



**MALAYSIAN JOINT WARFARE CENTRE  
(PESAMA)**



# **INTRODUCTION TO INTELLIGENCE PREPARATION OF THE OPERATIONAL ENVIRONMENT (IPOE)**

**by**

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**IPOE – Step 2**  
**DESCRIBE THE OPERATIONAL**  
**ENVIRONMENT EFFECT**



## STEP 2: DESCRIBE THE OPERATIONAL ENVIRONMENT EFFECT

**Acty 1.** Terrain Analysis

**Acty 2.** Weather Analysis

**Acty 3.** Analysis Other Operation Environment Characteristic

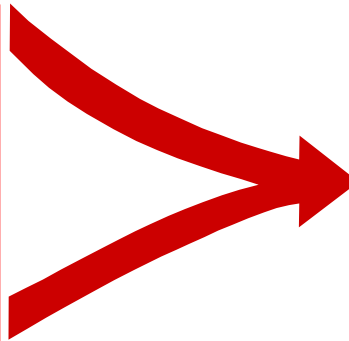
**Acty 4.** Combine The Operation Environment Effects

- Analyse the environmental effects on both friendly & threat op



## OPERATIONAL ENVIRONMENT EFFECT

- Terrain analysis
- Weather analysis
- Other OE characteristics analysis



**EFFECTS**



## Why need to analyse OE effects?

Three Aims:

- ☐ Provide a clear and concise military view of the ground / battlespace;
- ☐ Predict threat use the ground, assisting development of EN COA;
- ☐ Assist development of FF COA that:
  - Enhance weapon capabilities
  - Provides, movement, concealment and protection





## ACTY 1: TERRAIN ANALYSIS

- ❖ Determine how the terrain can be used most effectively & exploit it to interfere with the threat
- ❖ Mil aspect of battlefield's terrain



- **O**bsn & fd of fire
- **C**over & Concealment
- **O**bstacle
- **K**ey Terrain (KT)
- **A**venue of Approach (AA)



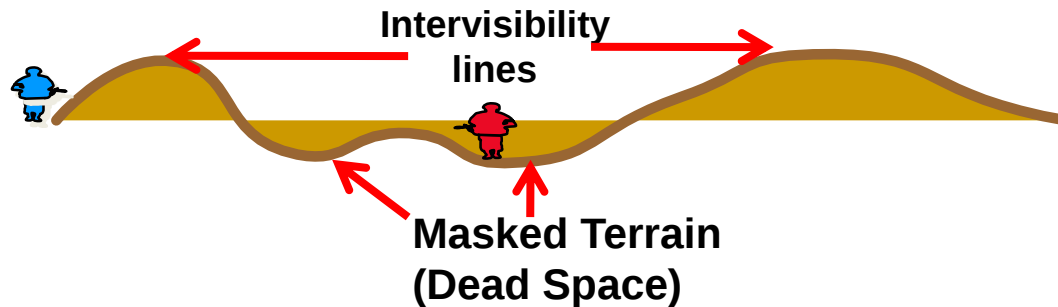
## ACTY 1: TERRAIN ANALYSIS

- ❖ Terrain analysis is subject to re-evaluation due to natural or artificial changes, such as heavy rainfall, fires caused by incendiary munitions and the destruction of urban areas
- ❖ Analysis of the mil aspect of terrain aim to identify:
  - KT
  - Decisive Terrain
  - AA to key and decisive terrain
  - EA
  - Battle posn
  - Infiltration lanes
  - Point of entry
  - Best loc for specific combat, CS and CSS systems... etc



## O Obsn & Fd of Fire

- **Obsn:** ability to see visually or through devices for early wng, int gathering & con of fire



- **Fd of Fire:** The area that a wpn/gp of wpn can effectively cover with fire fm a given posn



## O Obsn & Fd of Fire

**Engage vs Observe:** obsn & fd of fire not always equate to each other. You may be able to see 5 km, but if you only armed with a rifle, then your fd of fire is limited to 500 m.

**\*Obsn is TERRAIN dependent !**

**\*Visibilty is WEATHER dependent !**



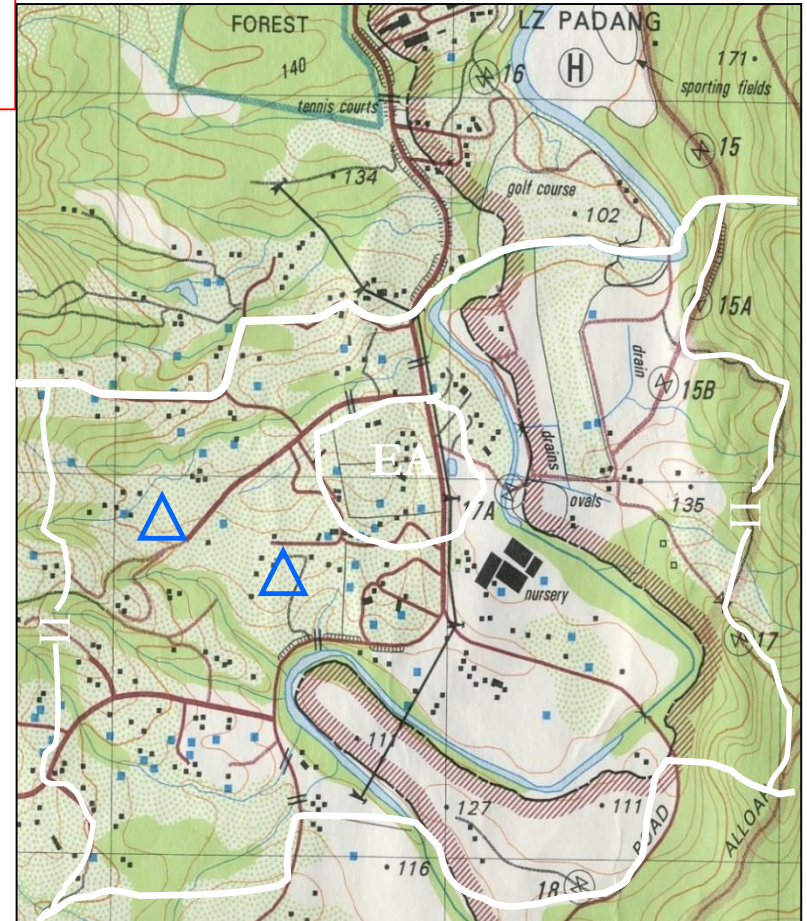
# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)



## ASSIST TO IDENTIFY

- ☐ Potential EA
- ☐ Def terrain & specific sy posn
- ☐ Vulnerable areas
- ☐ Surv areas
- ☐ Potential ops/RSI

\*Terrain that offers good obsn and fd of fire  
generally favours defensive COAs





## C COVER & CONCEALMENT

### COVER

- Protection fm the effects of dir & indir fires
- May be provided by dead ground, buildings, sunken roads, river banks, embankments, tunnel systems, caves and field fortifications

### CONCEALMENT

- Protection fm obsn
- May be provided by darkness, fog, rain, vegetation, camouflage, materials, deliberate obscurants and infrastructure





# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)

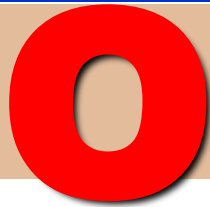


## C COVER & CONCEALMENT

### WHAT CAN BE IDENTIFIED ?

- Movement techniques
- Recon ability
- Formations
- RSI threshold
- Battle positions
- Avenues of approach
- Infiltration lanes
- Vulnerable area
- Key Terrain etc





## OBSTACLE

- ❖ Natural or man-made terrain feature that:
  - ☐ Stop/Restrict
  - ☐ Delay/Impede
  - ☐ Divert/Channel
  
- ❖ Should be examined on their capacity to impede armd & inf, suitability for breaching, bypassing or improvement
  
- ❖ An evaluation of obs leads to the identification of MC. This in turn helps identify defensible terrain & AA



# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)



