



**GOVERNMENT OF PAKISTAN
MINISTRY OF WATER AND POWER
PROJECT MANAGEMENT & POLICY IMPLEMENTATION UNIT (PMPIU)**

**Water Sector Capacity Building and Advisory
Services Project (WCAP)**

**Development of National Flood Protection Plan-IV (NFPP-IV)
and Related Studies to Enhance the Capacity of
Federal Flood Commission-FFC**

**LANDUSE AND
DISTRICT LEVEL SUBMERGENCE PLANS**

**DISTRICT LOWER DIR
KHYBER PAKHTUNKHWA PROVINCE**

JUNE 2015



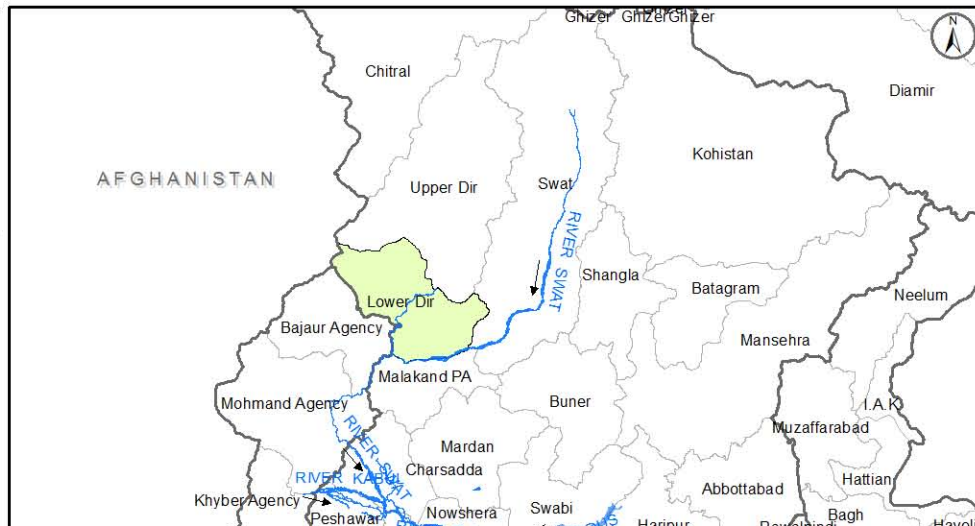
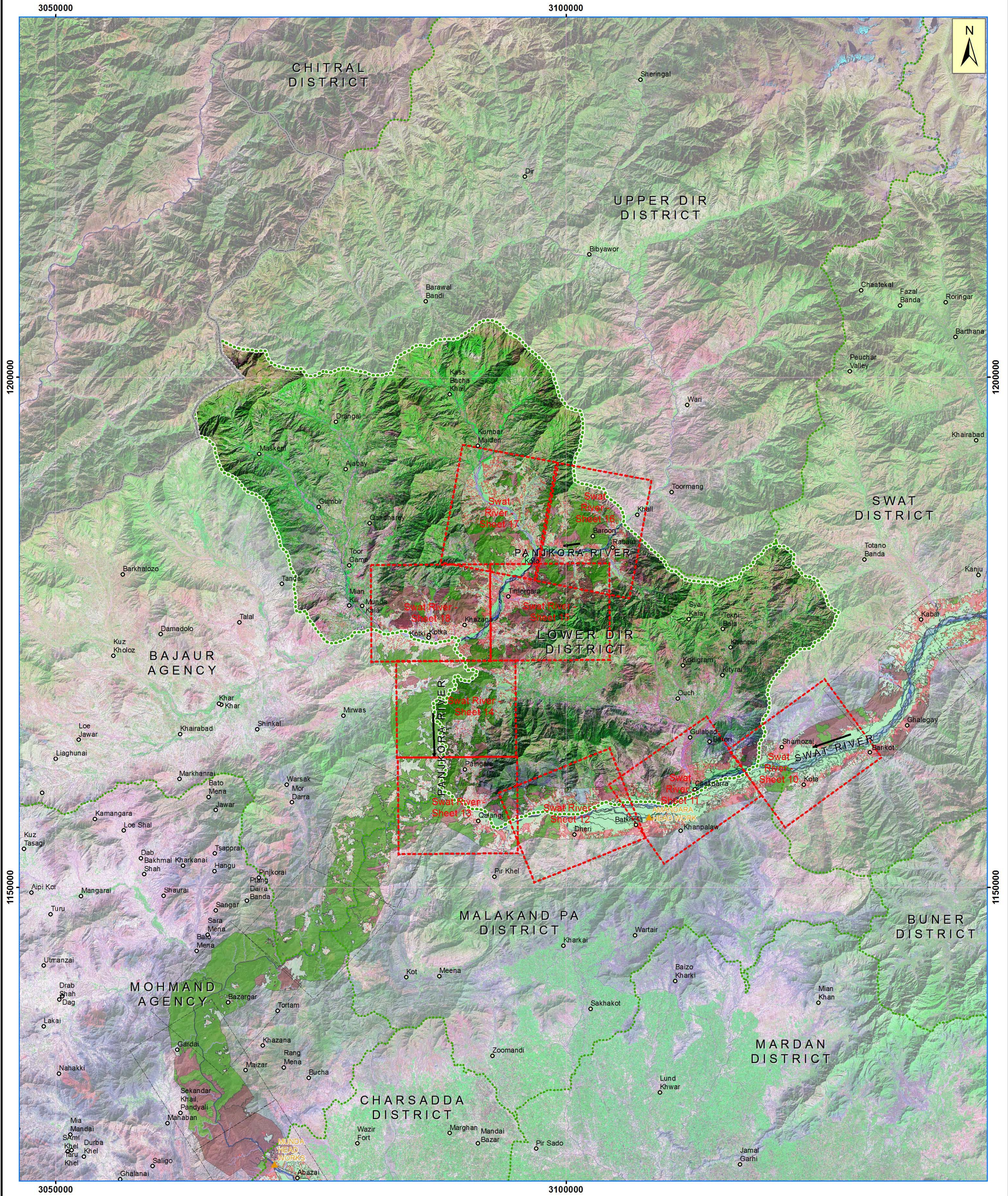
**NATIONAL ENGINEERING SERVICES
PAKISTAN (PVT) LIMITED**
1-C, BLOCK-N, MODEL TOWN EXTENSION,
LAHORE - PAKISTAN

*in
association
with*



DELTA RES
THE NETHERLANDS
P.O. BOX 177, 2600 MH DELFT, ROTTERDAMSEWEG
185, 2629 HD DELFT, THE NETHERLANDS

LOWER DIR DISTRICT



DEVELOPMENT OF NATIONAL FLOOD PROTECTION PLAN-IV (NFPP-IV)
AND RELATED STUDIES TO ENHANCE THE CAPACITY OF
FEDERAL FLOOD COMMISSION-FFC

LOWER DIR DISTRICT

Client :
FEDERAL FLOOD COMMISSION
Ministry of Water & Power

Consultants:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED
1-C , Block-N, Model Town Extension,
Lahore - Pakistan.

in association with

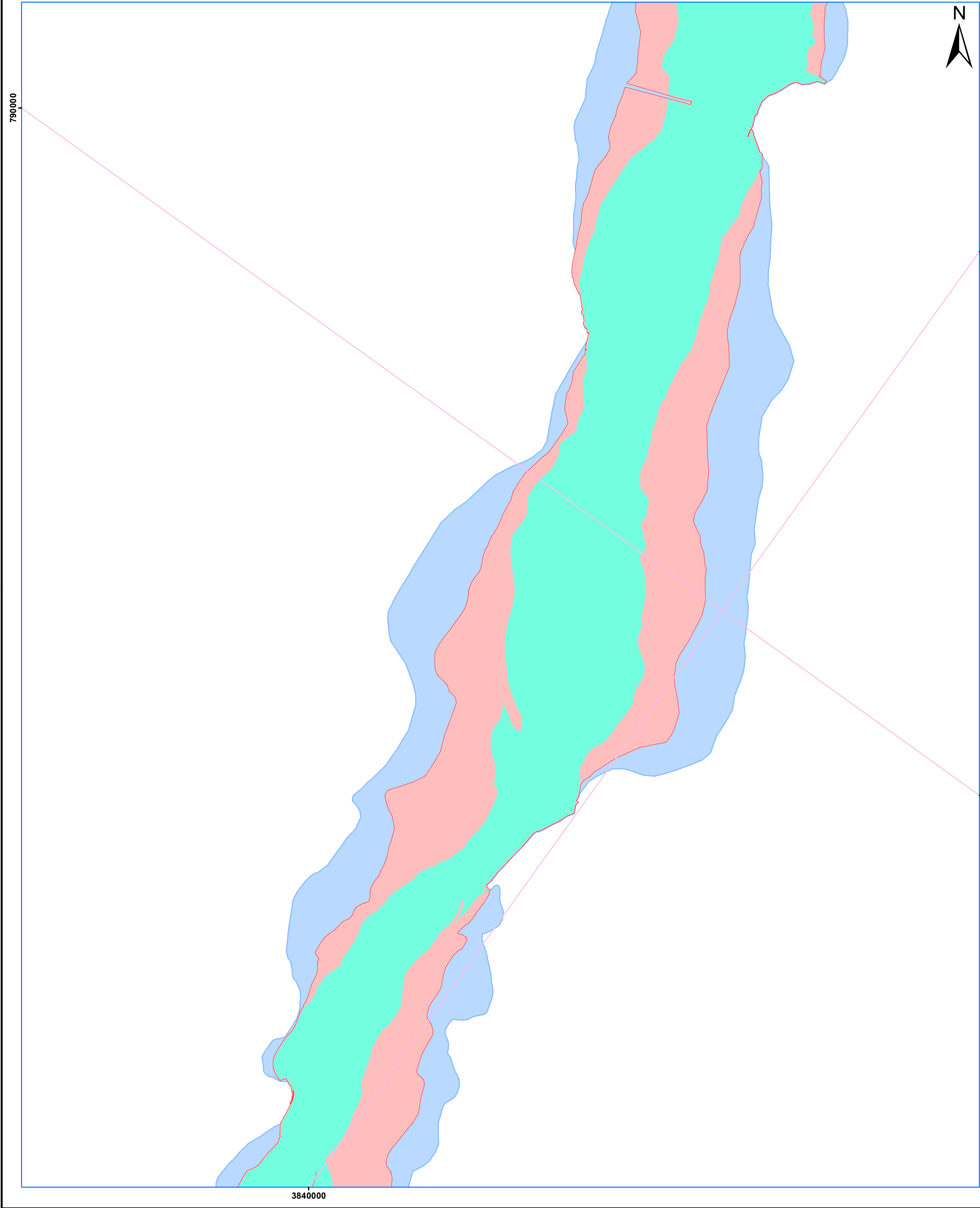
DELTARES, THE NETHERLANDS

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Source of Information:
1. Topographic sheets of Survey of Pakistan
2. Freely available satellite imagery

Coordinate System
PROJECTION: Lambert Conformal Conic (LMPAK-I) ,
DATUM: WGS84
 Grid Reference is in meters

