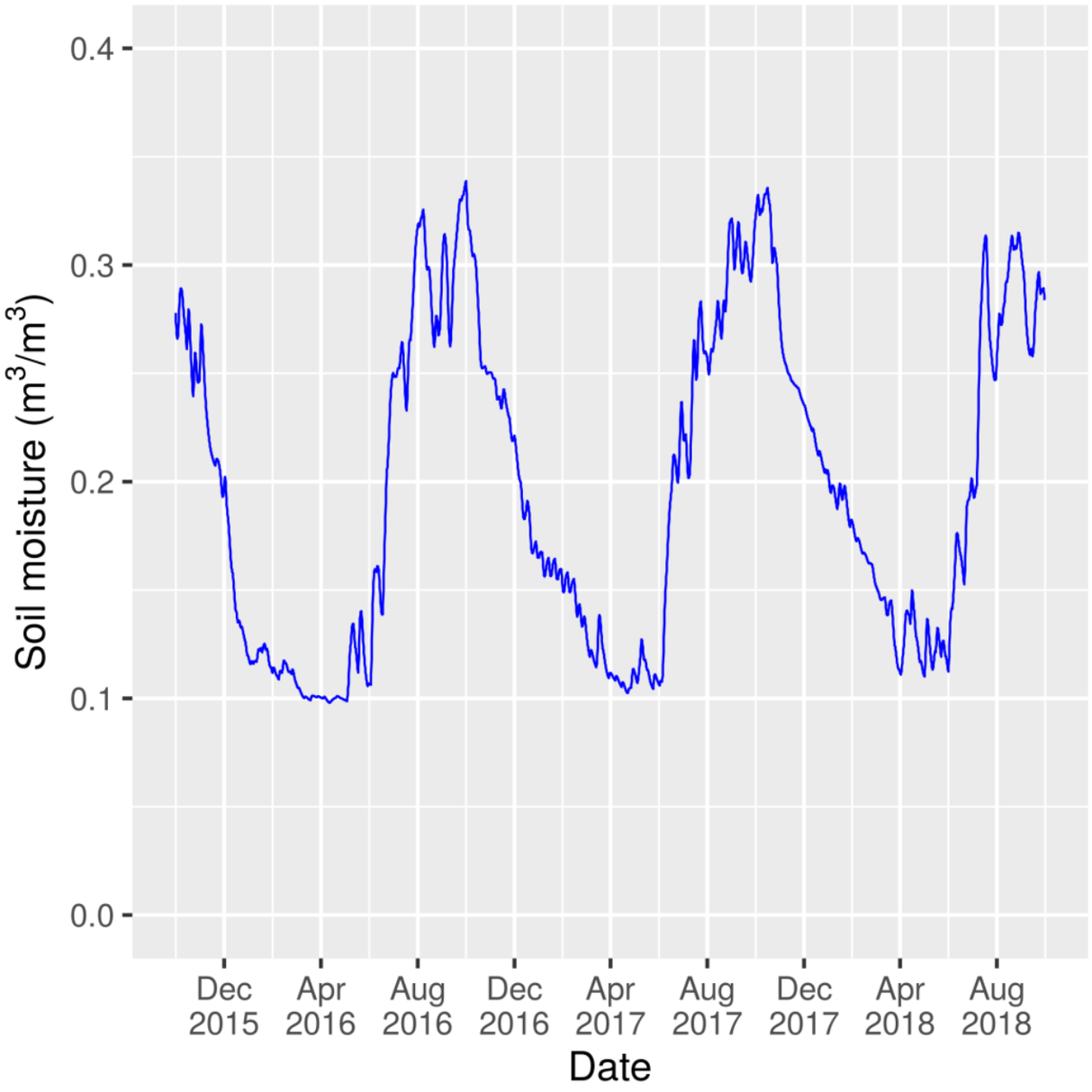


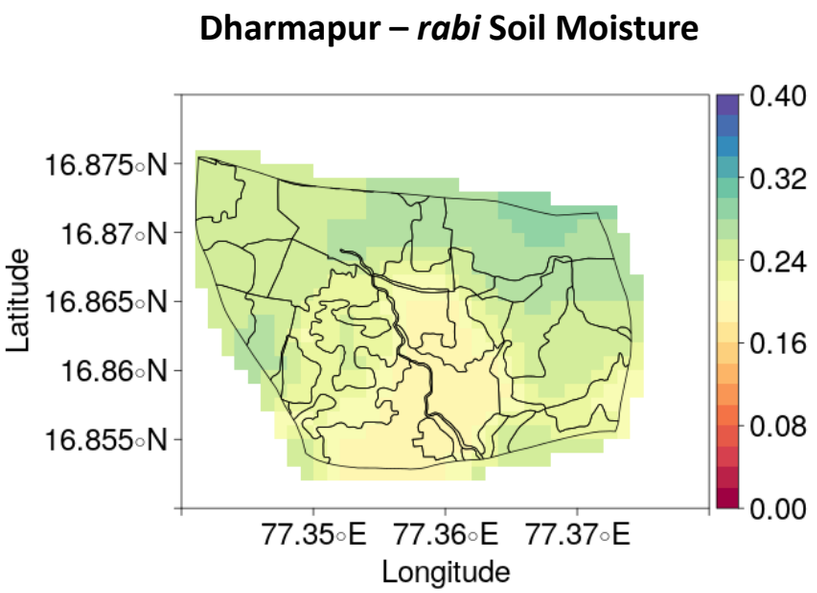


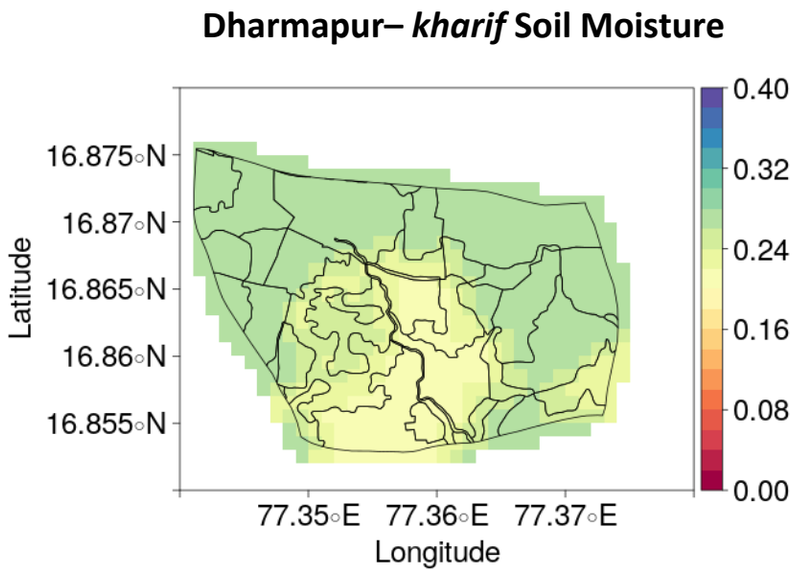
The average AET/P ratio was about 90%, which is slightly higher than the sustainable limit of about 80%. Even during extremely lower rainfall year of 2011, AET was 670 mm. This suggests the presence of water storage and utilization from other sources such as groundwater, which buffered the lower rainfall.



SATELLITE RETRIEVED SOIL MOISTURE





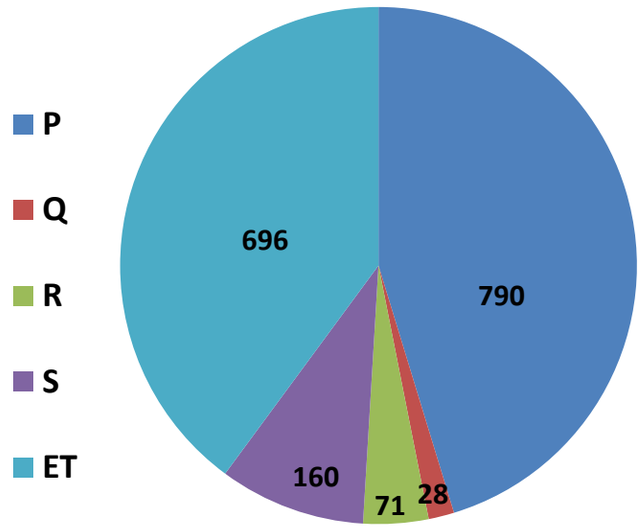


The method developed for retrieving soil moisture from multi-satellite observations allowed to map surface soil moisture behavior in the micro-watershed. The available surface moisture was varied in the range of 12-33 % in *kharif* and 34-17 % in *rabi* seasons of 2016, 12-33 % in *kharif* and 33-20% in *rabi* seasons of 2017.

WATER BALANCE

$$Q = P - E - R - S$$

- Q = Runoff
- P = Precipitation
- E = Evapotranspiration
- R = Groundwater recharge
- S = Soil moisture storage change