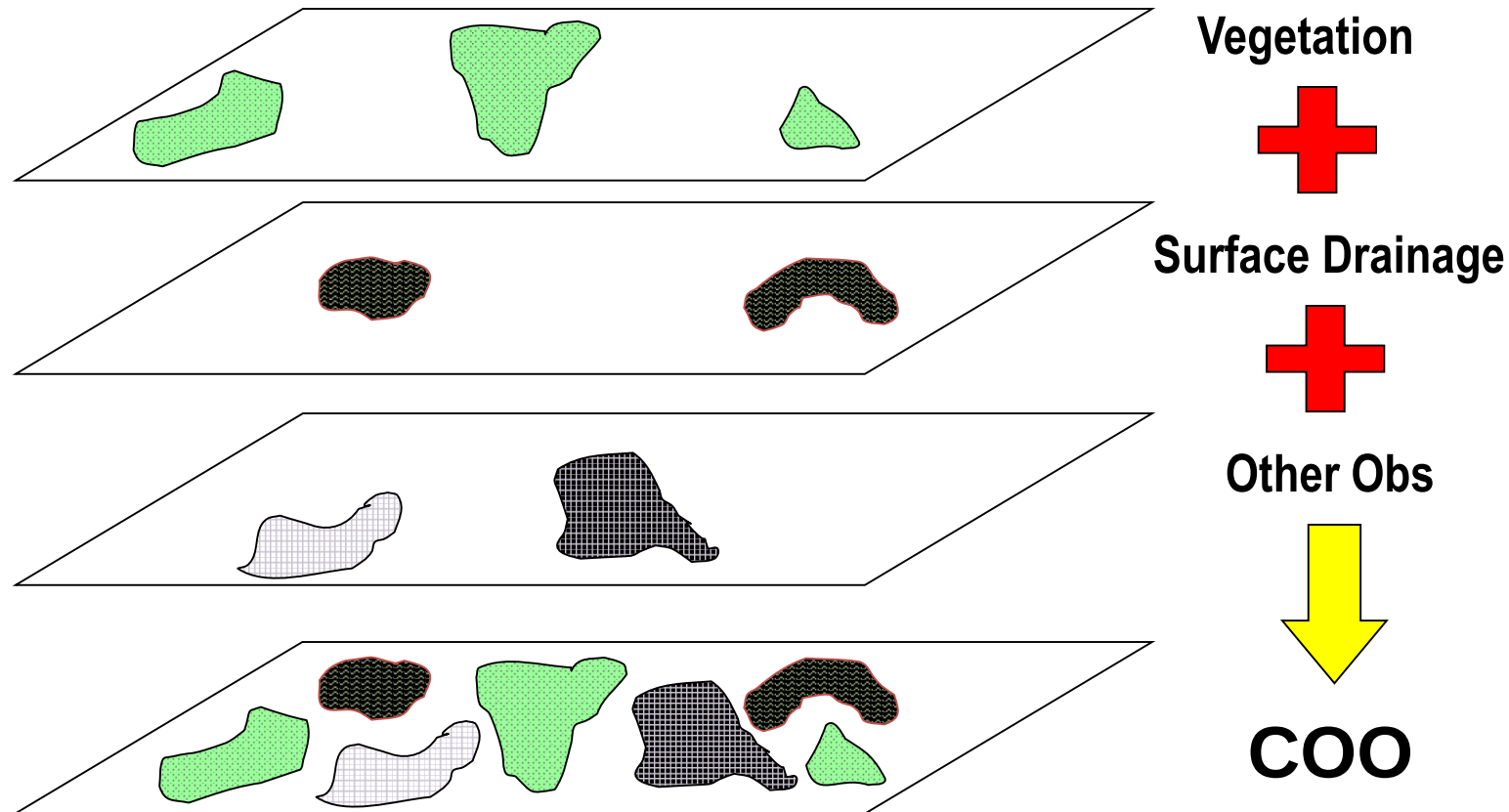
- ☐ VEGETATION (tree spacing & trunk diameter)
- ☐ SURFACE DRAINAGE (width, velocity, depth, bank slopes & height)
- ☐ SURFACE MATERIAL (soil type & cond that affect mob)
- ☐ OBS (natural/manmade)
- ☐ SURFACE CONFIGURATION (slopes that affect mob)
- ☐ TPT SYS (br classes & rd type)
- ☐ EFFECT OF WEATHER (forecast; flood, haze etc)

## WHAT NEED TO BE IDENTIFIED ?

- Vulnerable area
- Manoeuvre area
- C-Mob area



## Combined Obs Overlay (COO)



❖ The effects of all obs onto one obs overlay - COO.

❖ COO displays the cumulative evaluation of all obs using the mob classification

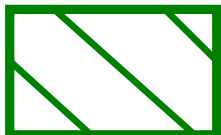


# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)

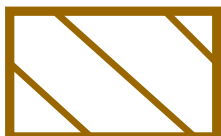


## Symbols on Combined Obstacle Overlay

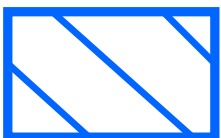
### Restricted



Medium Vegetation  
Vineyard  
Orchard



20- 30 Degrees



Subject to inundation

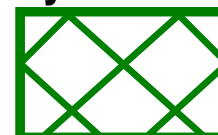
### Vegetation

### Slope

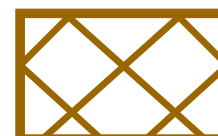
### Hydrography

### Urban

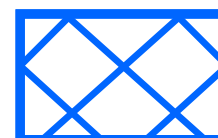
### Very Restricted



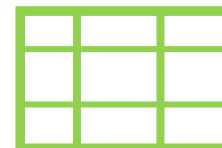
Dense Vegetation  
Rainforest  
Pine Plantation



> 30 Degrees



Swamps  
Dams  
Coastal flats



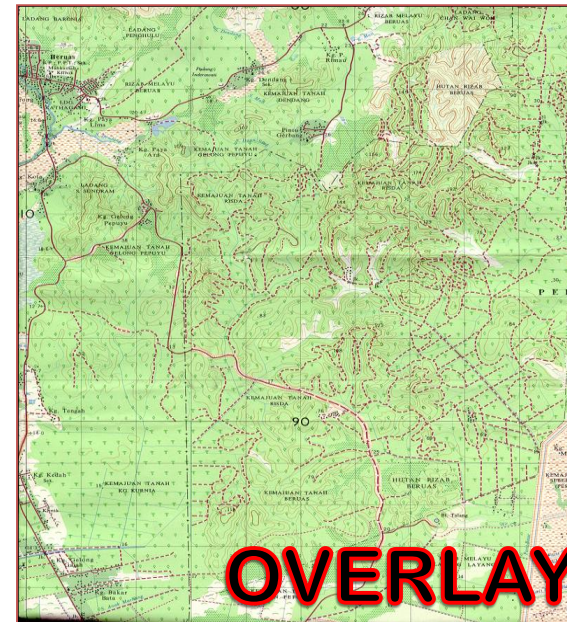
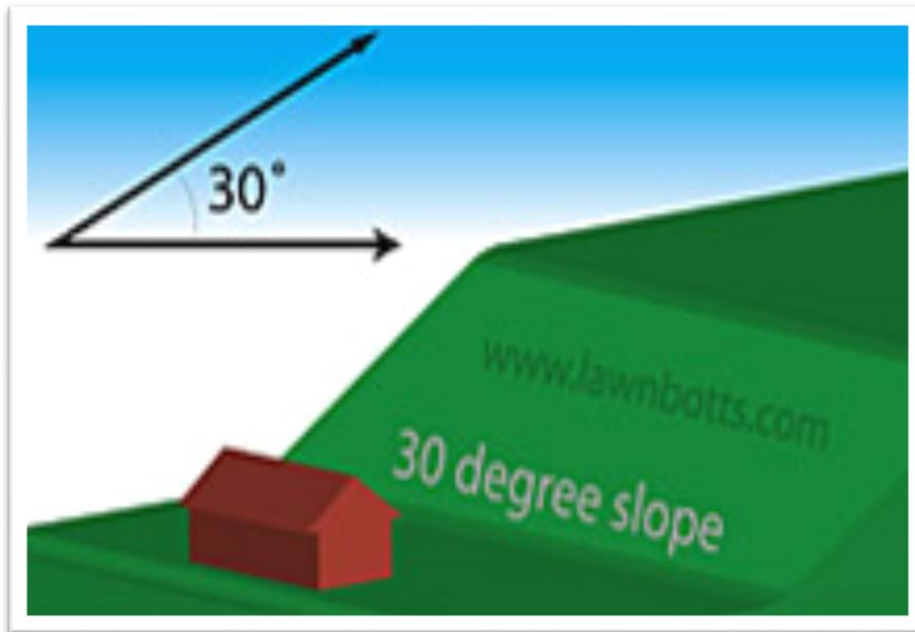
All BUA