Date: June 30, 2015

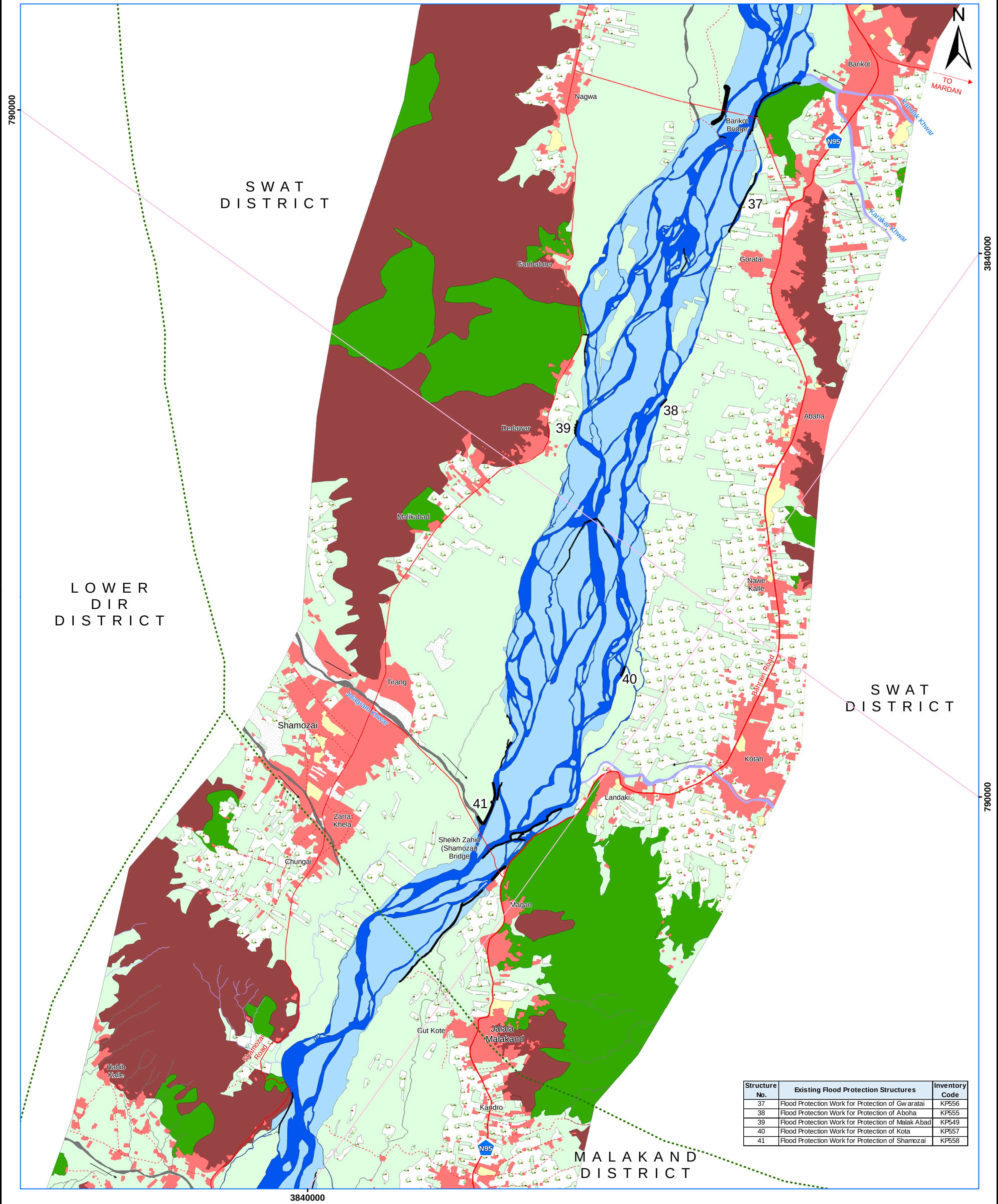


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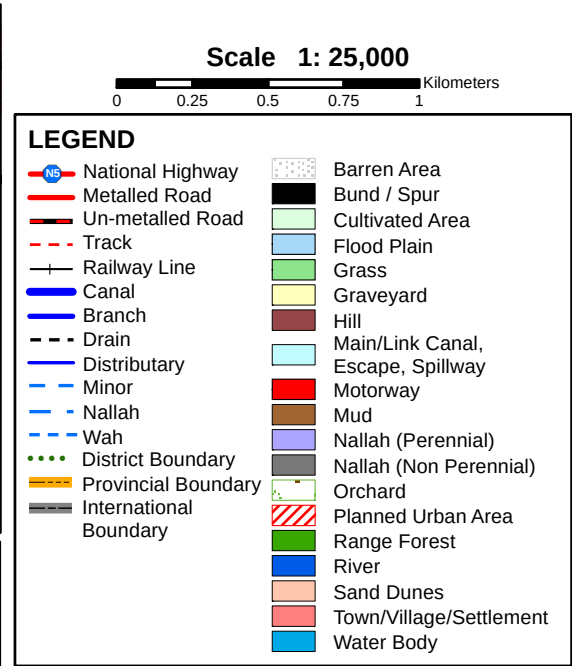
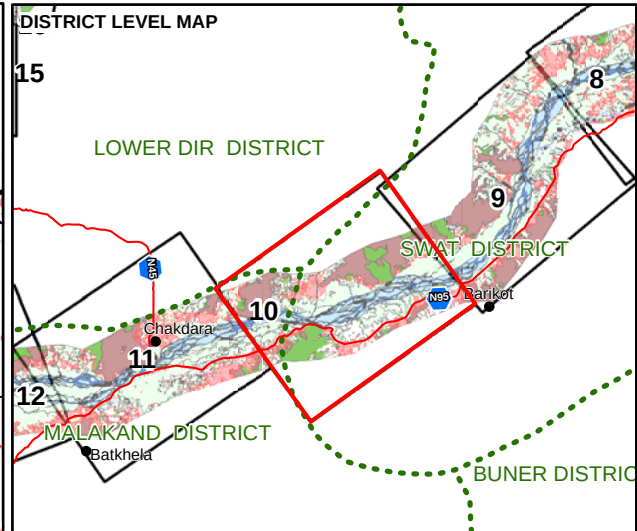
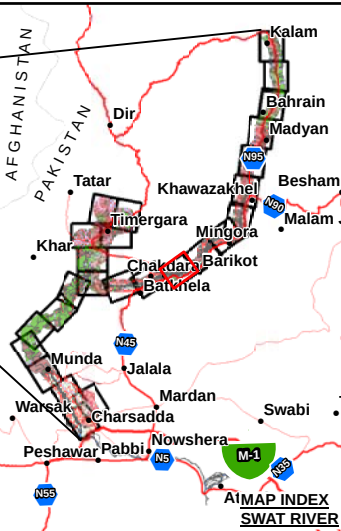
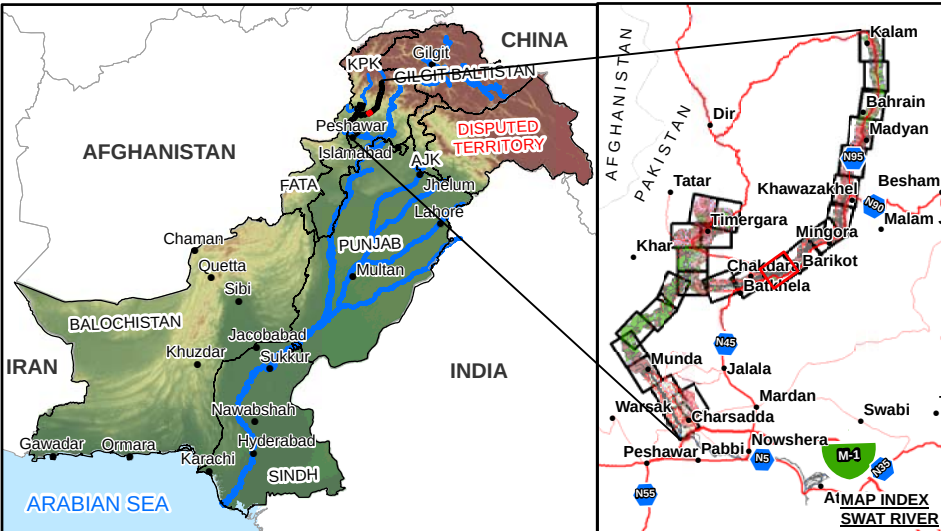
LEGEND

- High Risk Zone (Inundation Extent Corresponding to discharge of 16,845 cusecs below Kalam)
- Medium Risk Zone (Inundation Extent Corresponding to discharge of 19,246 cusecs below Kalam)
- Low Risk Zone (Inundation Extent Corresponding to discharge of 20,271 cusecs below Kalam)

Note: All flood extents are based on breachless conditions



Structure No.	Existing Flood Protection Structures	Inventory Code
37	Flood Protection Work for Protection of Gwaratal	KP556
38	Flood Protection Work for Protection of Abaha	KP555
39	Flood Protection Work for Protection of Malak Abad	KP549
40	Flood Protection Work for Protection of Kota	KP557
41	Flood Protection Work for Protection of Shamoza	KP558



DEVELOPMENT OF NATIONAL FLOOD PROTECTION PLAN-IV (NFPP-IV) AND RELATED STUDIES TO ENHANCE THE CAPACITY OF FEDERAL FLOOD COMMISSION-FFC

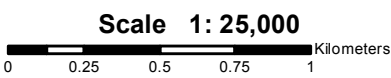
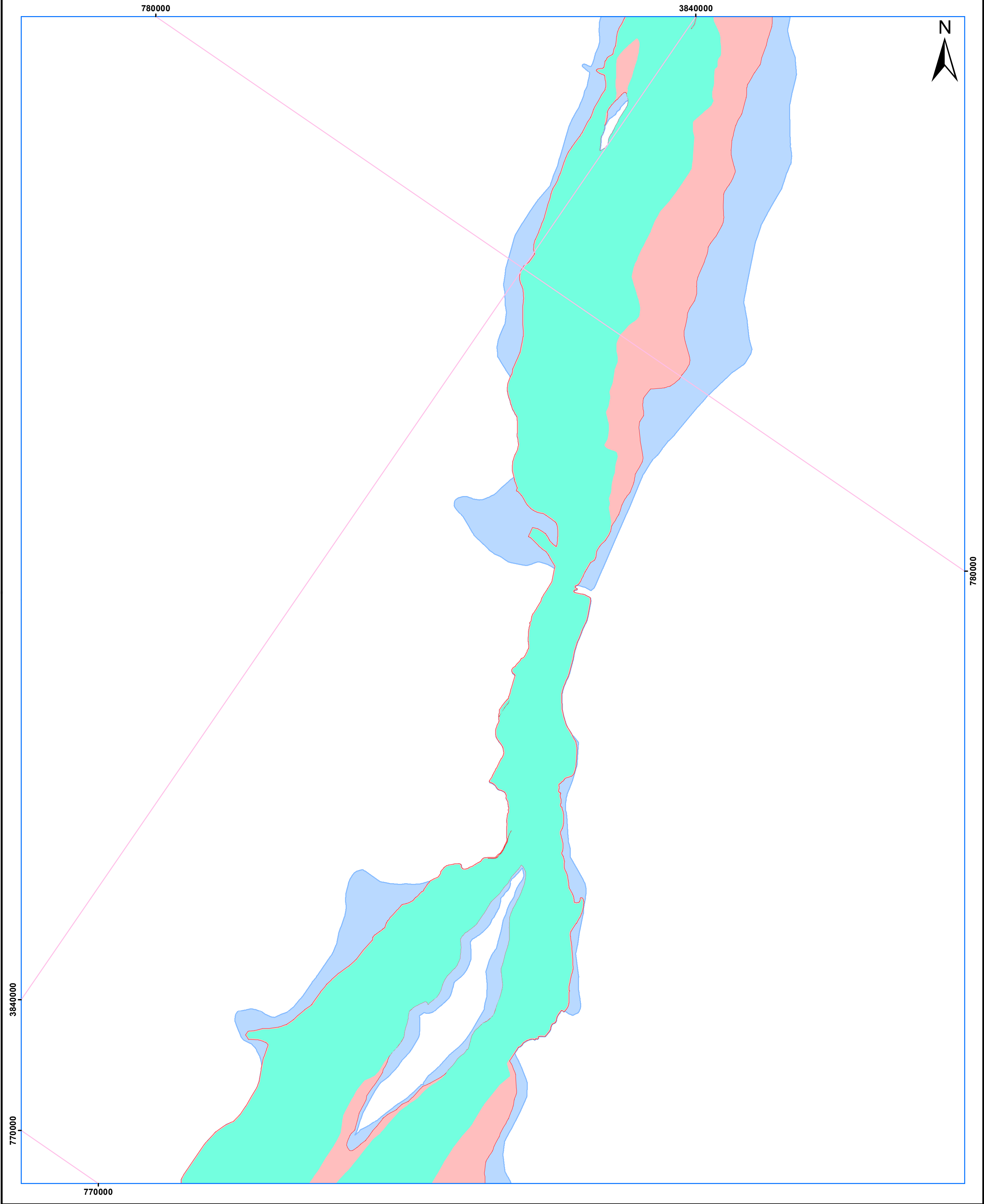
LANDUSE MAP
SWAT RIVER

Client :
FEDERAL FLOOD COMMISSION
Ministry of Water & Power

Consultants:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED
1-C , Block-N, Model Town Extension,
Lahore - Pakistan.

in association with
DELTAES, THE NETHERLANDS

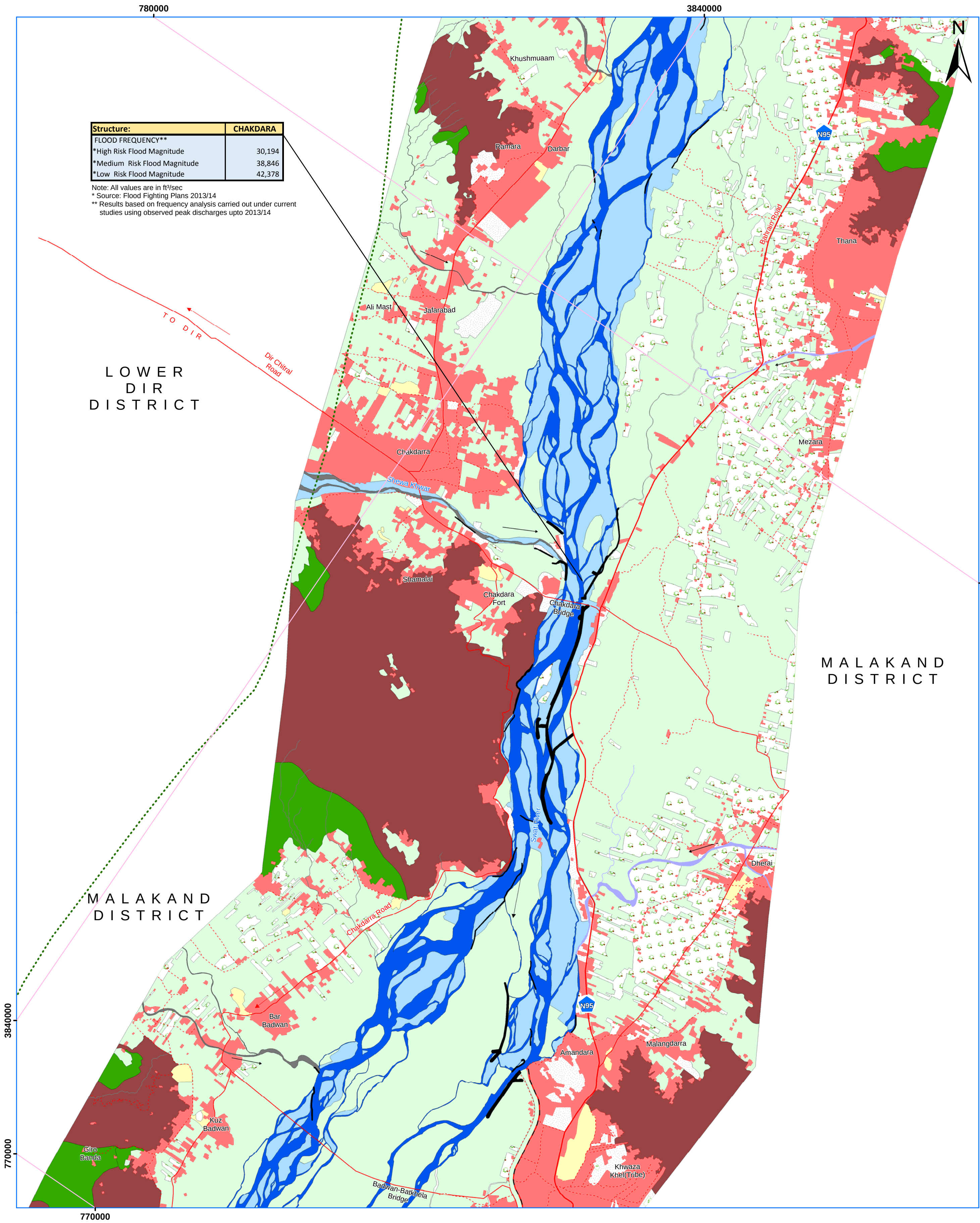
Rev. Date: Description Ckd. Ver.



LEGEND

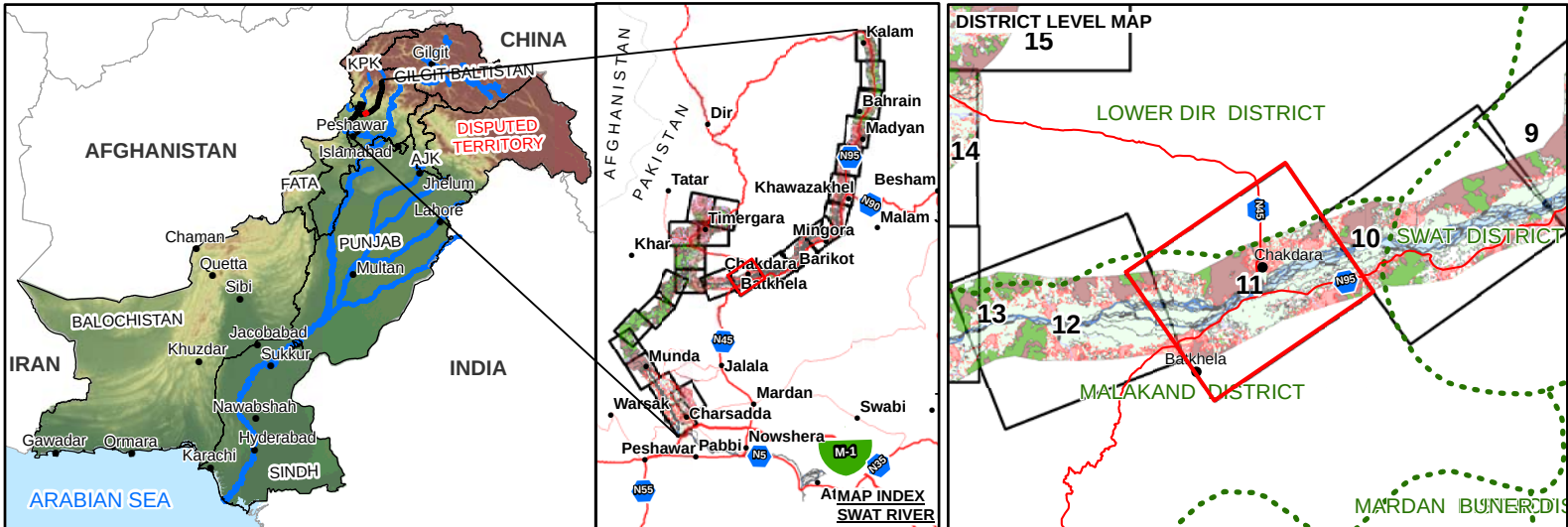
- High Risk Zone (Inundation Extent Corresponding to discharge of 30,194 cusecs below Chakdara)
- Medium Risk Zone (Inundation Extent Corresponding to discharge of 38,846 cusecs below Chakdara)
- Low Risk Zone (Inundation Extent Corresponding to discharge of 42,378 cusecs below Chakdara)