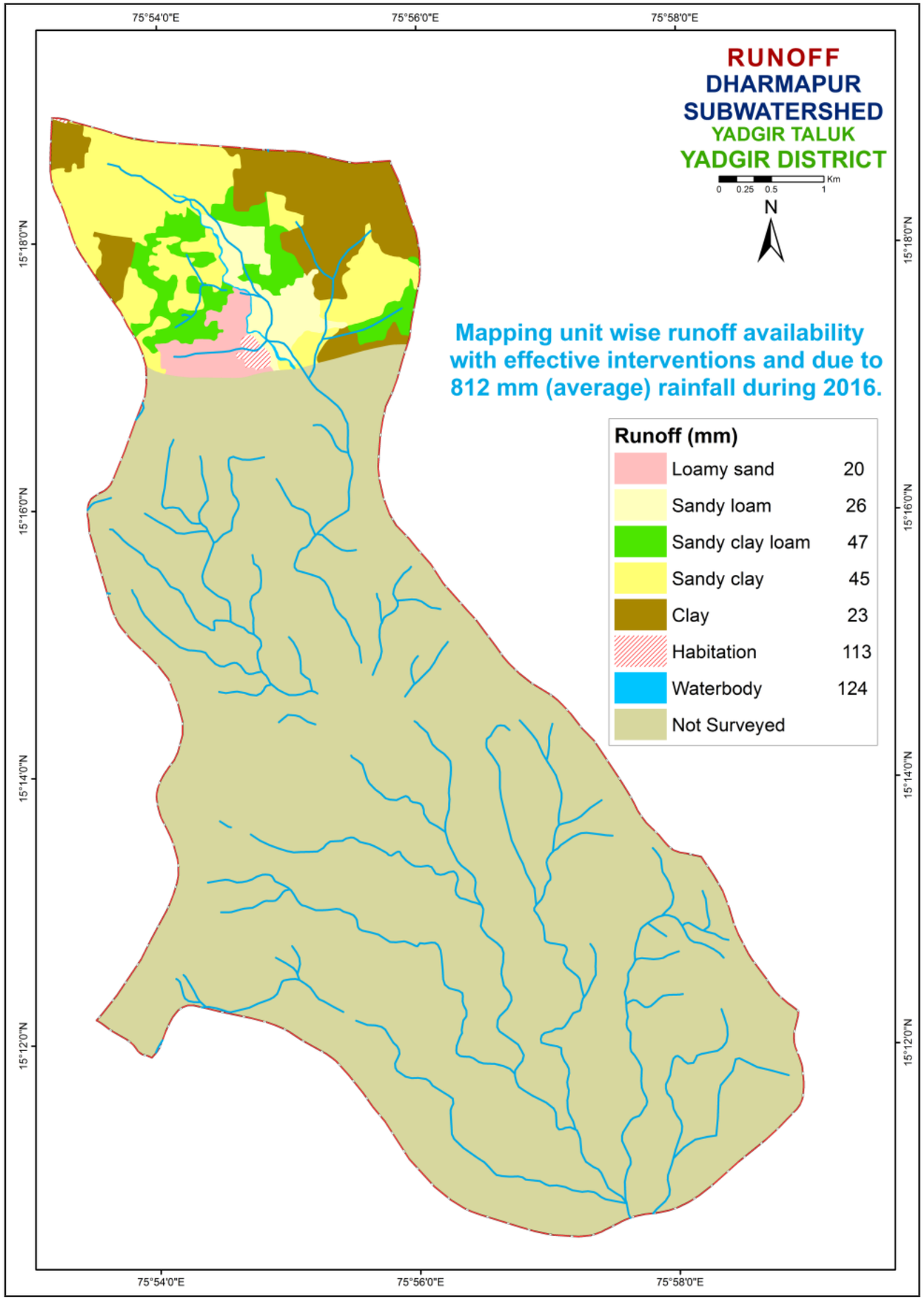


During June-October months, Precipitation is higher than Evapotranspiration, hence Runoff can occur in the watershed.