# Mobility Classifications

## UNRESTRICTED

- ❑ (0-30% slope) - free mov fm any restriction for armd & mech force
- ❑ Typically fm flat to moderately slopping sp by well dev rd



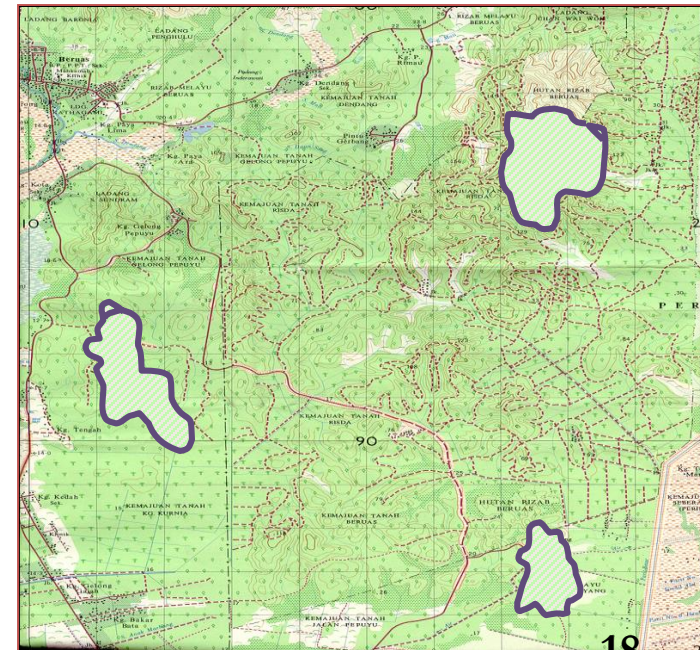
**OVERLAY NOT  
TO BE MARKED**



## Mobility Classifications

### RESTRICTED

- ❑ 31- 45% slope - Terrain hinders mov to some degree especially to armd & mech (speed may be hindered/slowed - little effort req)
- ❑ L of C also may be hindered by poorly dev rd

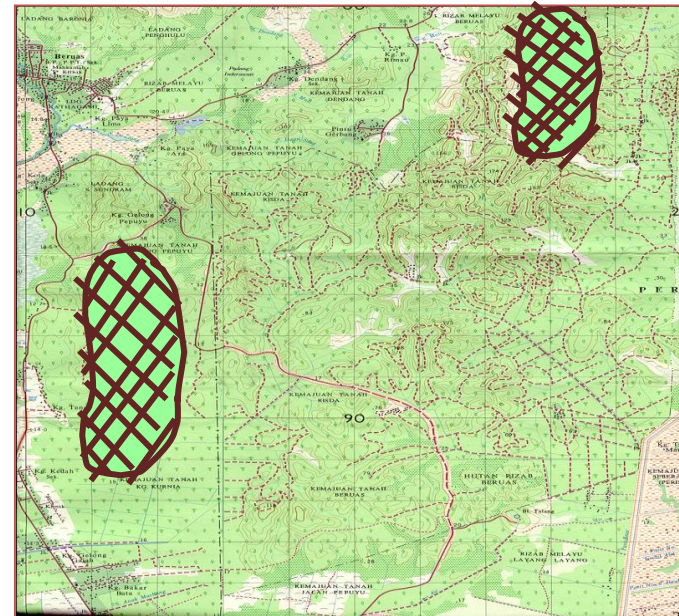




## Mobility Classifications

### VERY RESTRICTED

- ❑ **>45%/Steep slope + largely spaced obs** – Severely hinders or slows mov & great effort req – Engr assets involve
- ❑ Cbt fmn mov be likely deviate fm doctrinal tactics





## Unrestricted

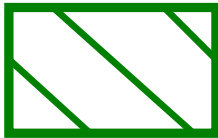




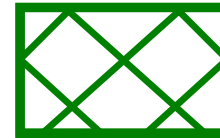
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## Vegetation



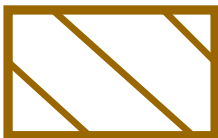
RESTRICTED



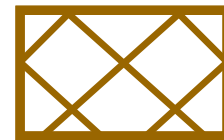
VERY RESTRICTED



## Slope



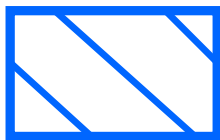
**RESTRICTED**



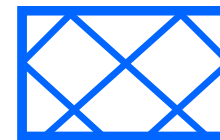
**VERY RESTRICTED**



# Hydrography

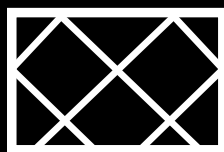
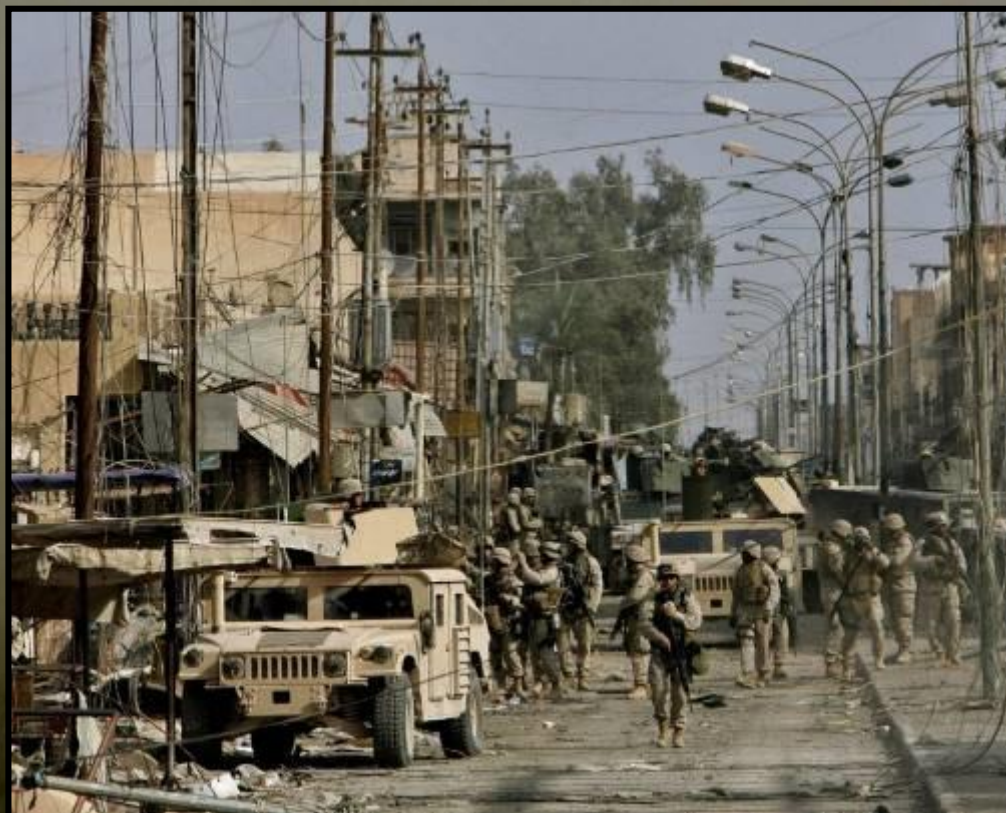


**RESTRICTED**



**VERY RESTRICTED**

# Urban



VERY RESTRICTED



# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)