Note: All flood extents are based on breachless conditions



Structure:	CHAKDARA
FLOOD FREQUENCY**	
*High Risk Flood Magnitude	30,194
*Medium Risk Flood Magnitude	38,846
*Low Risk Flood Magnitude	42,378

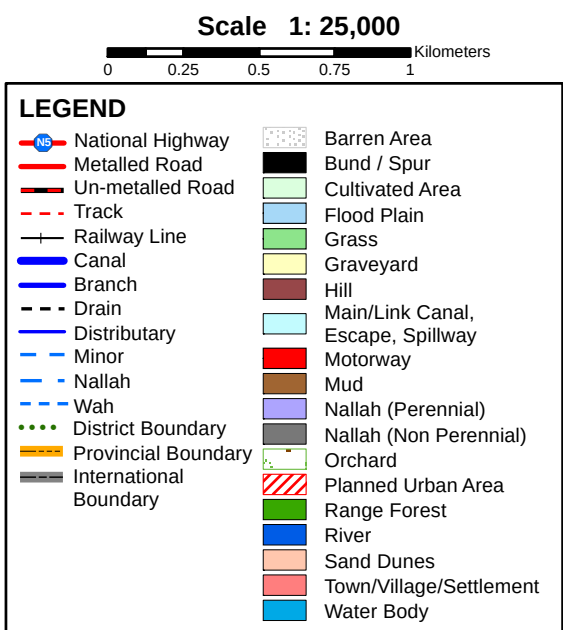
Note: All values are in ft³/sec
* Source: Flood Fighting Plans 2013/14
** Results based on frequency analysis carried out under current studies using observed peak discharges upto 2013/14



Source of Information:
1. Topographic sheets of Survey of Pakistan
2. Freely available satellite imagery
3. Shuttle Radar Topographic Mission Data (Resolution:90 m)
4. Survey data of Flood protection embankments and structures

Coordinate System
PROJECTION: Lambert Conformal Conic (LMPAC-I) ,
DATUM: WGS84
Grid Reference is in meters

Date: May 29, 2015



DEVELOPMENT OF NATIONAL FLOOD PROTECTION PLAN-IV (NFPP-IV)
AND RELATED STUDIES TO ENHANCE THE CAPACITY OF
FEDERAL FLOOD COMMISSION-FFC

LANDUSE MAP
SWAT RIVER

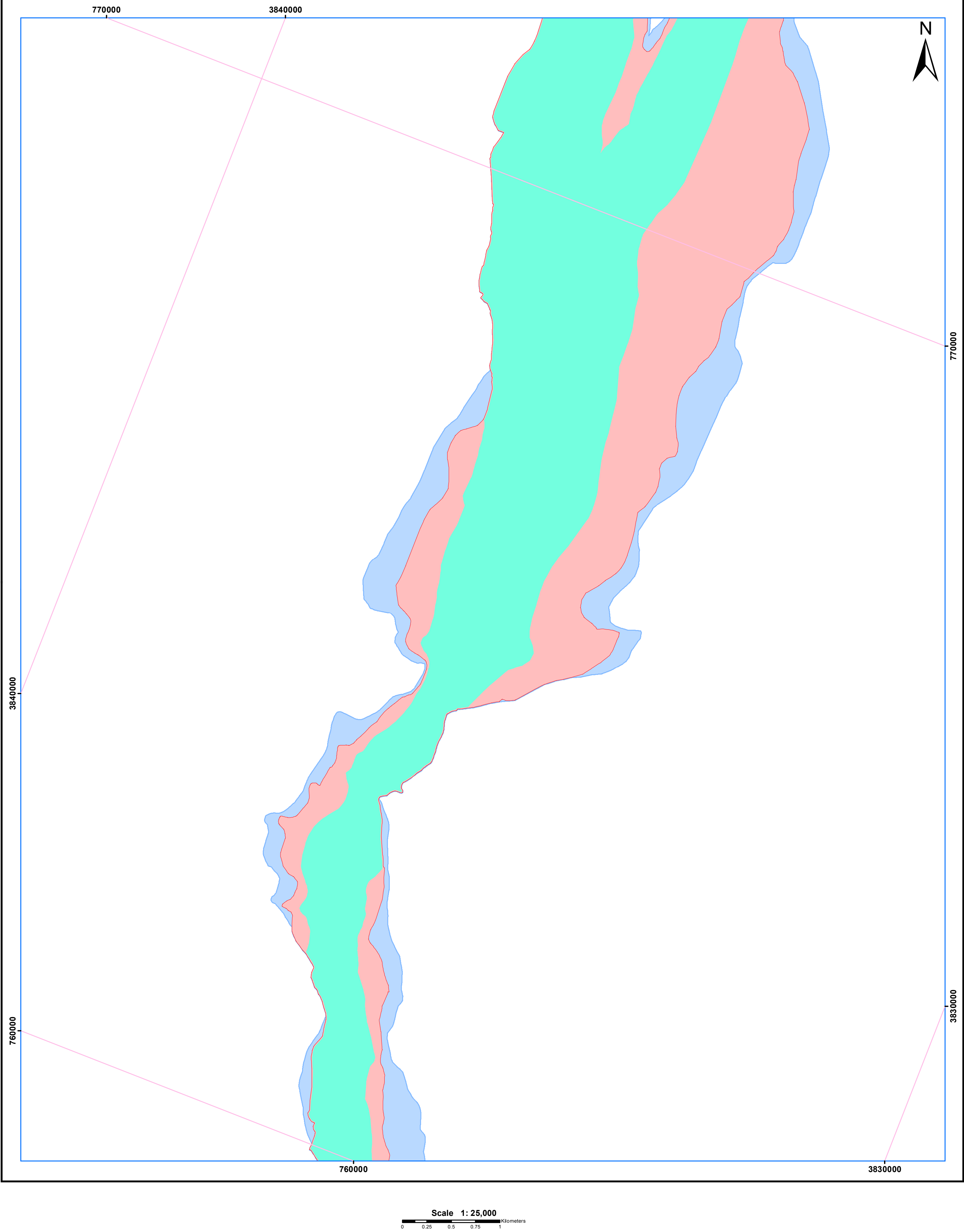
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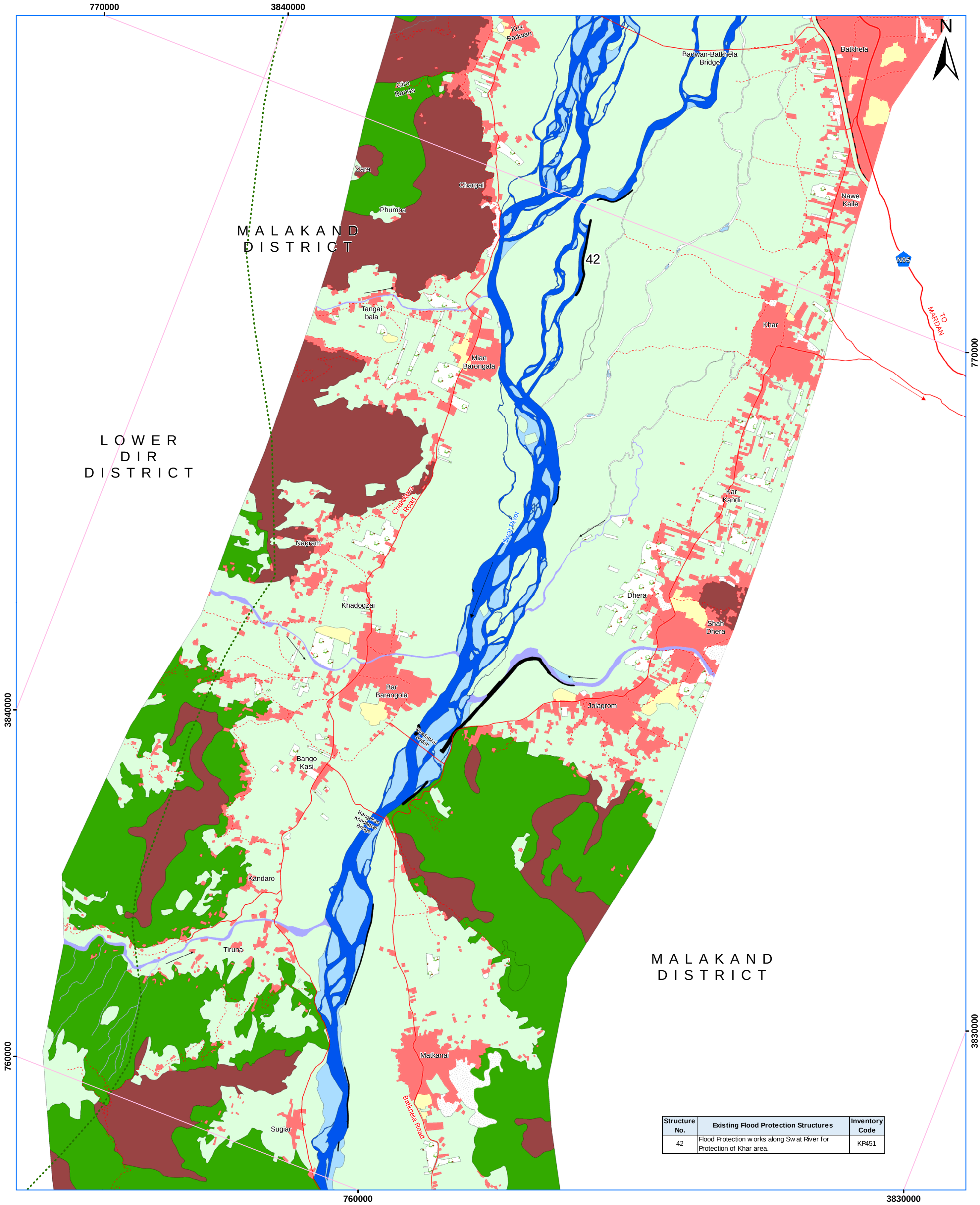
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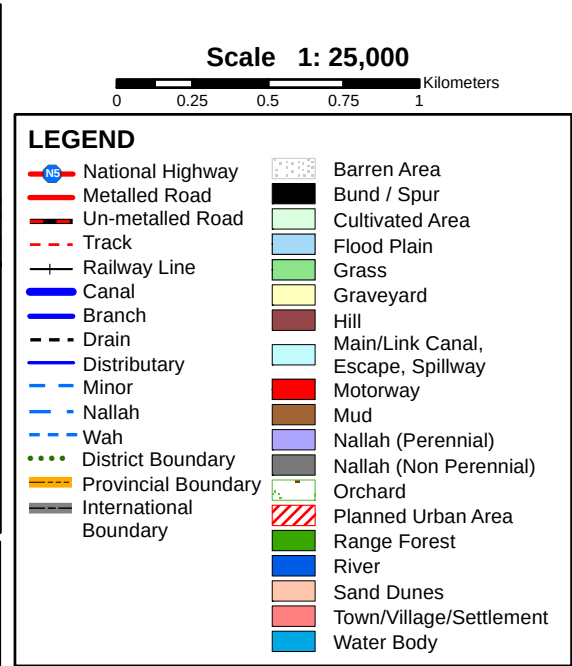
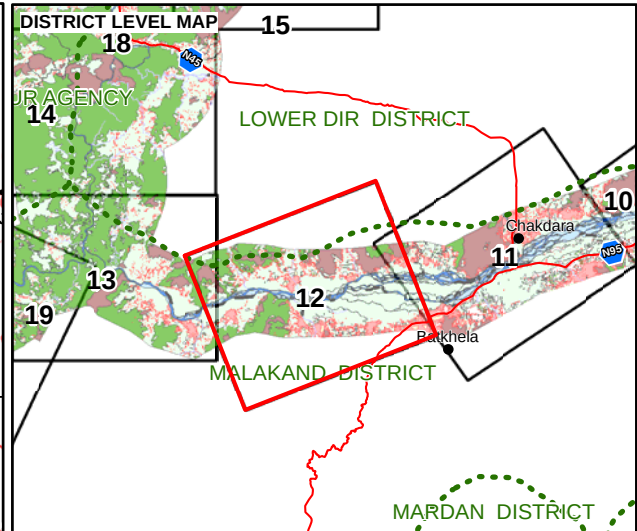
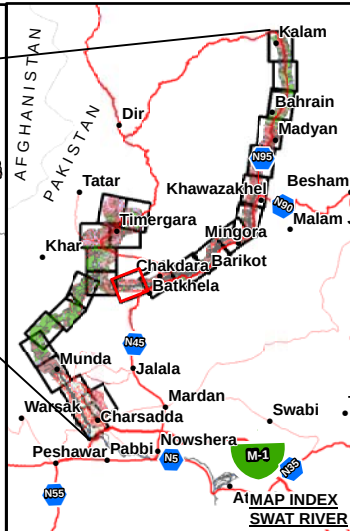
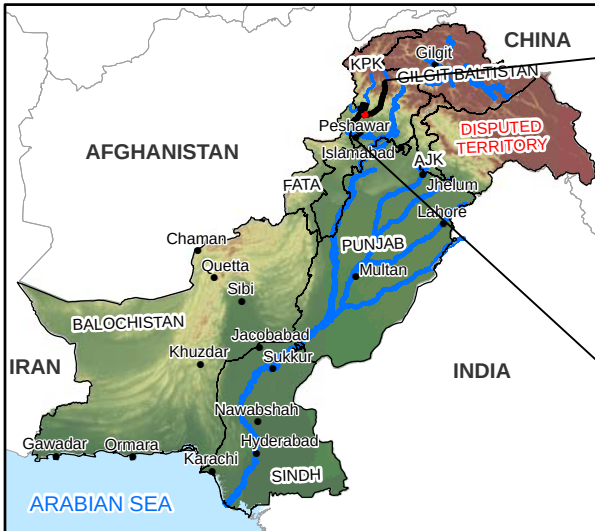
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- Low Risk Zone (Inundation Extent Corresponding to discharge of 42,378 cusecs below Chakdara)

Note: All flood extents are based on breachless conditions



Structure No.	Existing Flood Protection Structures	Inventory Code
42	Flood Protection works along Sw at River for Protection of Khar area.	KP451



DEVELOPMENT OF NATIONAL FLOOD PROTECTION PLAN-IV (NFPP-IV) AND RELATED STUDIES TO ENHANCE THE CAPACITY OF FEDERAL FLOOD COMMISSION-FFC