P = 790 mm (average of 2009-2017) ET = 696 mm R = 71 mm S = 160 mm Q = 28 mm

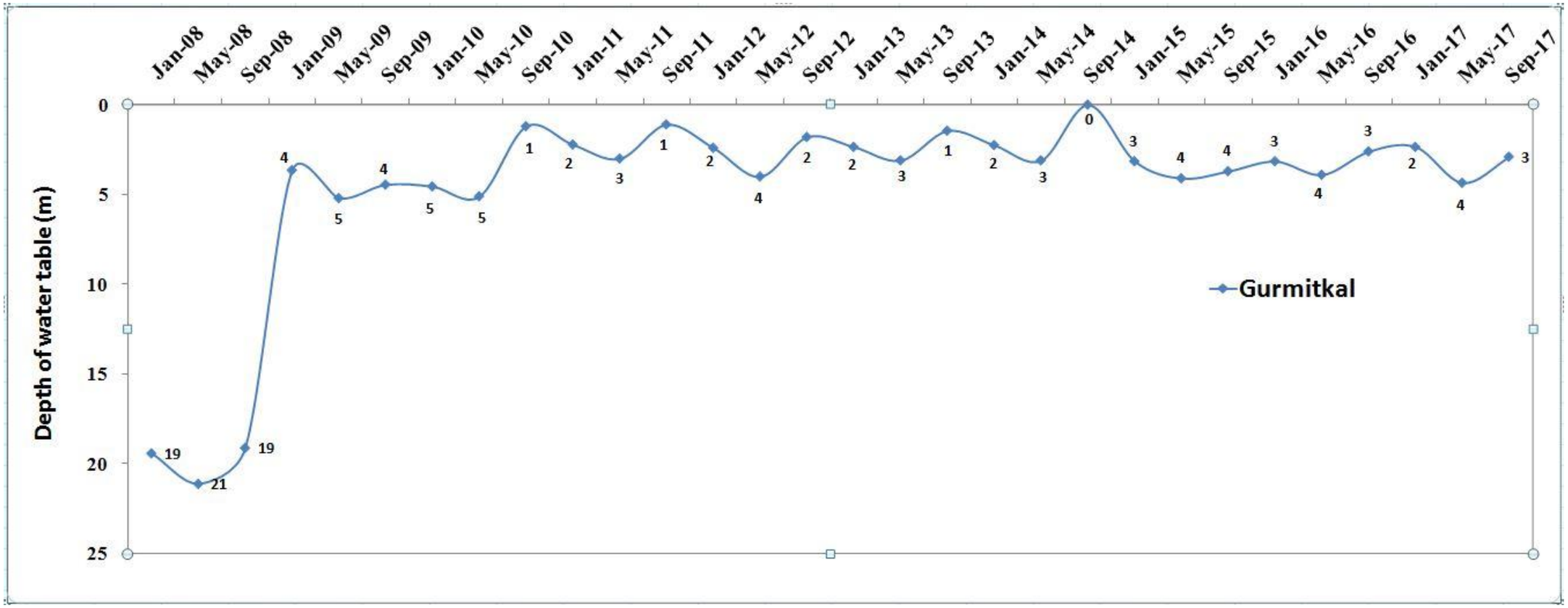
Sl. No.	Parameters	Average_ 2016 (mm)
1.	Rainfall	812
2.	Runoff availability with existing conditions	81
3.	Runoff availability with effective interventions	35
4.	Runoff allowed as environmental flow at the outlet	7
5.	Runoff excess for harvesting by construction of structures	28

RUNOFF


75°54'0"E
75°56'0"E
75°58'0"E
15°18'0"N
15°16'0"N
15°14'0"N
15°12'0"N
RUNOFF
DHARMAPUR
SUBWATERSHED
YADGIR TALUK
YADGIR DISTRICT
0 0.25 0.5 1 Km
N
Mapping unit wise runoff availability with effective interventions and due to 812 mm (average) rainfall during 2016.
Runoff (mm)
Loamy sand 20
Sandy loam 26
Sandy clay loam 47
Sandy clay 45
Clay 23
Habitation 113
Waterbody 124
Not Surveyed

GROUND WATER STATUS

GURMITKAL STATION



The total number of wells present in Dharmapur Sub-watershed as per LRI data is 2 (2-Borewells). The groundwater level was found from the data obtained from KSNDMC for the nearest station Gurmitkal .The above graph depicts the groundwater levels during the years 2009-2017 were slightly varying. Whereas groundwater levels during the year 2008 was declined . Deepest levels were found in 2008.

x

SUMMARY

- The average annual rainfall of 887 mm in the Dharmapur sub-watershed as recorded from the Konkala station data by KSNDMC.

- 75%, 14% and 11% of the annual rainfall occurs during *kharif*, *rabi* and summer seasons respectively and exhibited a higher temporal variability.

- The evapotranspiration estimation tool developed indicates that the watershed water balance is in deficit .The cropping & irrigation choices are not appropriate and need to be altered to shift the deficit water balance.

- The estimated runoff available to use is 28 mm for an average annual rainfall of 790 mm (2009-2017). The utilizable groundwater is 49.7 mm (70% of 71 mm recharge estimated). This means the total available water resource combining the soil moisture store for kharif & rabi (160 mm) and utilizable runoff plus recharge is 238 (=160+50+28)

- The average actual evapotranspiration estimated in the watershed based on the current land use and irrigation practices for the kharif and rabi seasons is 537 mm. Hence the amount of water use for kharif and rabi seasons may be estimated as 671 mm (i.e 125% of AET). This demand for the two seasons is higher by 433 mm, i.e. (671-238). The AET in June-Sept months is only 54% of rainfall. Hence, there is a good opportunity to harvest the excess water through watershed management practices for utilizing during rabi season.

- The total number of wells present in Dharmapur Sub-watershed as per LRI data is 2 (2-Borewells). The groundwater level was found from the data obtained from KSNDMC for the nearest station Gurmitkal. Deepest levels were found in 2008.