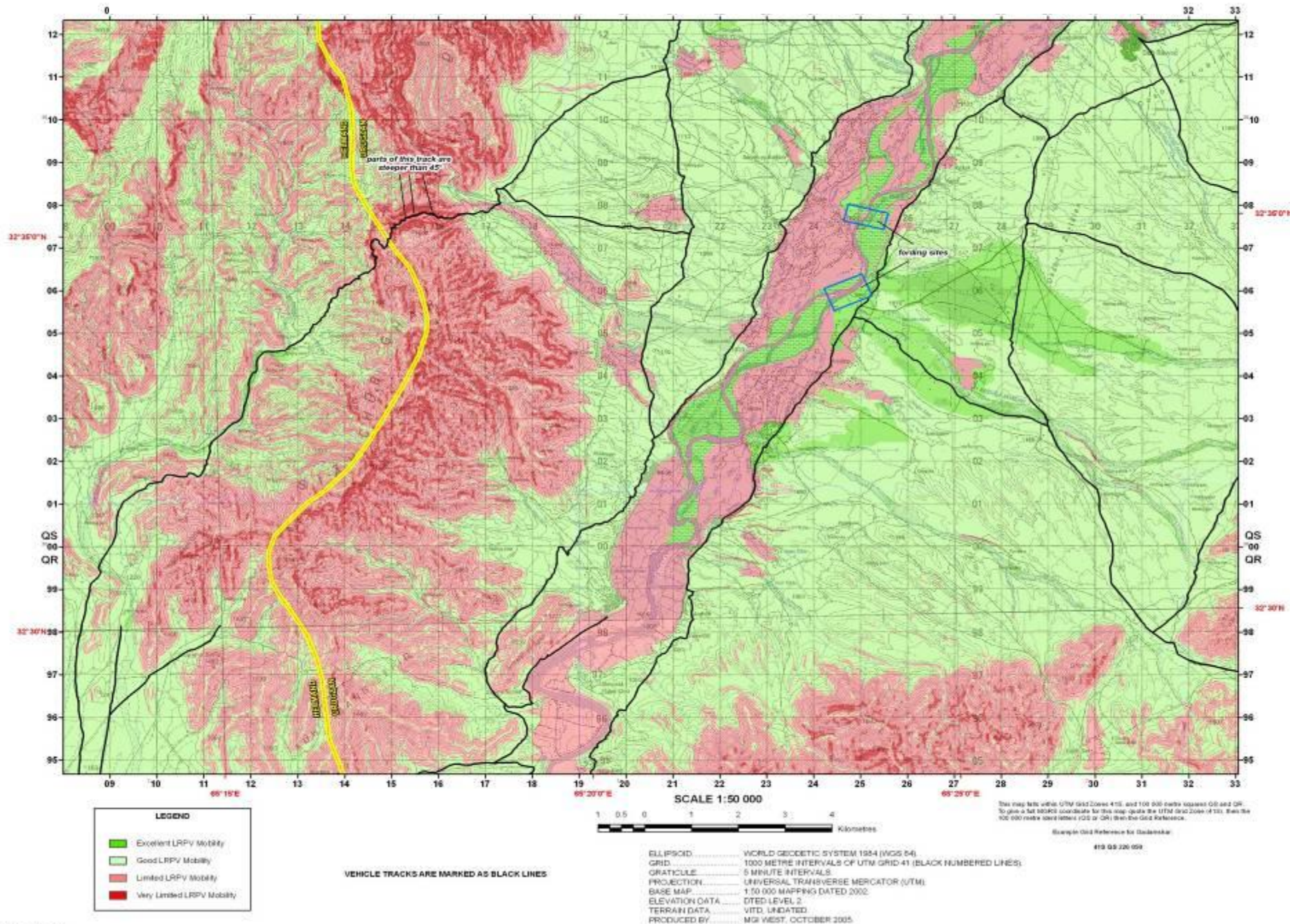


## Vehicles vs. Foot

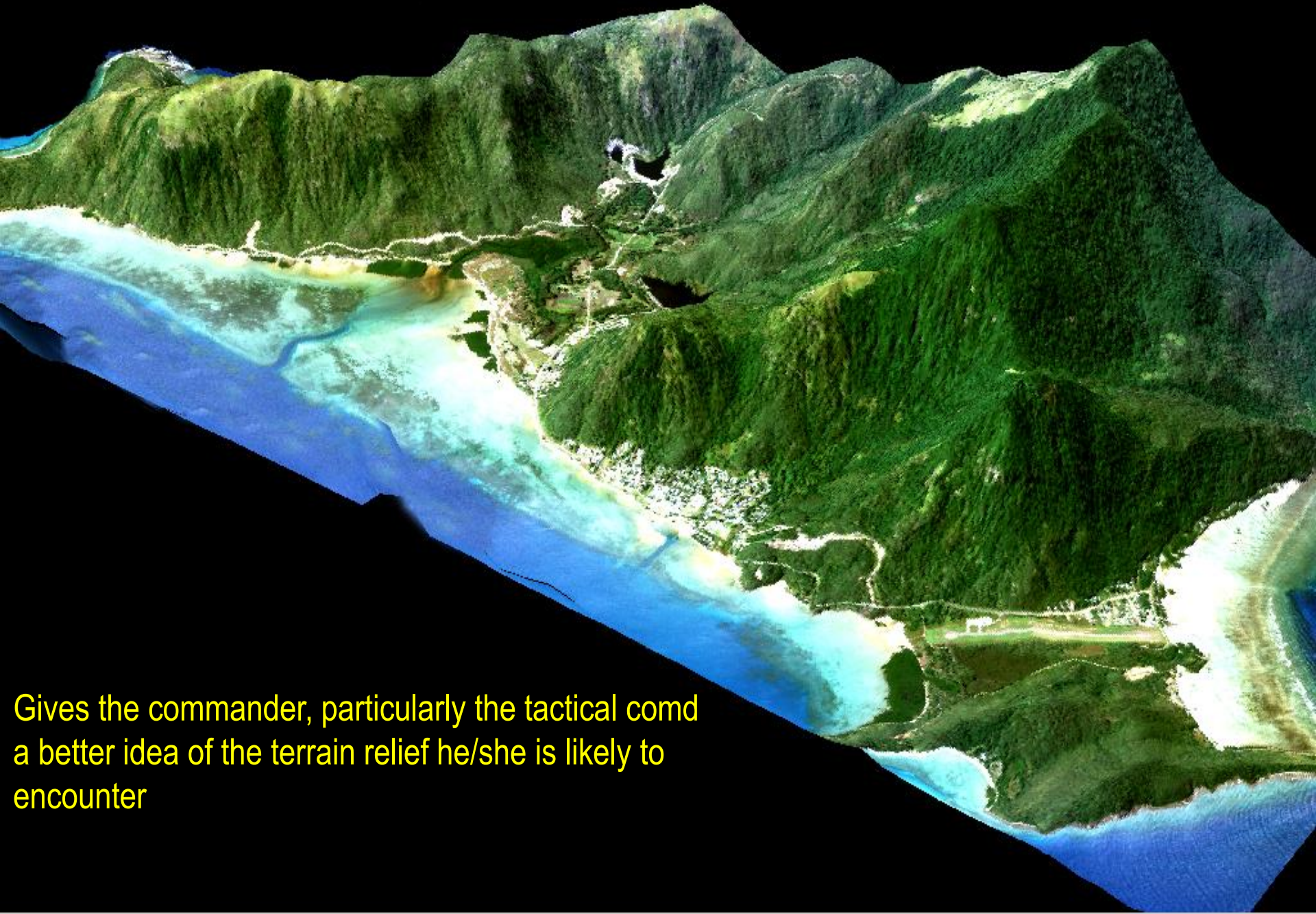


**WHAT MIGHT BE UNRESTRICTED FOR SOME MIGHT  
NOT BE FOR OTHERS...**

# Mobility Analysis – Military Geospatial Information Teams – Spt IPOE



## 3-Dimensional Draping



Gives the commander, particularly the tactical comd a better idea of the terrain relief he/she is likely to encounter