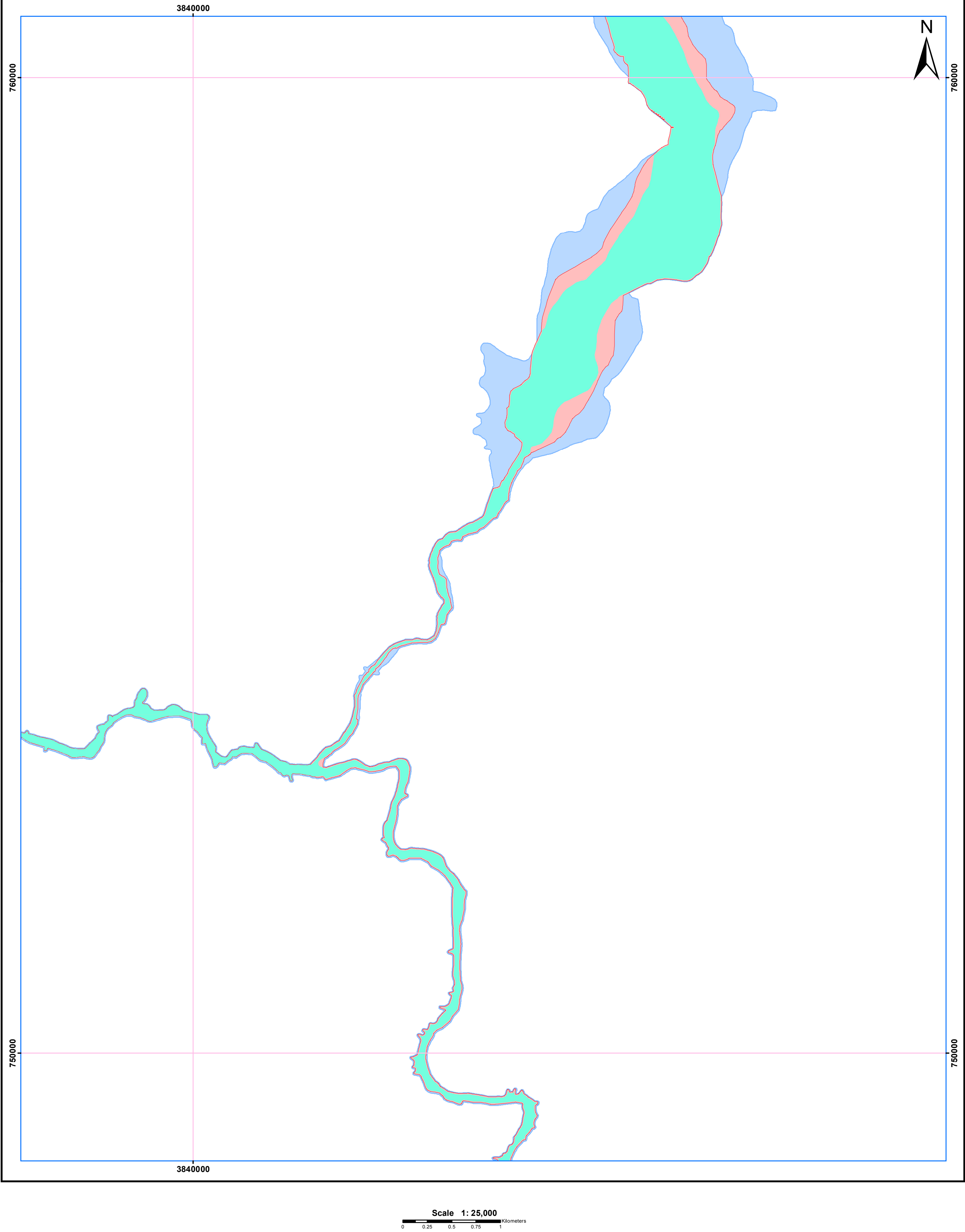
LANDUSE MAP
SWAT RIVER

Client :
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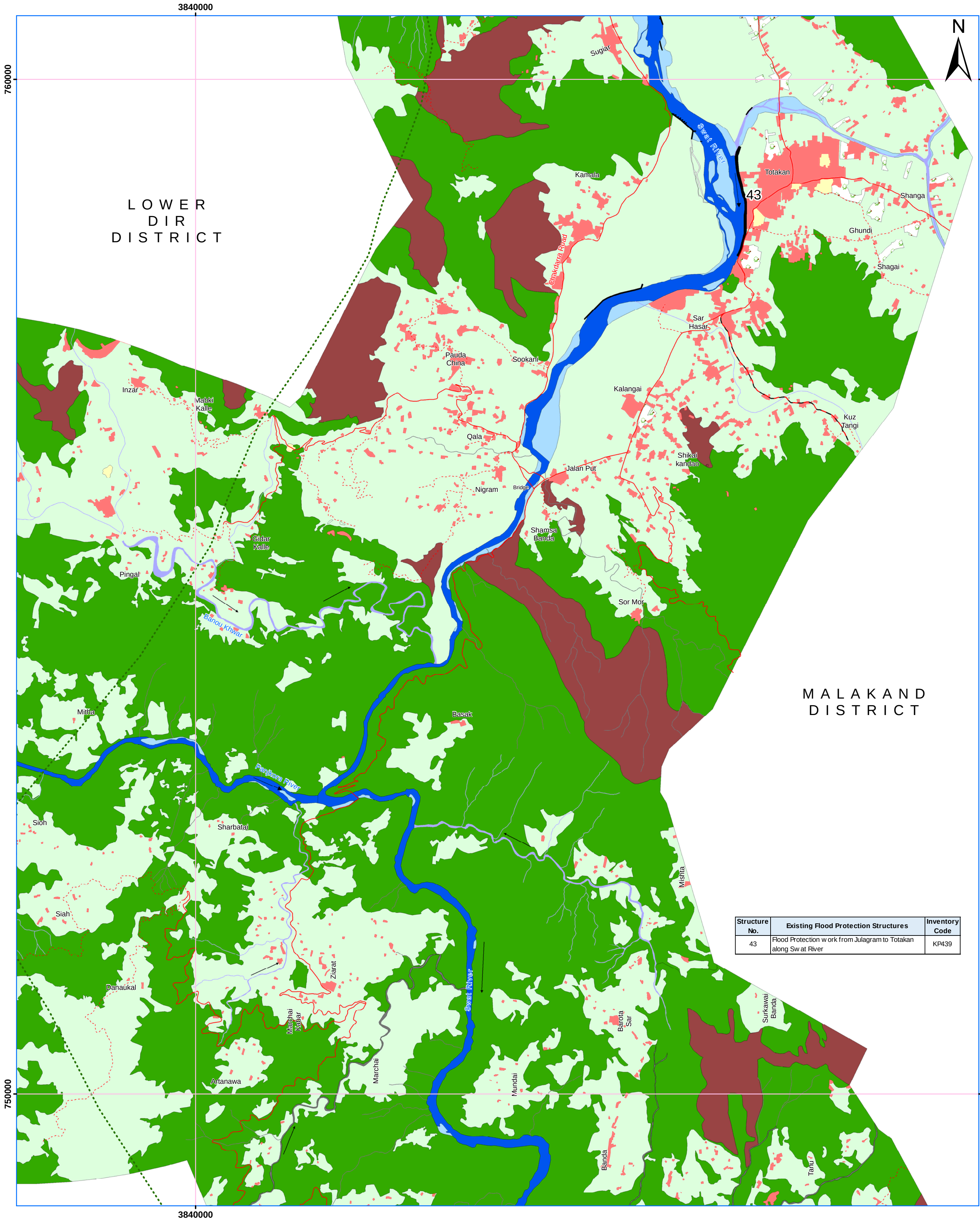
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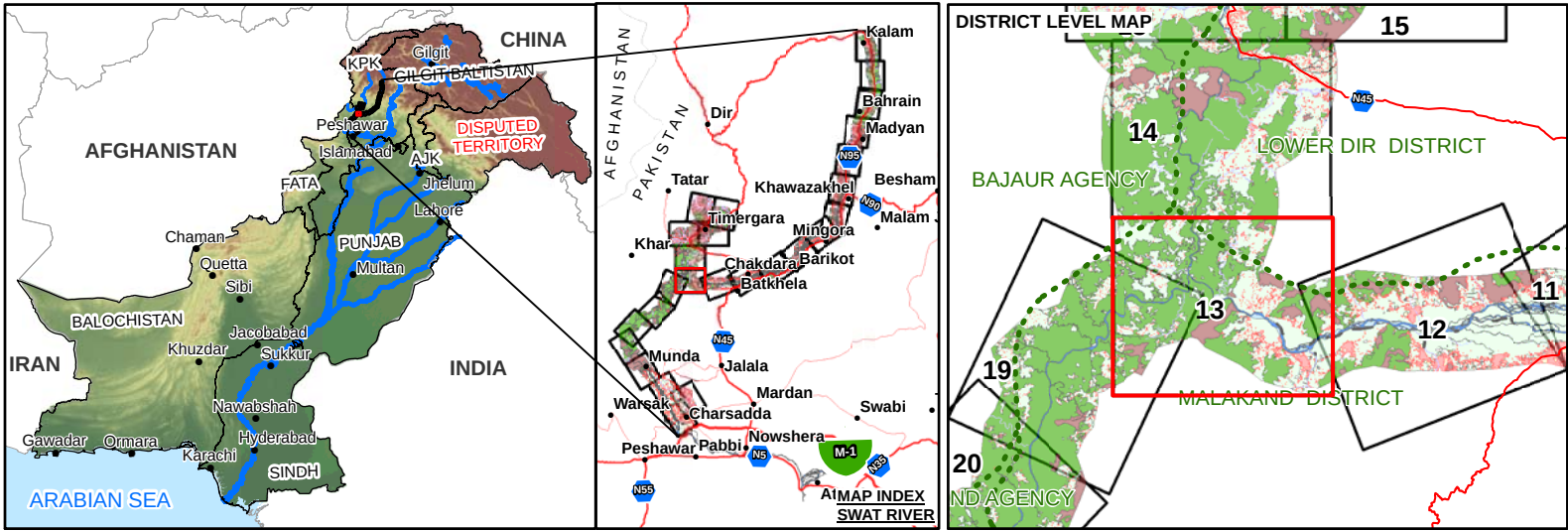
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- Low Risk Zone (Inundation Extent Corresponding to discharge of 42,378 cusecs below Chakdara)

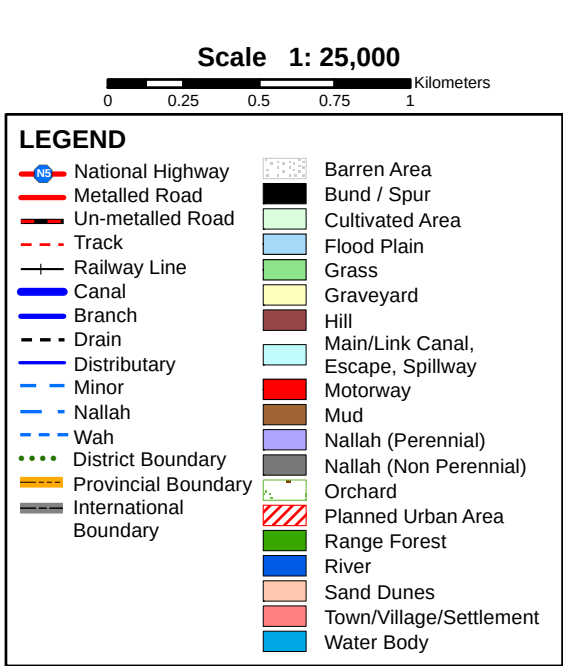
Note: All flood extents are based on breachless conditions



Structure No.	Existing Flood Protection Structures	Inventory Code
43	Flood Protection work from Julagram to Totakan along Sw at River	KP439



Source of Information: 1. Topographic sheets of Survey of Pakistan 2. Freely available satellite imagery 3. Shuttle Radar Topographic Mission Data (Resolution:90 m) 4. Survey data of Flood protection embankments and structures	Coordinate System PROJECTION: Lambert Conformal Conic (LMPAK-I) , DATUM: WGS84 Grid Reference is in meters	Date: May 29, 2015
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DEVELOPMENT OF NATIONAL FLOOD PROTECTION PLAN-IV (NFPP-IV) AND RELATED STUDIES TO ENHANCE THE CAPACITY OF FEDERAL FLOOD COMMISSION-FFC

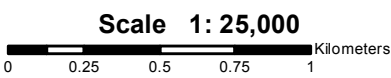
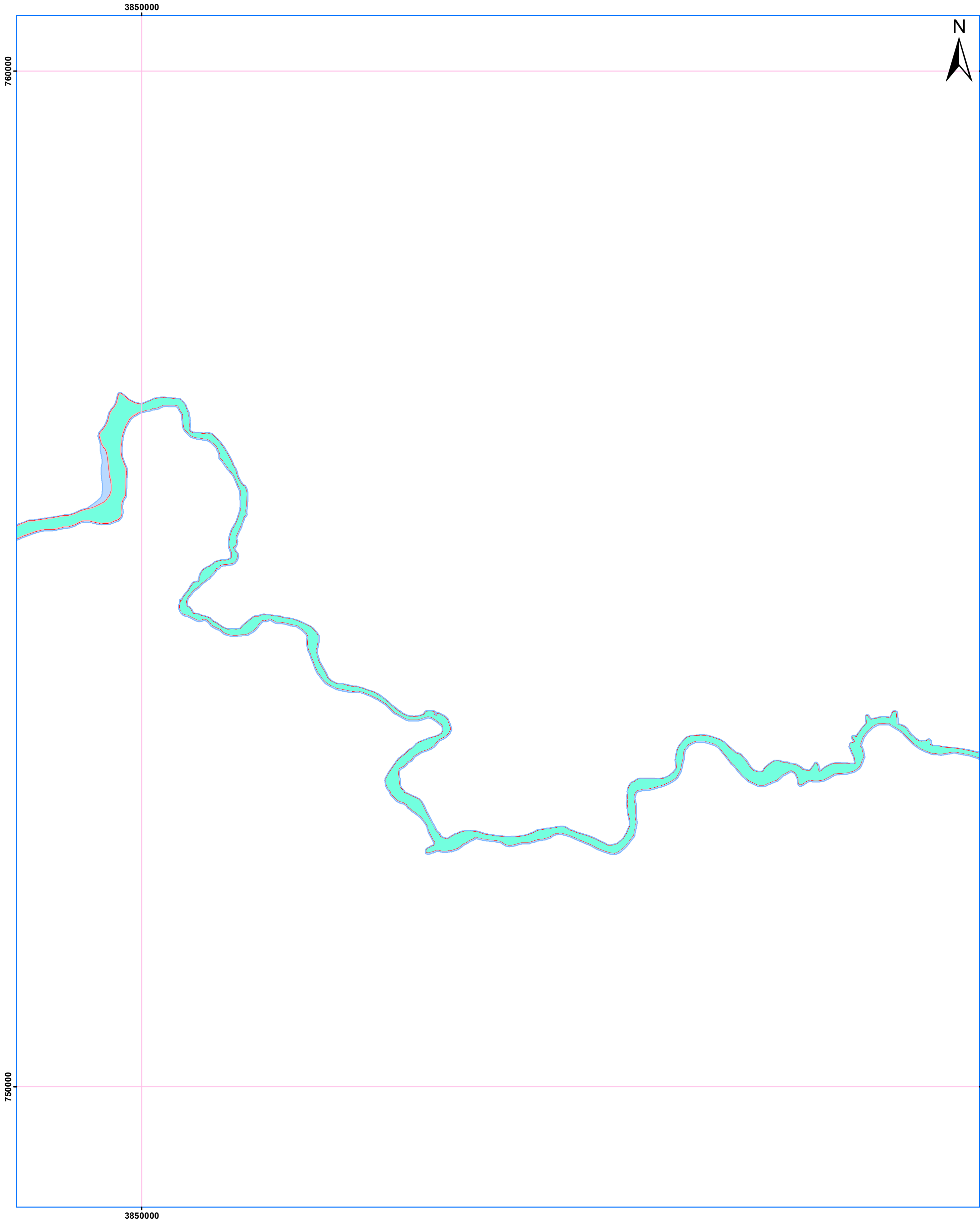
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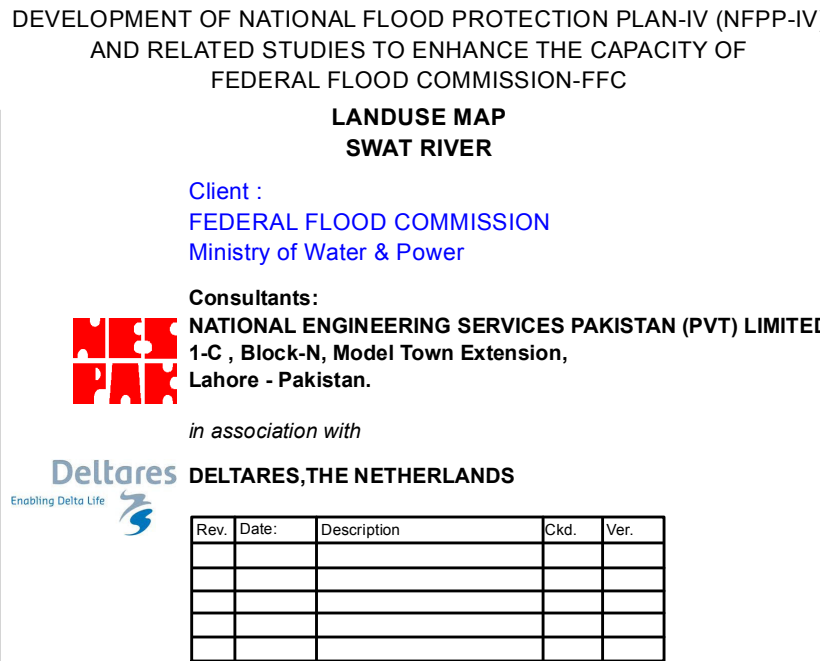
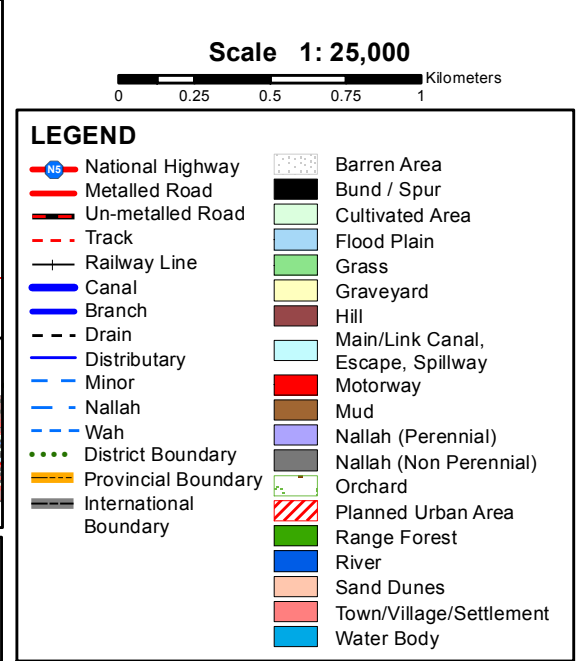
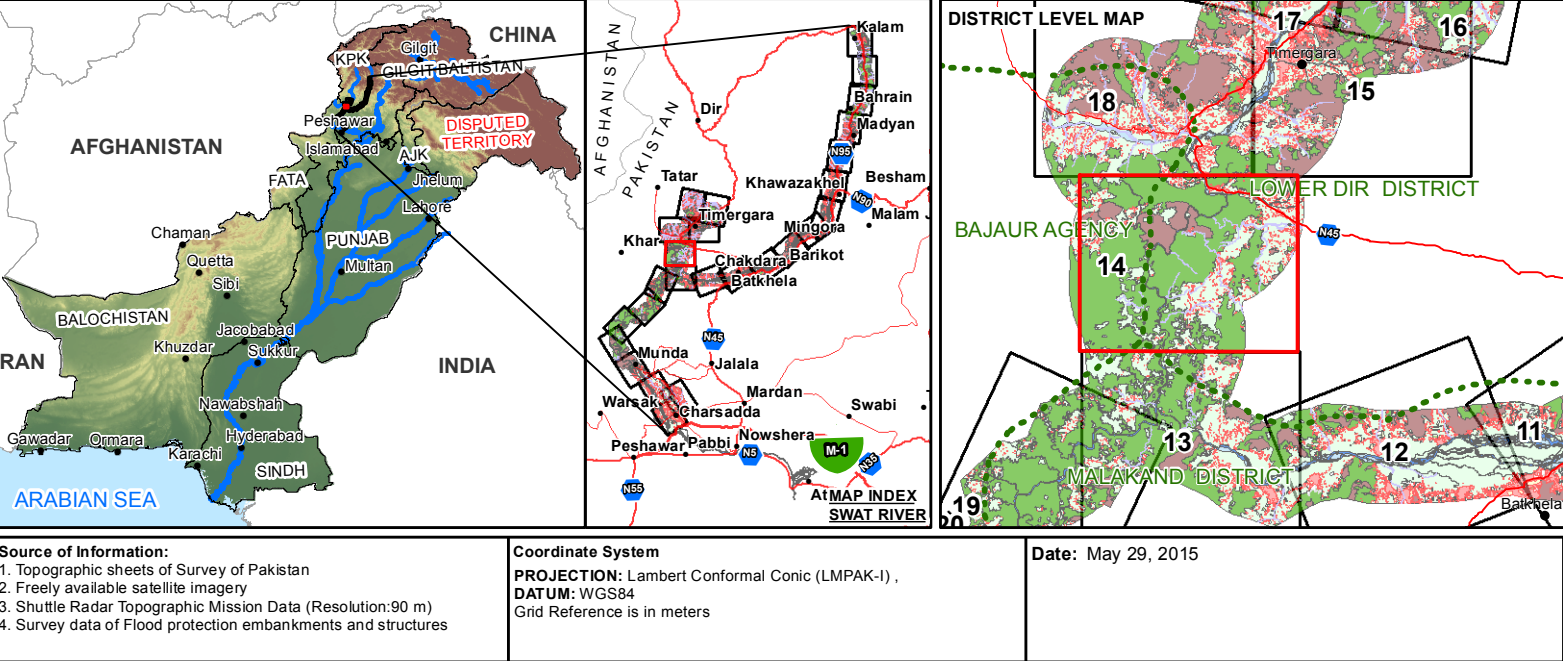
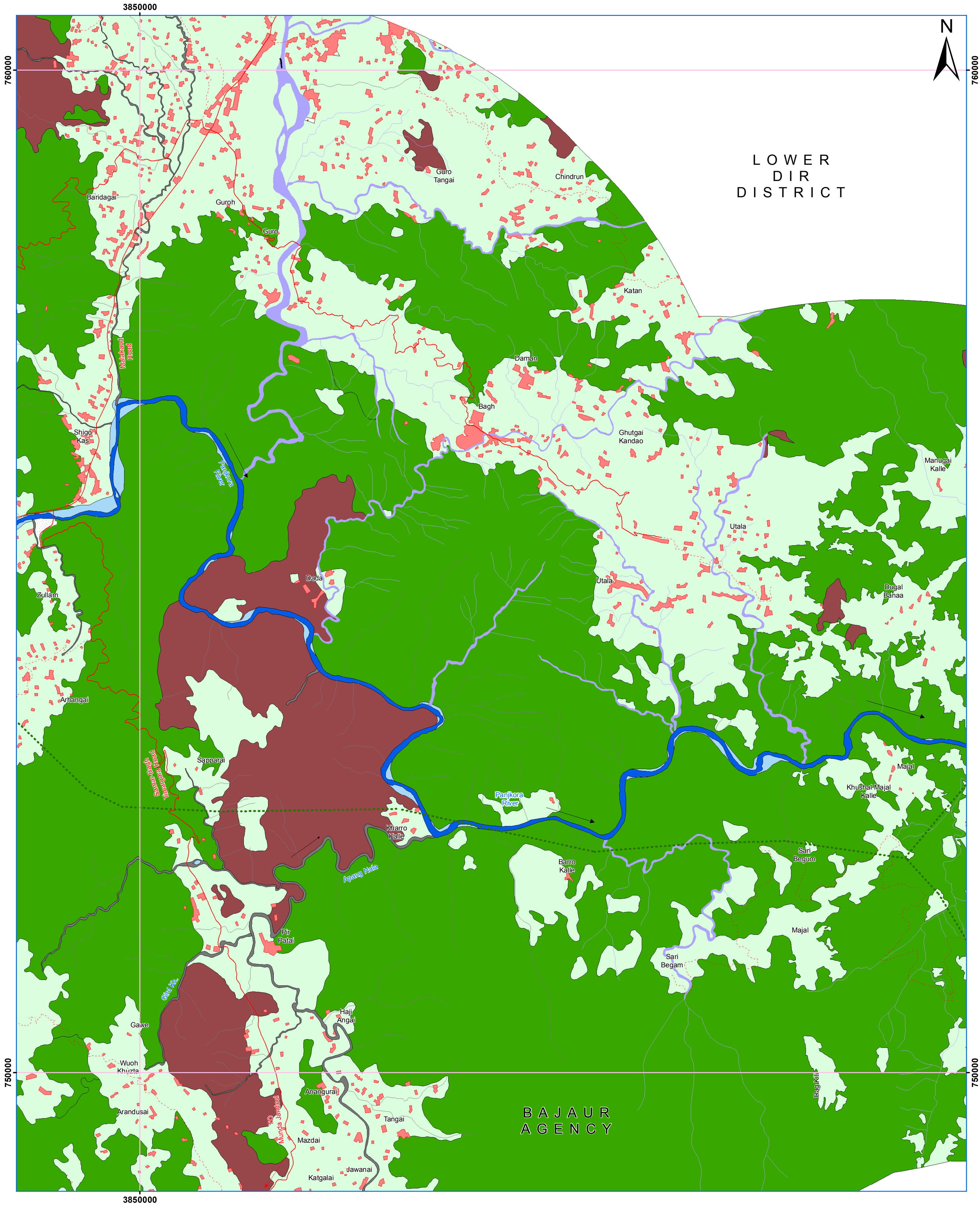
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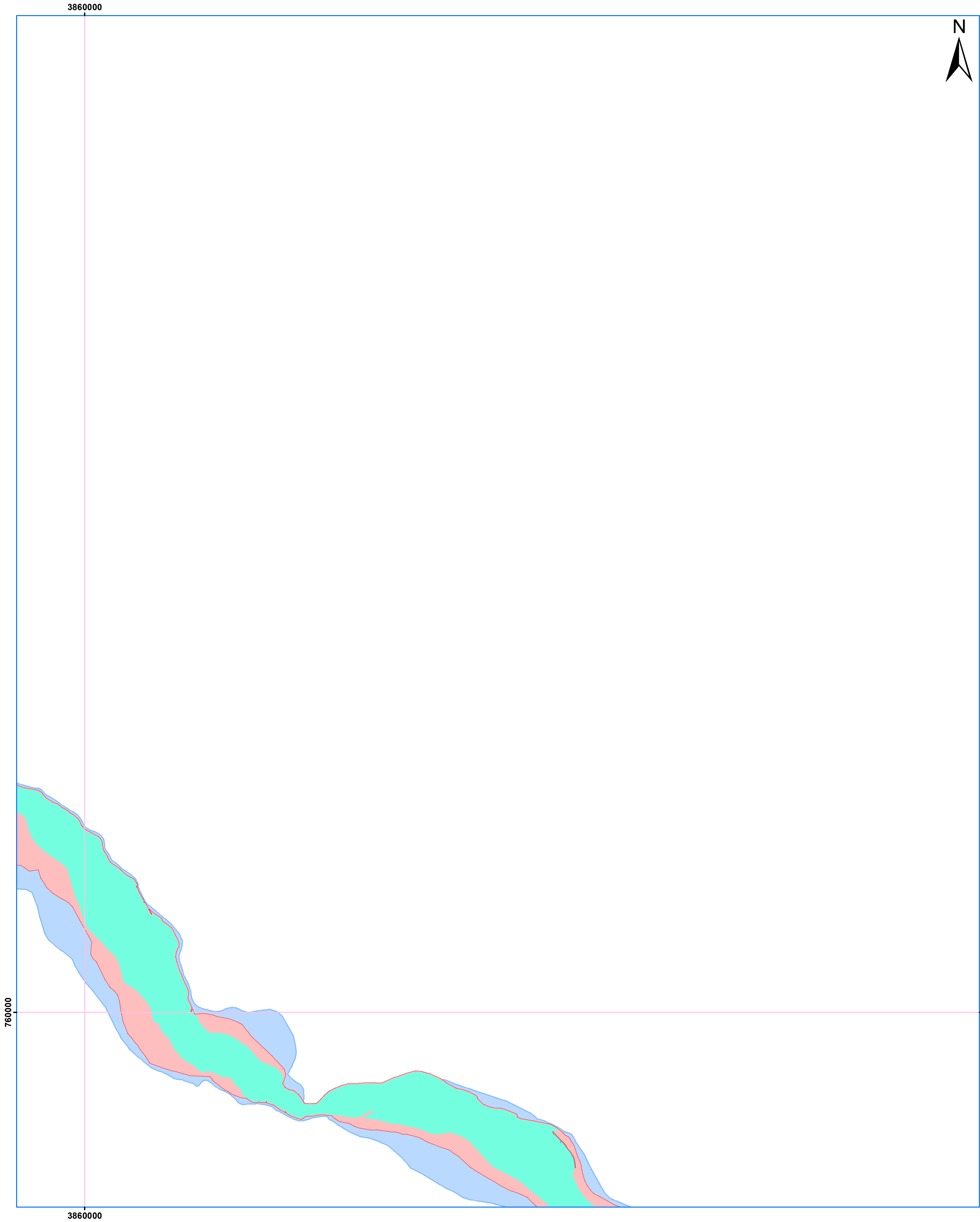


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Note: All flood extents are based on breachless conditions