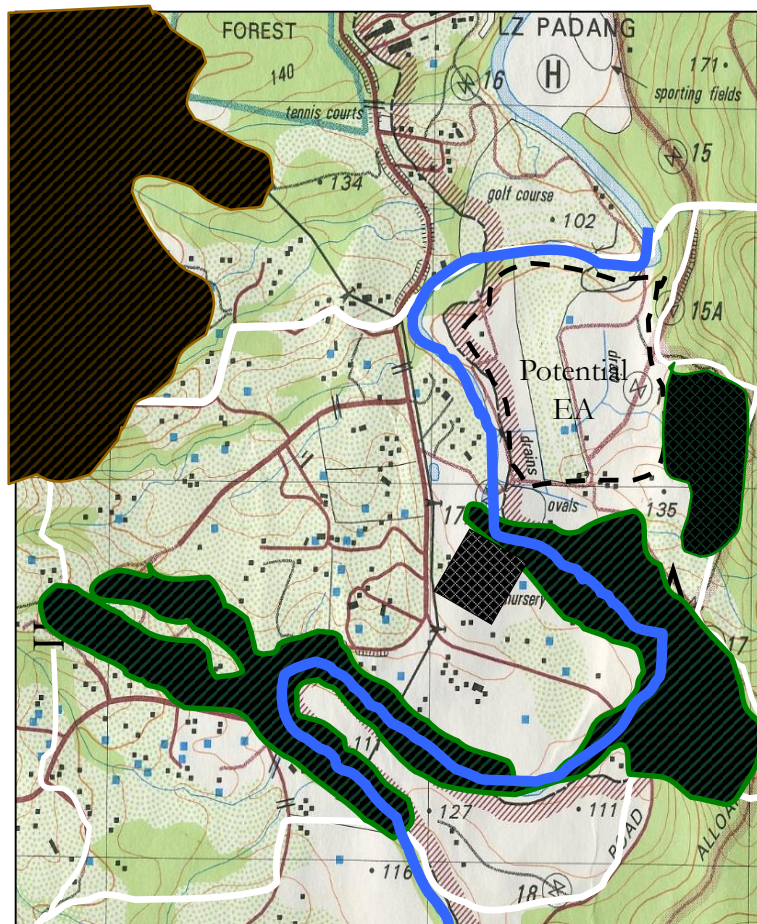
# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)



## Output of the COO

### WHAT CAN BE IDENTIFIED?

- Vulnerable Areas
- Manoeuvre Areas
- C-Mob Areas





# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)

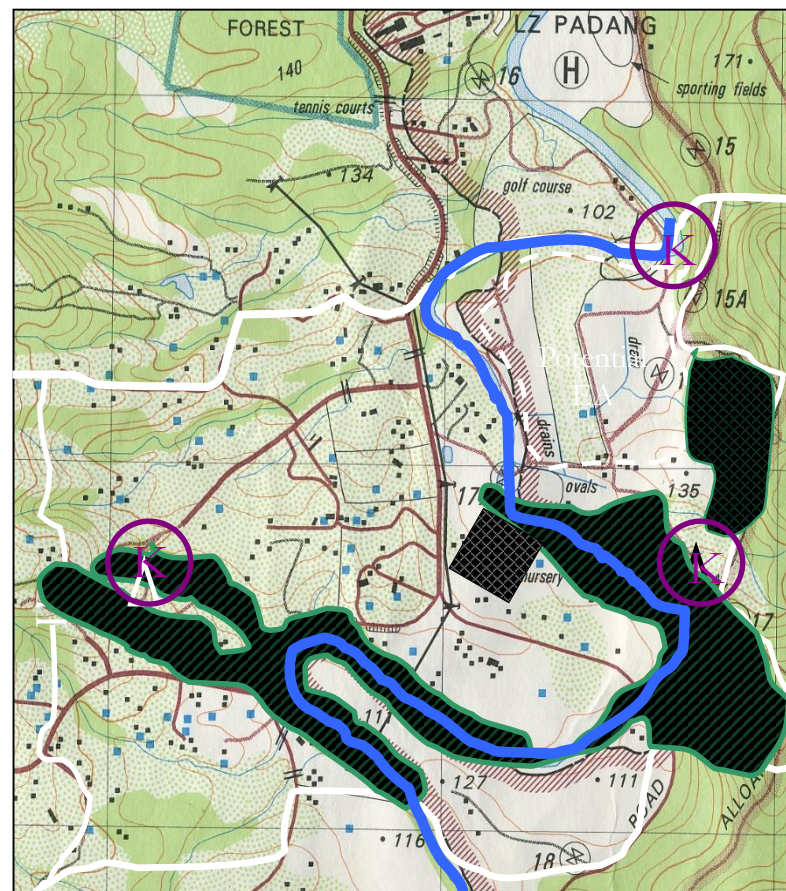


# K

## KEY TERRAIN

Is any locality or area, the seizure or retention of which affords a ***marked advantage*** to either combatant

- Must be controlled, not necessarily occupied
- Controlled by either direct fire or manoeuvre
- Good Observations and FoF
- Choke point or influence mobility
- Access control point
- Economically/ politically important
- Key personnel





## VITAL GND (VG)/TERRAIN

- ▣ Based on one or more KT identified which affords msn success
- ▣ Has an extraordinary impact on ops – need to be retained or seized



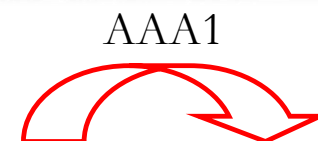
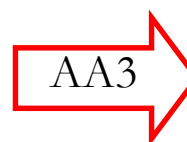


# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)



## A AVENUES OF APPROACH

- ❑ Air or gnd route of an attacking force of a given size leading to its obj or KT. All COA that involve maneuver depend upon available AA
- ❑ Determination should consider:
  - ❖ Access to KT & adjacent avenue
  - ❖ Degree of canalization & ease of mov (wide enough to permit manoeuvre)
  - ❖ Use of cover & concealment
  - ❖ Use of obsn & fd of fire
  - ❖ Sustainability
  - ❖ Directness to the obj





## MOBILITY CORRIDOR (MC)

- ❑ Areas where a force will be canalized due to terrain restrictions
- ❑ Indicate the size of the force that can manoeuvre in battle formation
  - ❖ Relatively free of obs
  - ❖ Allows mil forces to capitalize *mass & speed*
  - ❖ Best MCs use unrestd terrain & wide enough to permit manoeuvre
  - ❖ Categorize MC' s by size of force must consider size of force that suits the MC