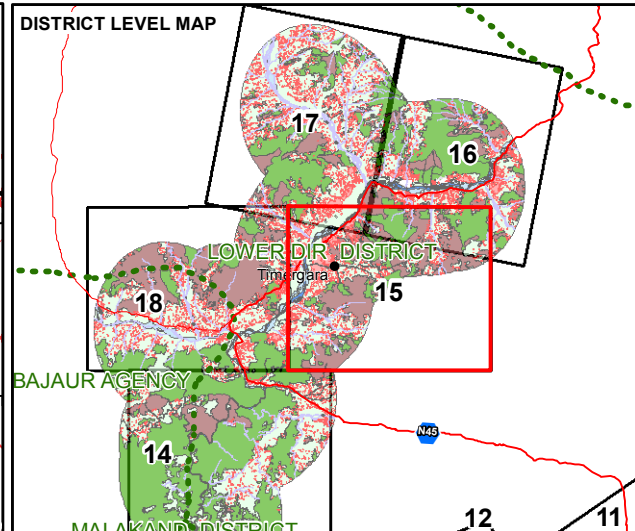
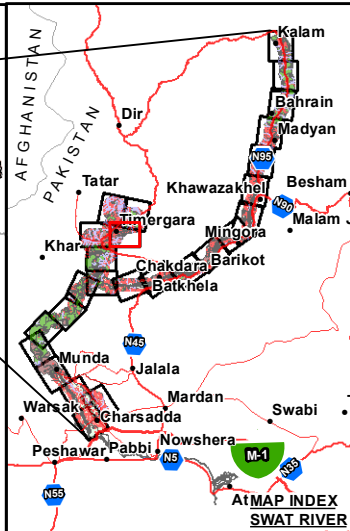
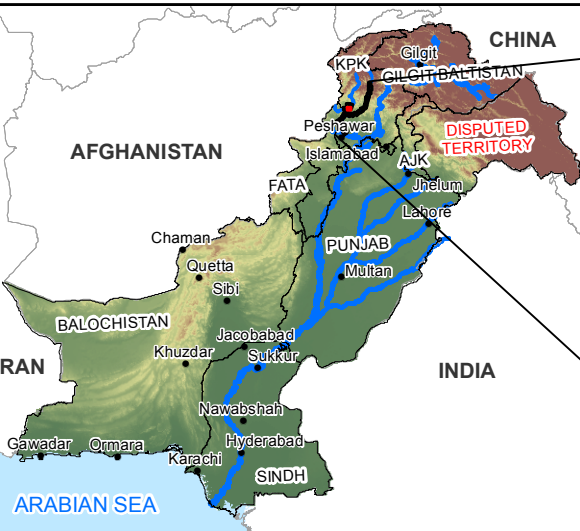
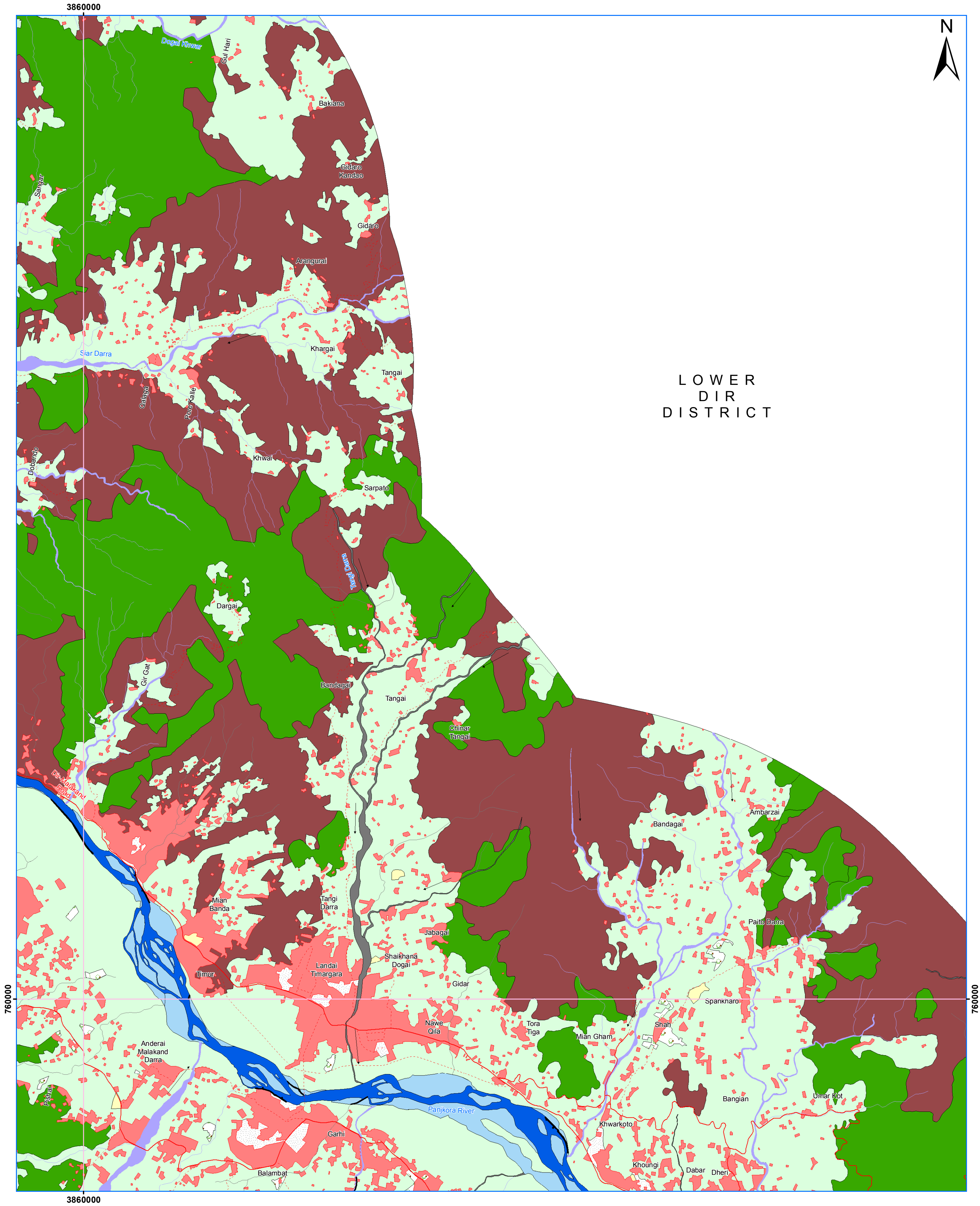


Scale 1: 25,000
0 0.25 0.5 0.75 1 Kilometers

LEGEND

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Note: All flood extents are based on breachless conditions



Scale 1: 25,000

0 0.25 0.5 0.75 1 Kilometers

LEGEND

- National Highway
- Metalled Road
- Un-metalled Road
- Track
- Railway Line
- Canal
- Branch
- Drain
- Distributary
- Minor
- Nallah
- Wah
- District Boundary
- Provincial Boundary
- International Boundary
- Barren Area
- Bund / Spur
- Cultivated Area
- Flood Plain
- Grass
- Graveyard
- Hill
- Main/Link Canal
- Escape, Spillway
- Motorway
- Mud
- Nallah (Perennial)
- Nallah (Non Perennial)
- Orchard
- Planned Urban Area
- Range Forest
- River
- Sand Dunes
- Town/Village/Settlement
- Water Body

DEVELOPMENT OF NATIONAL FLOOD PROTECTION PLAN-IV (NFPP-IV) AND RELATED STUDIES TO ENHANCE THE CAPACITY OF FEDERAL FLOOD COMMISSION-FFC

**LANDUSE MAP
SWAT RIVER**

Client :
FEDERAL FLOOD COMMISSION
Ministry of Water & Power

Consultants:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED
1-C , Block-N, Model Town Extension,
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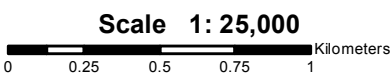
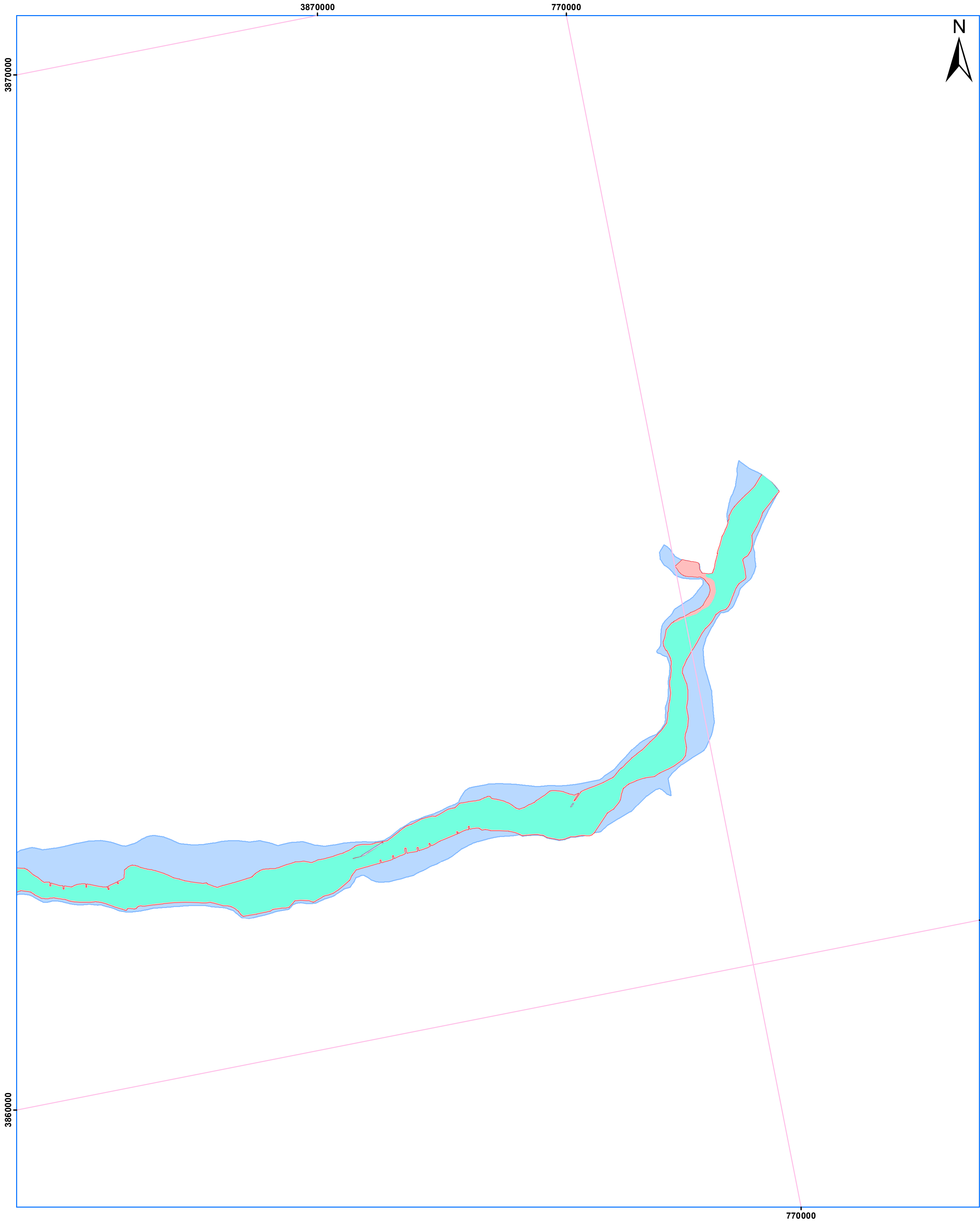
in association with
DELTAES, THE NETHERLANDS

Rev.	Date:	Description	Ckd.	Ver.

Source of Information:
1. Topographic sheets of Survey of Pakistan
2. Freely available satellite imagery
3. Shuttle Radar Topographic Mission Data (Resolution:90 m)
4. Survey data of Flood protection embankments and structures

Coordinate System
PROJECTION: Lambert Conformal Conic (LMPAK-I),
DATUM: WGS84
Grid Reference is in meters

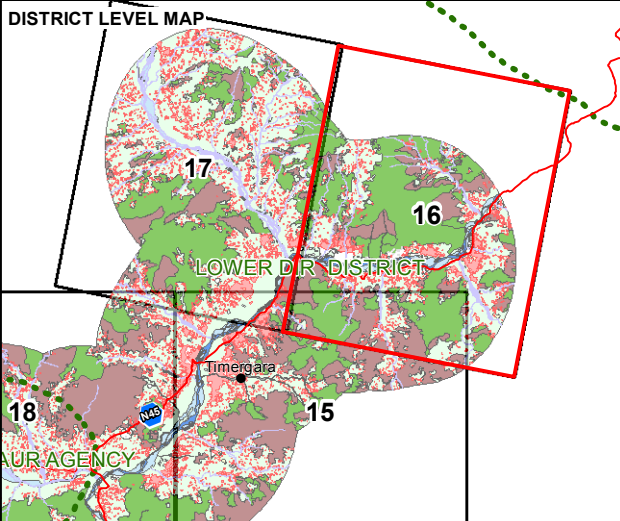
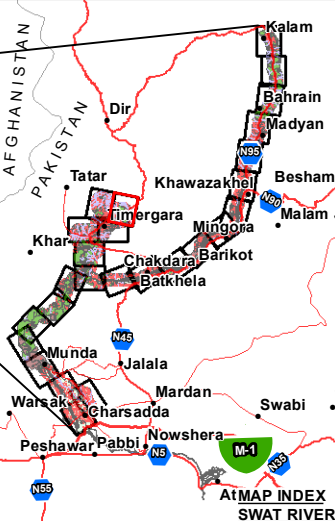
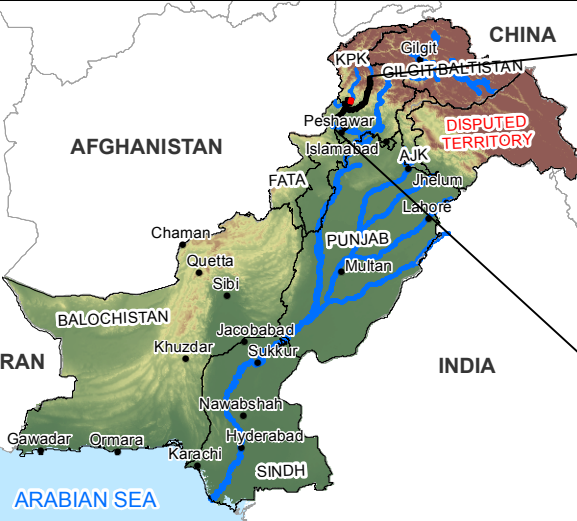
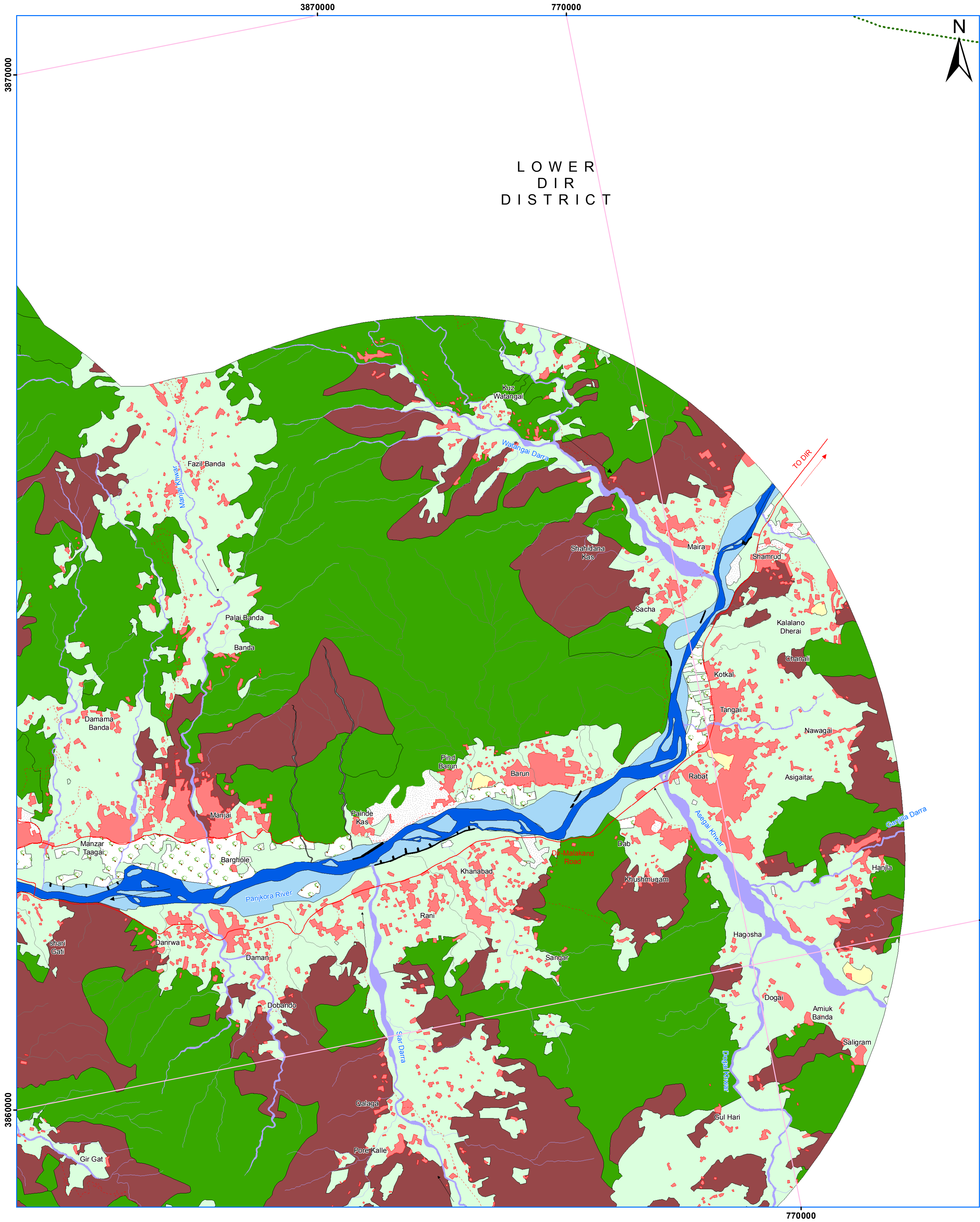
Date: May 29, 2015



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Scale 1: 25,000

0 0.25 0.5 0.75 1 Kilometers

LEGEND

- National Highway
- Metalled Road
- Un-metalled Road
- Track
- Railway Line
- Canal
- Branch
- Drain
- Distributary
- Minor
- Nallah
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DEVELOPMENT OF NATIONAL FLOOD PROTECTION PLAN-IV (NFPP-IV) AND RELATED STUDIES TO ENHANCE THE CAPACITY OF FEDERAL FLOOD COMMISSION-FFC

LANDUSE MAP SWAT RIVER

Client : **FEDERAL FLOOD COMMISSION**
Ministry of Water & Power

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1-C , Block-N, Model Town Extension, Lahore - Pakistan.