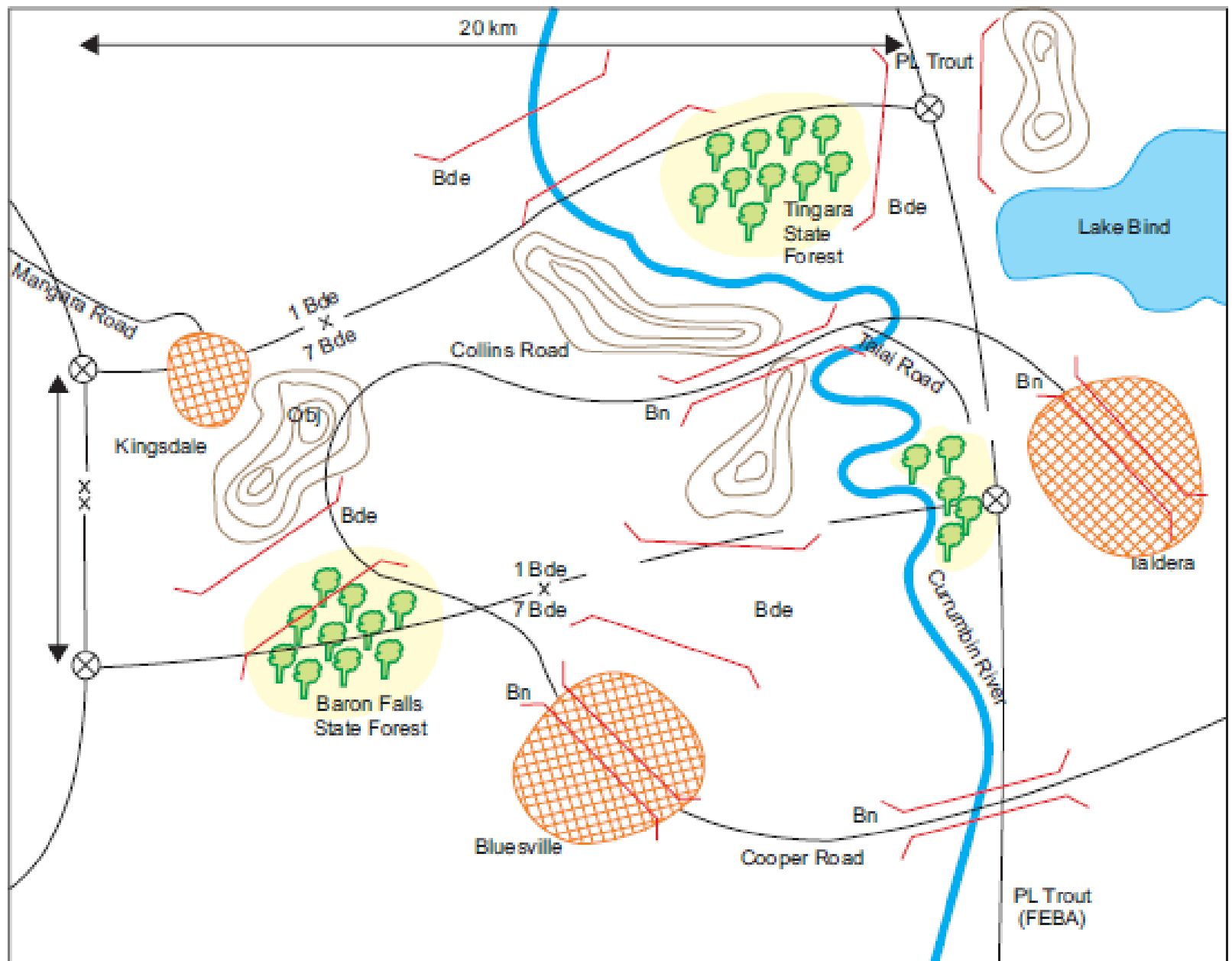
## MOBILITY CORRIDOR (MC)

- Must consider size of force that suits the MC

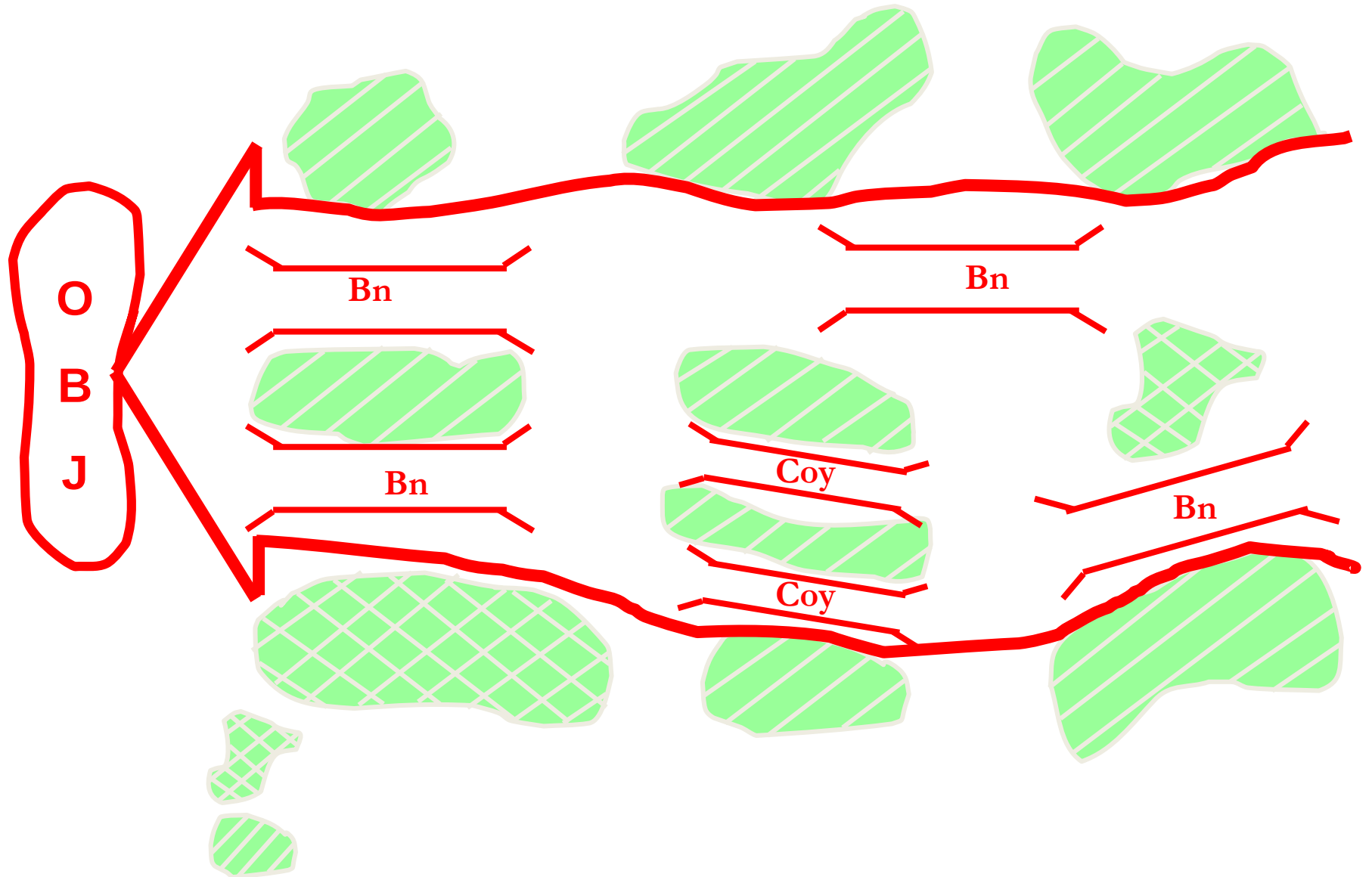
|            |   |        |
|------------|---|--------|
| ■ Coy      | - | 0.5 km |
| ■ Bn       | - | 1.5 km |
| ■ Regt/Bde | - | 3 km   |
| ■ Div      | - | 6 km   |

- Symbol:





# AA & MC





# **PRODUCE MCOO**

- MCOO reflects the results of terrain analysis & the battlespace's effects on mil ops.



## PRODUCE MCOO

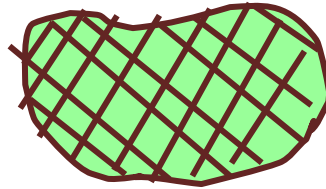
- Begin with the COO & consider adding:
  - Mob classifications (Unrestd, Restd, & Severely Restd)
  - AA
  - MC
  - CMob obs sys (own & threat)
  - Defensible terrain
  - EA
  - KT
  - Obj
- MCOO reflects the results of terrain analysis & the OE effects on mil ops



# MCOO Symbols



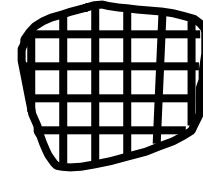
Green



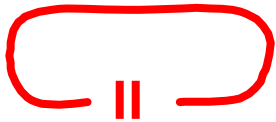
Brown

Green

Brown

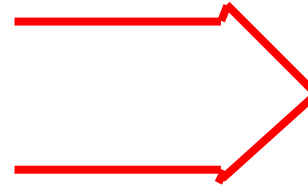


Built-up Areas  
Black



Red

Blue



Red

Blue



Red

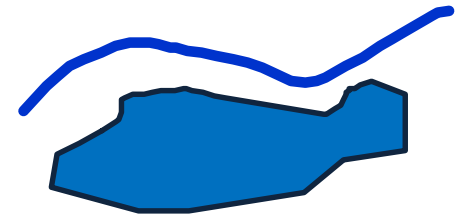
Blue



Green



Purple

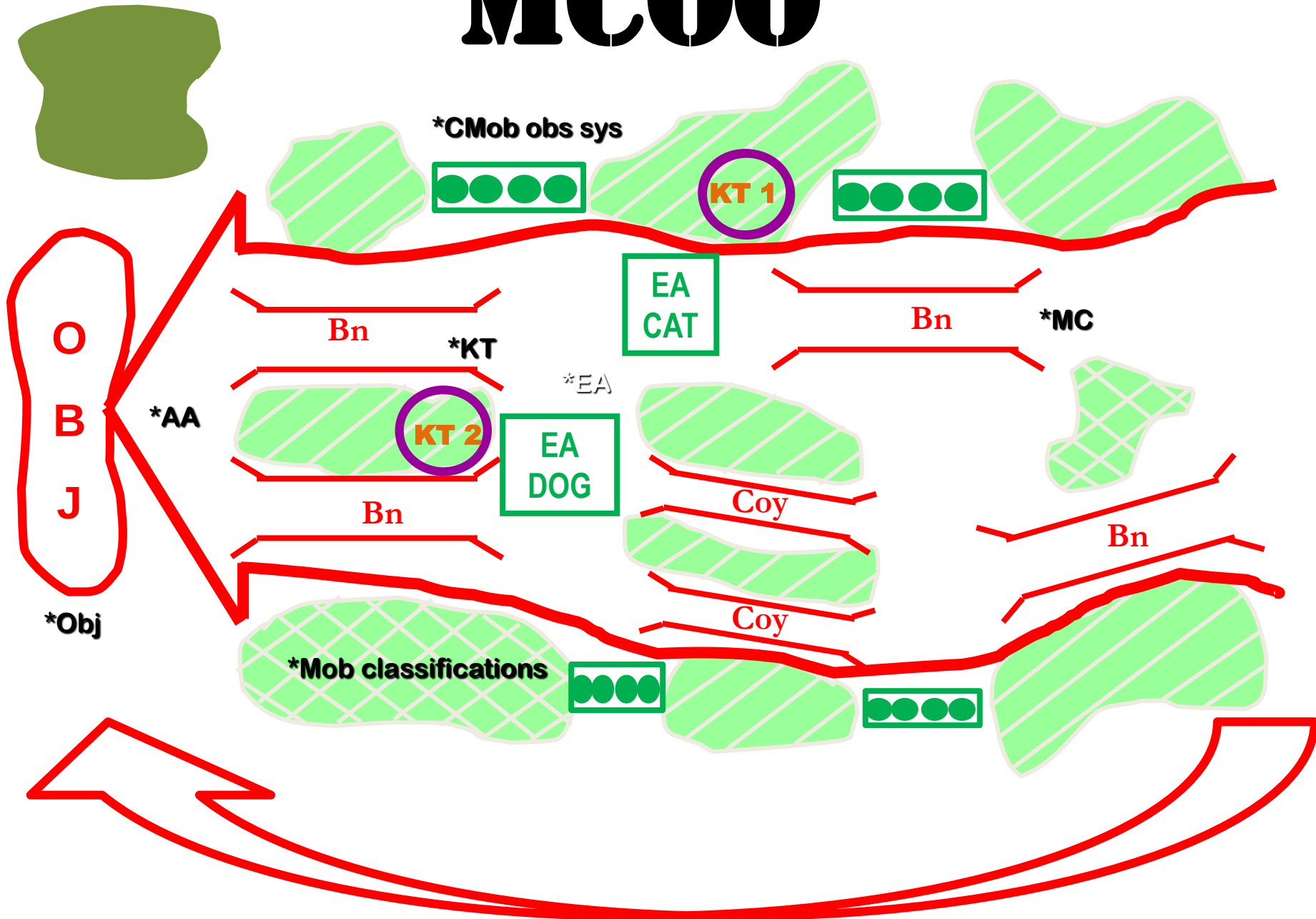


Blue

NOTE: Ensure all graphics & symbols are listed in the Legend.