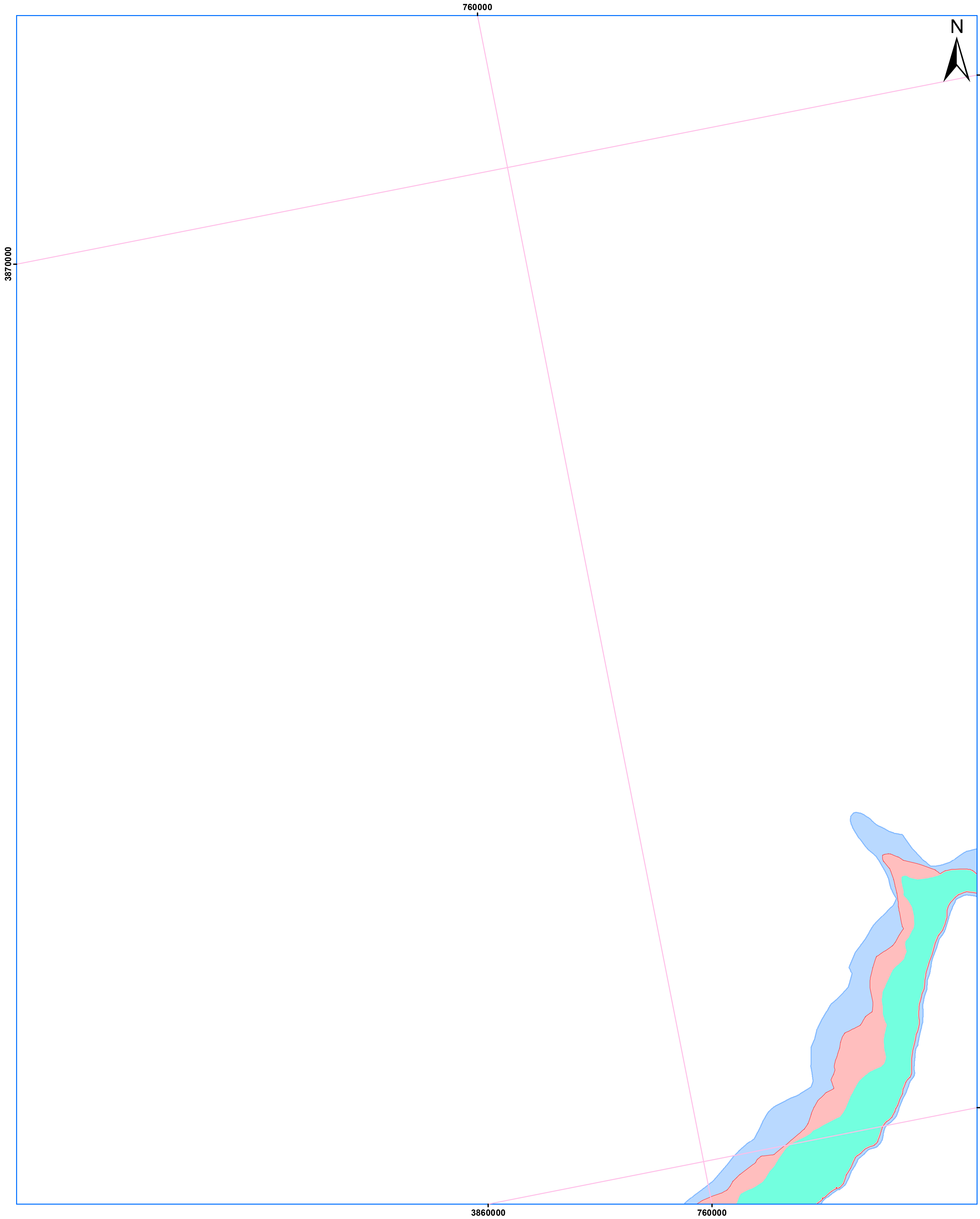
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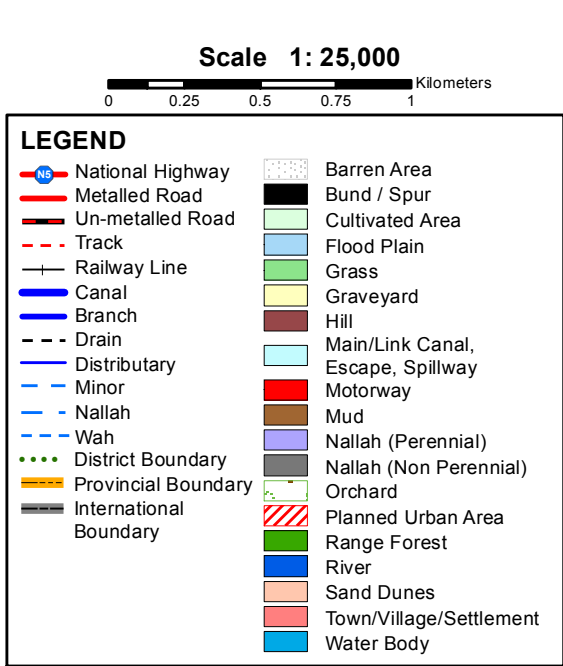
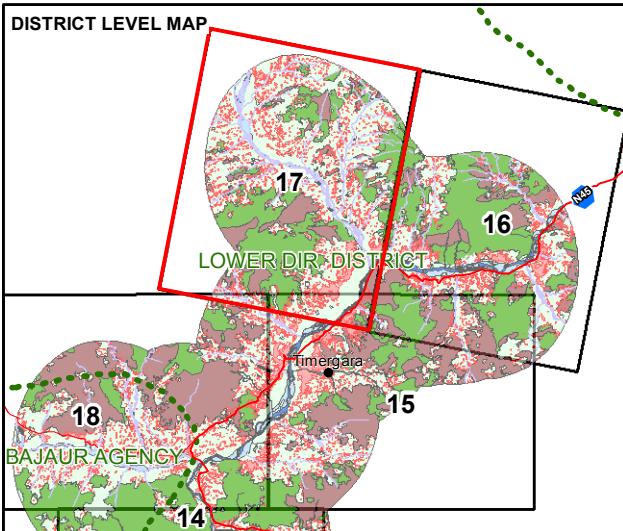
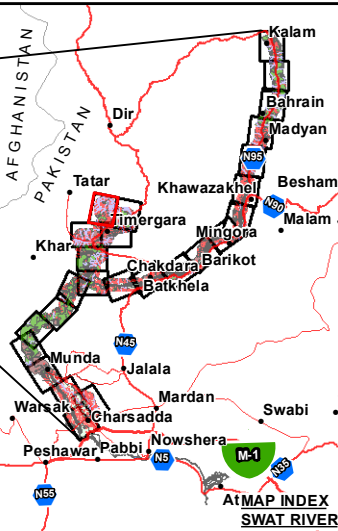
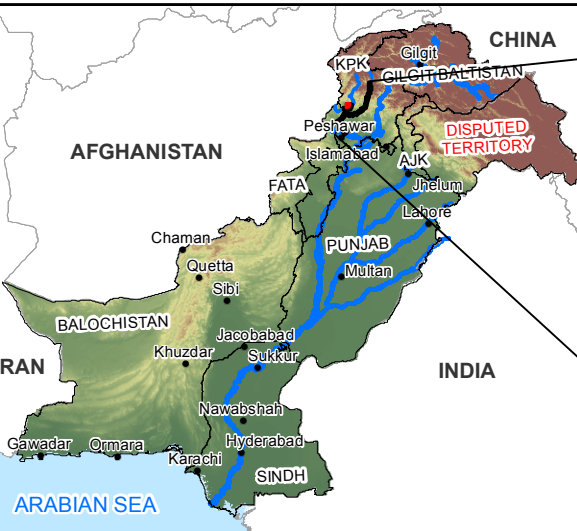
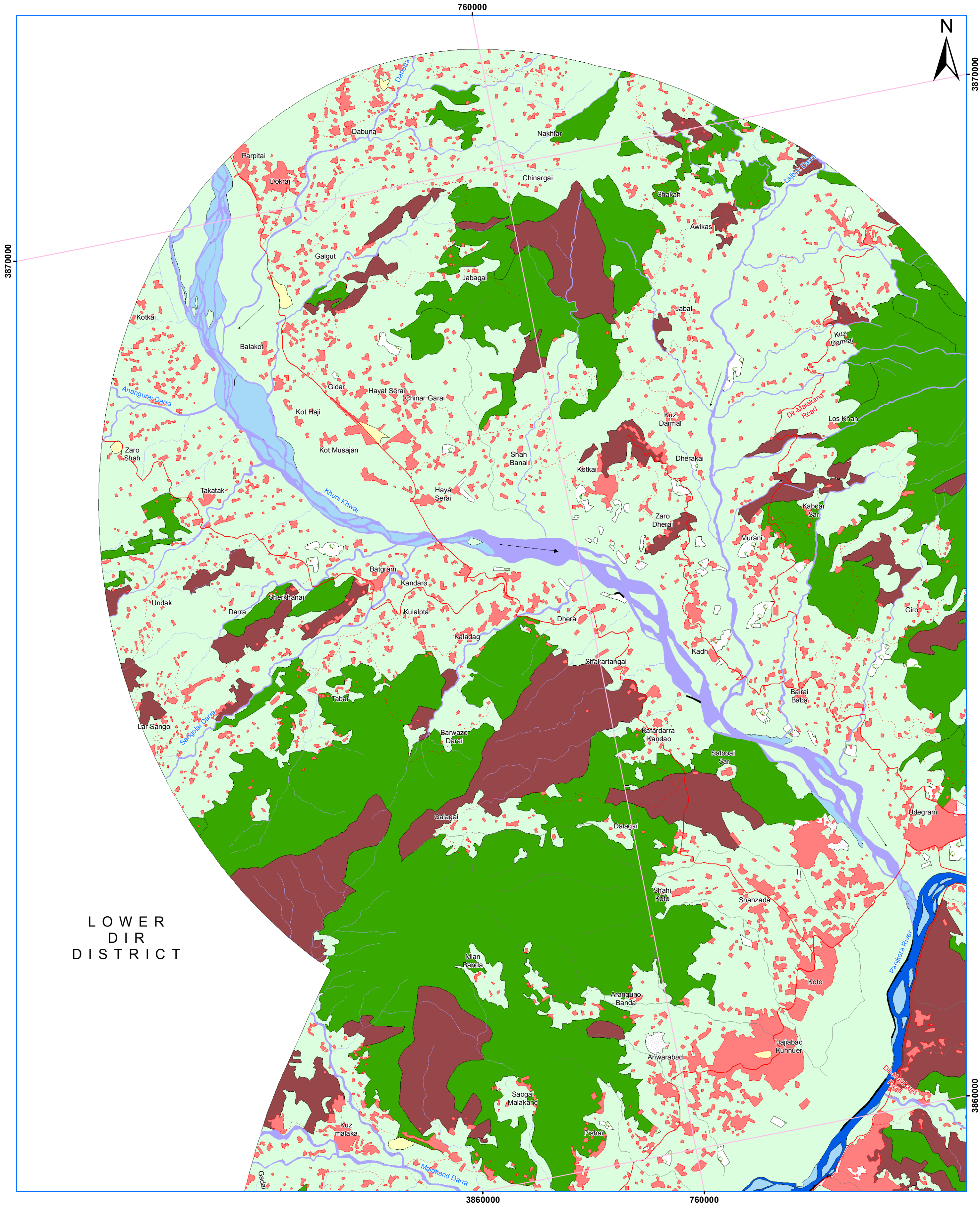


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0 0.25 0.5 0.75 1 Kilometers

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DEVELOPMENT OF NATIONAL FLOOD PROTECTION PLAN-IV (NFPP-IV) AND RELATED STUDIES TO ENHANCE THE CAPACITY OF FEDERAL FLOOD COMMISSION-FFC

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SWAT RIVER

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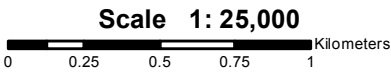
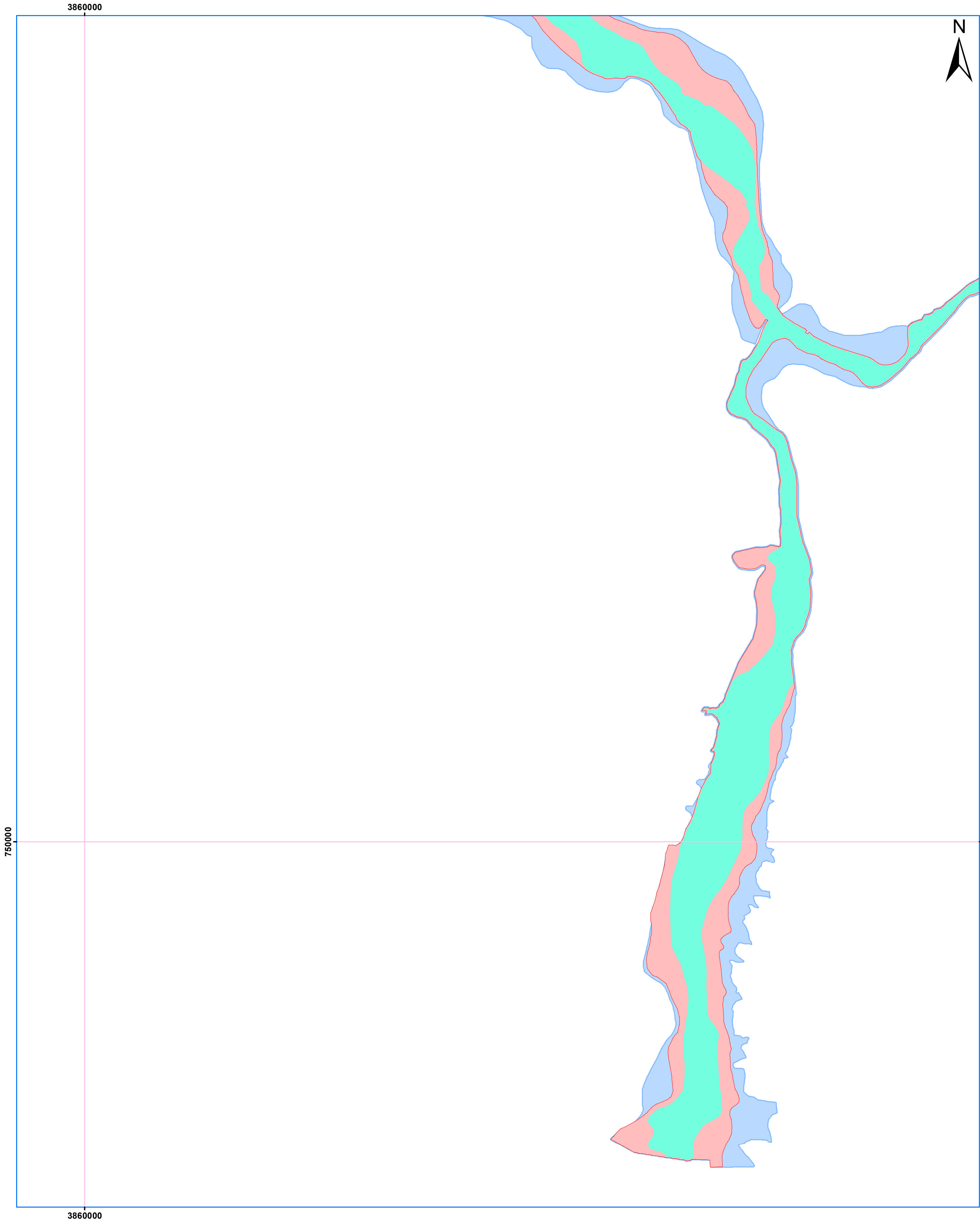
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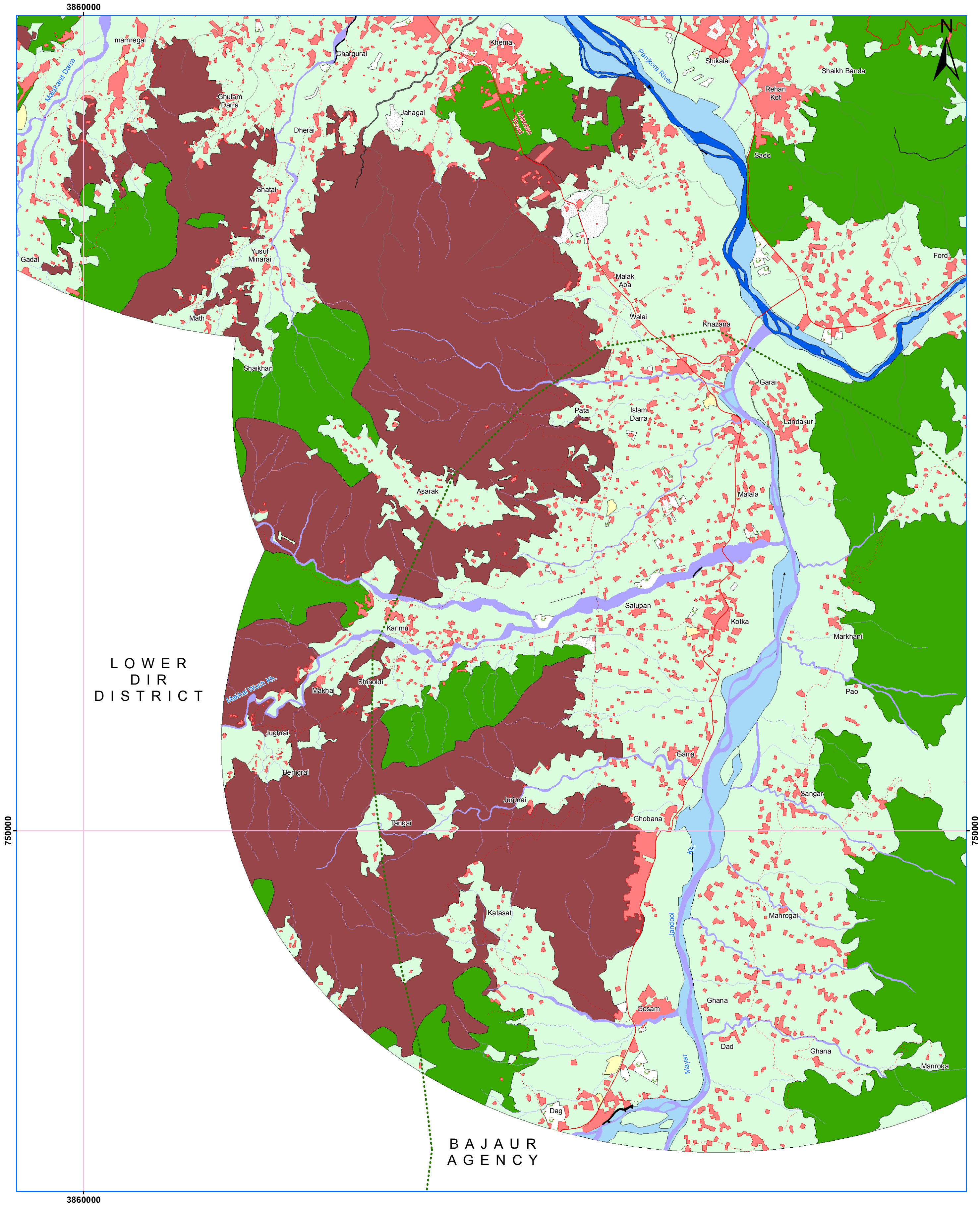
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- Survey data of Flood protection embankments and structures

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DATUM: WGS84
Grid Reference is in meters

Date: May 29, 2015

DISTRICT LEVEL MAP

Scale 1: 25,000

0 0.25 0.5 0.75 1 Kilometers

LEGEND

- National Highway
- Metalled Road
- Un-metalled Road
- Track
- Railway Line
- Canal
- Branch
- Drain
- Distributary
- Minor
- Nallah
- Wah
- District Boundary
- Provincial Boundary
- International Boundary
- Barren Area
- Bund / Spur
- Cultivated Area
- Flood Plain
- Grass
- Graveyard
- Hill
- Main/Link Canal, Escape, Spillway
- Motorway
- Mud
- Nallah (Perennial)
- Nallah (Non Perennial)
- Orchard
- Planned Urban Area
- Range Forest
- River
- Sand Dunes
- Town/Village/Settlement
- Water Body

DEVELOPMENT OF NATIONAL FLOOD PROTECTION PLAN-IV (NFPP-IV) AND RELATED STUDIES TO ENHANCE THE CAPACITY OF FEDERAL FLOOD COMMISSION-FFC

LANDUSE MAP SWAT RIVER

Client :
FEDERAL FLOOD COMMISSION
Ministry of Water & Power

Consultants:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED
1-C, Block-N, Model Town Extension,
Lahore - Pakistan.

in association with
DELTAES, THE NETHERLANDS

Rev. **Date:** **Description** **Ckd.** **Ver.**

Inundation Depth of Settlements in District Lower DIR

Swat River - Sheet No. 11

Sr. No.	Settlement Name	Zone*	District	Inundation Depth at Discharge of 30,194 Cusec below Chakdara		Inundation Depth at Discharge of 38,846 Cusec below Chakdara		Inundation Depth at Discharge of 42,378 Cusec below Chakdara	
				Min (m)	Max (m)	Min (m)	Max (m)	Min (m)	Max (m)
1	Chakdarra	H,M,L	Lower Dir	0.04	0.73	0.07	1.27	0.10	1.87
3	18 settlements nearby Mezara	M,L	Lower Dir	0.00	0.00	0.04	1.06	0.05	1.37
6	Chakdara Fort and nearby 2 settlements	M,L	Lower Dir	0.00	0.00	0.02	1.10	0.25	1.20
7	Kuz Badwan	M,L	Lower Dir	0.00	0.00	0.04	1.09	0.06	1.18
8	2 settlements nearby khushmuam	M,L	Lower Dir	0.00	0.00	0.00	0.00	0.04	0.06
9	Bar Badwan	L	Lower Dir	0.00	0.00	0.00	0.00	0.03	0.60
10	Shamalai	L	Lower Dir	0.00	0.00	0.00	0.00	0.25	0.64

Swat River - Sheet No. 17

Sr. No.	Settlement Name	Zone*	District	Inundation Depth at Discharge of 30,194 Cusec below Chakdara		Inundation Depth at Discharge of 38,846 Cusec below Chakdara		Inundation Depth at Discharge of 42,378 Cusec below Chakdara	
				Min (m)	Max (m)	Min (m)	Max (m)	Min (m)	Max (m)
1	Hajiabad Kuhnuer	L	Lower Dir	0.00	0.00	0.00	0.00	0.46	1.07
2	Koto	L	Lower Dir	0.00	0.00	0.00	0.00	0.10	1.33
3	Udegram and nearby 1 settlement	L	Lower Dir	0.00	0.00	0.00	0.00	0.20	1.17

Swat River - Sheet No. 12

Sr. No.	Settlement Name	Zone*	District	Inundation Depth at Discharge of 30,194 Cusec below Chakdara		Inundation Depth at Discharge of 38,846 Cusec below Chakdara		Inundation Depth at Discharge of 42,378 Cusec below Chakdara	
				Min (m)	Max (m)	Min (m)	Max (m)	Min (m)	Max (m)
1	5 settlements nearby Chargai	H,M,L	Lower Dir	0.04	3.42	0.57	4.04	1.43	4.44
2	Khadogzai and nearby 2 settlements	H,M,L	Lower Dir	0.01	3.61	0.07	4.27	1.76	4.79
3	1 settlement nearby Suglar	M,L	Lower Dir	0.00	0.00	0.08	2.65	0.94	3.04
4	2 settlements nearby Kandaro	M,L	Lower Dir	0.00	0.00	0.63	2.91	0.92	3.62
5	Bar Barangola	M,L	Lower Dir	0.00	0.00	0.74	2.29	0.60	2.50
8	Mian Barongala	M,L	Lower Dir	0.00	0.00	0.26	2.85	0.93	3.04

Swat River - Sheet No. 18

Sr. No.	Settlement Name	Zone*	District	Inundation Depth at Discharge of 30,194 Cusec below Chakdara		Inundation Depth at Discharge of 38,846 Cusec below Chakdara		Inundation Depth at Discharge of 42,378 Cusec below Chakdara	
				Min (m)	Max (m)	Min (m)	Max (m)	Min (m)	Max (m)
1	5 settlements nearby Kotka	H,M,L	Lower Dir	0.04	3.07	1.10	3.87	1.61	4.01
2	7 settlements nearby Khazana	H,M,L	Lower Dir	0.01	3.35	1.18	3.82	1.84	4.57
3	7 settlements nearby Malala	H,M,L	Lower Dir	0.05	3.04	0.39	3.83	1.35	4.29
4	Ghana and nearby 12 settlements	H,M,L	Lower Dir	0.02	3.60	0.53	4.14	1.27	4.46
5	Manroga and nearby 12 settlements	H,M,L	Lower Dir	0.02	3.59	0.28	4.00	1.15	4.81
6	5 settlements nearby Ford	M,L	Lower Dir	0.00	0.00	0.14	3.06	1.10	3.74
7	Ghobana and nearby 6 settlements	M,L	Lower Dir	0.00	0.00	0.46	3.26	0.79	3.41
8	Gosam	M,L	Lower Dir	0.00	0.00	0.47	2.36	1.39	3.52
9	Landakur	M,L	Lower Dir	0.00	0.00	0.13	3.24	1.08	3.99
10	Sarai	L	Lower Dir	0.00	0.00	0.00	0.00	0.25	0.64
11	Rhema	L	Lower Dir	0.00	0.00	0.00	0.00	0.28	1.09
12	Rehan Kot	L	Lower Dir	0.00	0.00	0.00	0.00	0.14	1.04
13	Shikalai	L	Lower Dir	0.00	0.00	0.00	0.00	0.02	0.74

Swat River - Sheet No. 13

Sr. No.	Settlement Name	Zone*	District	Inundation Depth at Discharge of 30,194 Cusec below Chakdara		Inundation Depth at Discharge of 38,846 Cusec below Chakdara		Inundation Depth at Discharge of 42,378 Cusec below Chakdara	
				Min (m)	Max (m)	Min (m)	Max (m)	Min (m)	Max (m)
2	1 settlement nearby Sookani	M,L	Lower Dir	0.00	0.00	0.13	3.17	0.57	3.27
4	2 settlements nearby Kamala	L	Lower Dir	0.00	0.00	0.00	0.00	0.09	0.42
5	Nigram	L	Lower Dir	0.00	0.00	0.00	0.00	0.08	0.71

Swat River - Sheet No. 14

Sr. No.	Settlement Name	Zone*	District	Inundation Depth at Discharge of 30,194 Cusec below Chakdara		Inundation Depth at Discharge of 38,846 Cusec below Chakdara		Inundation Depth at Discharge of 42,378 Cusec below Chakdara	
				Min (m)	Max (m)	Min (m)	Max (m)	Min (m)	Max (m)
1	1 settlement nearby Kharro Kalle	H,M,L	Lower Dir	0.08	3.34	0.63	4.04	1.45	4.48
3	3 settlements nearby Shigo Kas	H,M,L	Lower Dir	0.09	3.29	0.74	3.97	1.66	4.21

Swat River - Sheet No. 15

Sr. No.	Settlement Name	Zone*	District	Inundation Depth at Discharge of 30,194 Cusec below Chakdara		Inundation Depth at Discharge of 38,846 Cusec below Chakdara		Inundation Depth at Discharge of 42,378 Cusec below Chakdara	
				Min (m)	Max (m)	Min (m)	Max (m)	Min (m)	Max (m)
1	Khwarkoto	M,L	Lower Dir	0.00	0.00	0.23	3.09	0.30	3.83
2	Timur and nearby 2 settlements	M,L	Lower Dir	0.00	0.00	0.11	3.28	0.85	3.74
3	2 settlements nearby Pishai	L	Lower Dir	0.00	0.00	0.00	0.00	0.07	1.44
4	Garhi	L	Lower Dir	0.00	0.00	0.00	0.00	0.02	1.10

Swat River - Sheet No. 16

Sr. No.	Settlement Name	Zone*	District	Inundation Depth at Discharge of 30,194 Cusec below Chakdara		Inundation Depth at Discharge of 38,846 Cusec below Chakdara		Inundation Depth at Discharge of 42,378 Cusec below Chakdara	
				Min (m)	Max (m)	Min (m)	Max (m)	Min (m)	Max (m)
1	2 settlements nearby Sacha	L	Lower Dir	0.00	0.00	0.00	0.00	0.04	1.60
2	3 settlements nearby Barghole	L	Lower Dir	0.00	0.00	0.00	0.00	0.01	1.56
3	Barun	L	Lower Dir	0.00	0.00	0.00	0.00	0.05	1.73
4	Manzar Taagai	L	Lower Dir	0.00	0.00	0.00	0.00	0.02	1.83
5	Rabat	L	Lower Dir	0.00	0.00	0.00	0.00	0.03	0.59
6	Shamrud	L	Lower Dir	0.00	0.00	0.00	0.00	0.02	1.28

Zone*

- H= High Risk Inundation Zone corresponds to 5 yr return period flood
- M=Medium Risk Inundation Zone corresponds to 15 yr return period flood
- L= Low Risk Inundation Zone corresponds to 50 yr return period flood