# MCOO

## Terrain Analysis

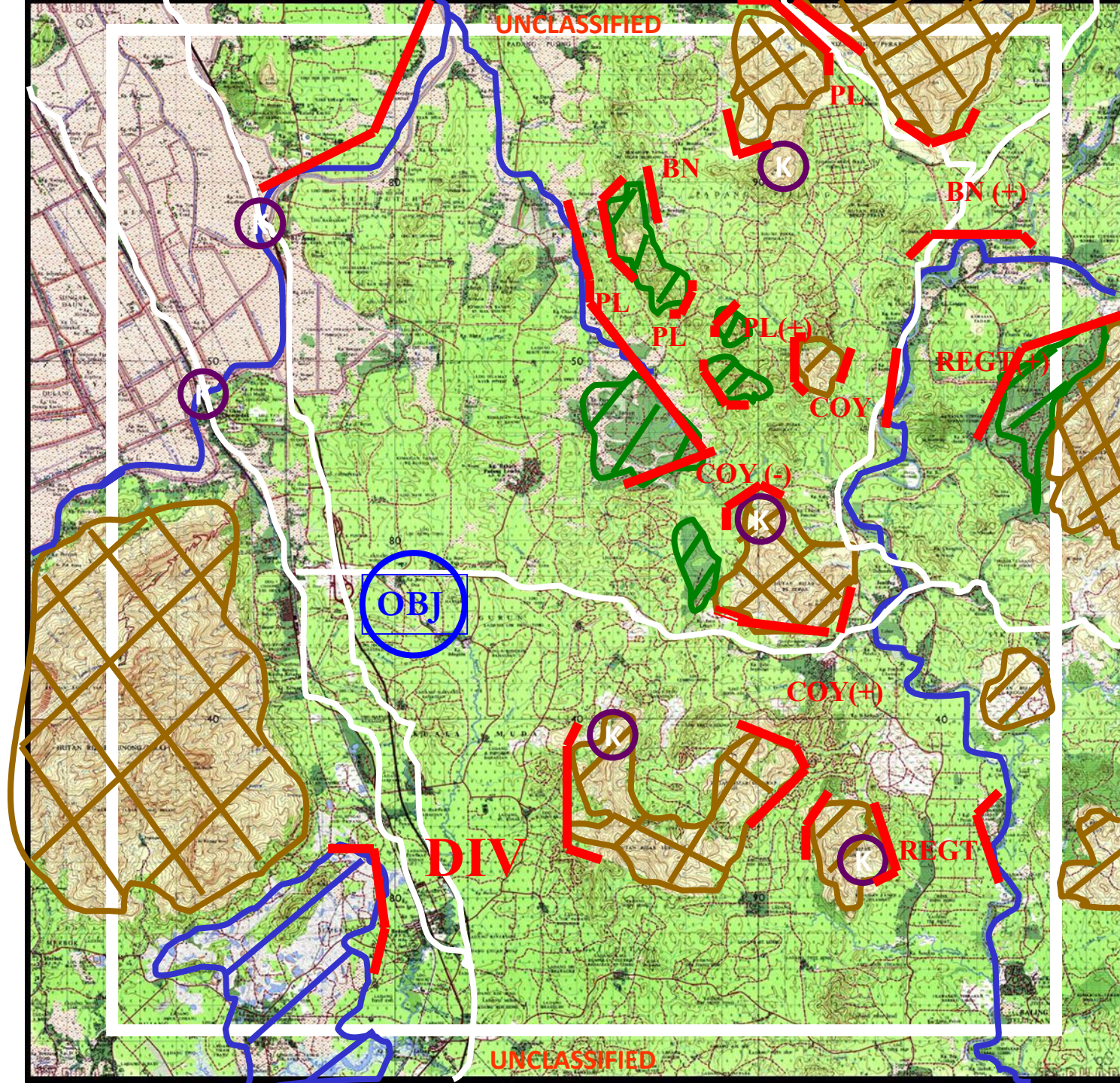


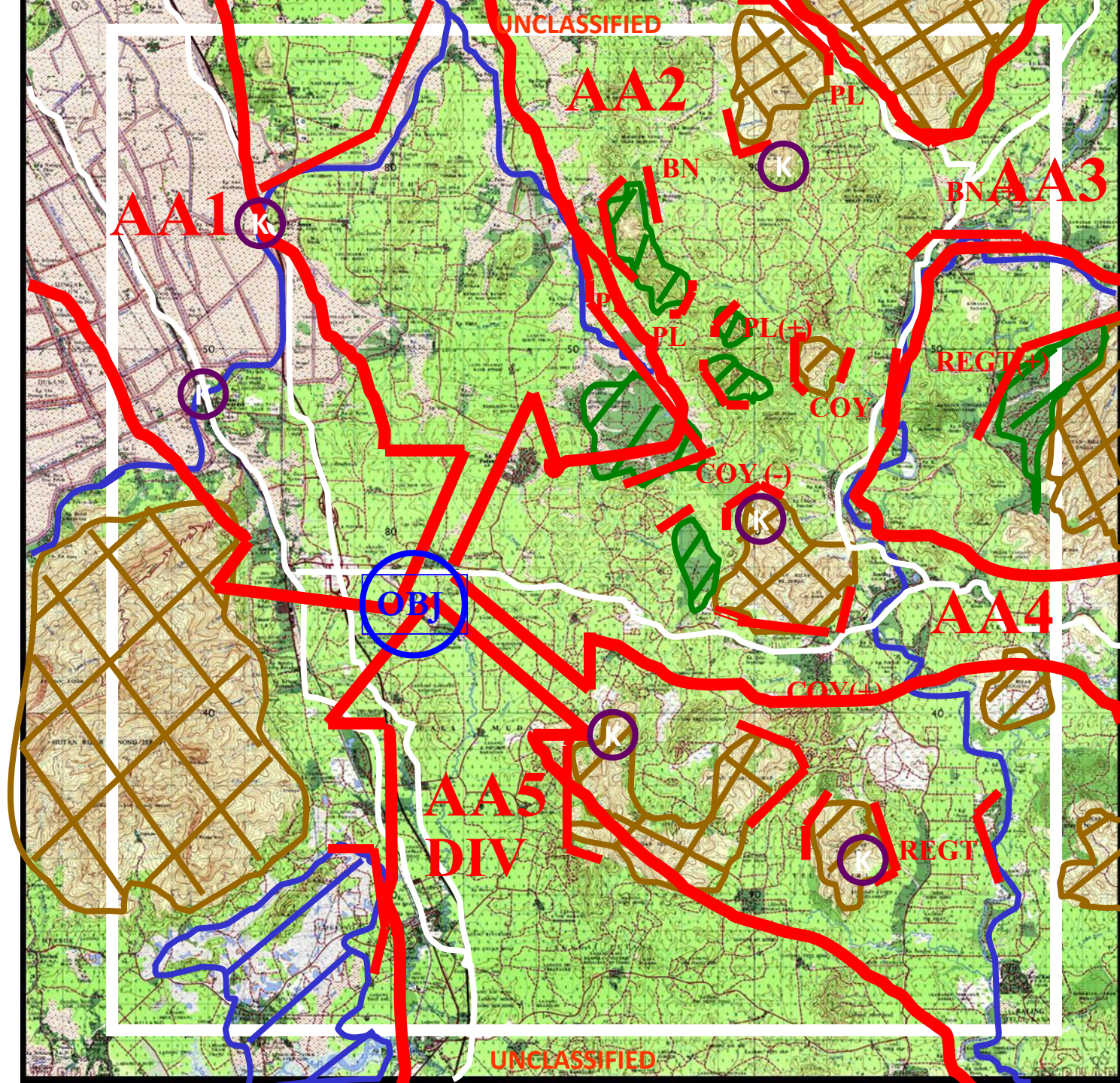


# **EXAMPLE - Modified Combined Obstacles Overlay (MCOO)**

## Example









# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)



## ACTY 2. WEATHER ANALYSIS

### □ ELM 1 - IDENTIFY THE EFFECT OF WEATHER

#### MIL ASPECT OF WEATHER

- Analysis based on:
  - Visibility
  - Wind
  - Precipitation
  - Cloud Cover
  - Temperature & Humidity
- Weather is neutral





## ACTY 2. WEATHER ANALYSIS

### ☐ ELM 2 - PRODUCE THE WEATHER EFFECT MATRIX

#### # Products:

- **Weather Effects Matrix** (daily or weekly)
- **Key deductions** / assessments on climate.



## ACTY 2. WEATHER ANALYSIS

### Visibility

- Measures in metres
- Aided by technology
- Natural illumination

### • Effects

- Concealment
- Target acquisition
- Engagement ranges
- Air operations





# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)



## ACTY 2. WEATHER ANALYSIS

### Wind

- **Strong winds effect:**
  - Moves obscurants
  - Visibility better when viewing downwind
  - Limits air operations
  - Rough seas limit amphibious operations
  - Engagement ranges
  - Reduced weapon accuracy





# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)

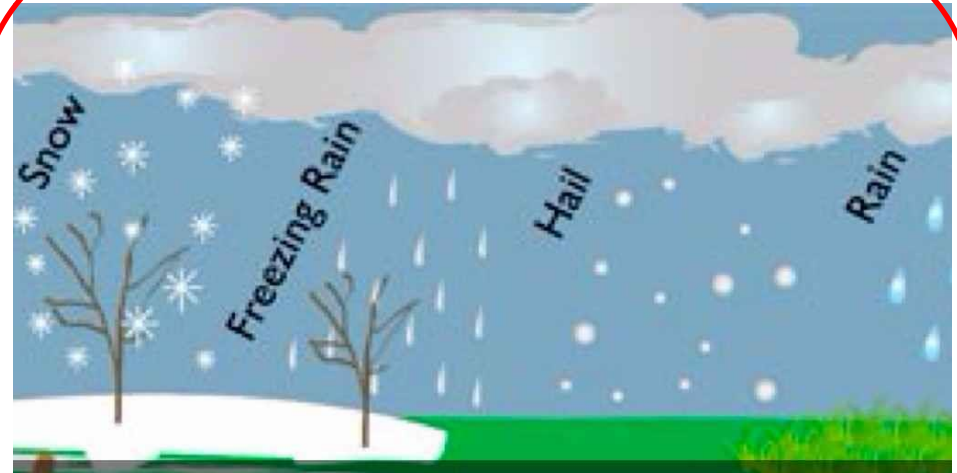


## Precipitation

- Any form of water - liquid or solid - falling from the sky. It includes rain, sleet, snow, hail and drizzle plus a few less common occurrences such as ice pellets, diamond dust and freezing rain

- **Effects**

- Reduces soil trafficability
- Reduced visibility
- Reduced air ops
- Snow reduces comms
- In dusty climate rain can reduce dust signature
- Health



- **Light Rain**
  - Drops are easily seen, very little spray. 2.5mm per hour
- **Moderate Rain**
  - Drops are not easily seen, spray noticeable, puddles form rapidly. 2.6-7.5mm per hour
- **Heavy Rain**
  - Drops are not seen, heavy spray, puddles form quickly. greater than 7.6mm



# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)



## Cloud Cover

- **Expressed in 'eights'**
  - **Few**
    - Clouds cover 1/8 to 2/8 the sky
  - **Scattered**
    - Clouds cover 3/8 to 4/8 the sky
  - **Broken**
    - Clouds cover 5/8 to 7/8 of the sky
  - **Overcast**
    - Clouds cover 8/8 of the entire sky
- **Effects**
  - limits illumination
  - reduces temperatures
  - degrades many TA systems
  - reduces effectiveness of air operations
  - Cloud-free LOS is required for delivery of precision-guided munitions from aircraft

Types of  
Clouds





# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)



## Temperature & Humidity

- Humidity: The state of atmosphere with respect to water vapor content
- Affect air density.
- Air density decreases as the temperature or humidity increases
- Aided by technology

### Effects

- Visibility (haze/glare)
- Impact water sources
- Heat/cold injuries
- impact in shelter and equipment
- degrades thermal devices
- Reduces battery life
- reduce personnel and equipment capabilities and may necessitate a reduction of aircraft payloads



# WEATHER EFFECTS MATRIX

| FORECAST TIME PERIOD |    |    |    |    |    |    |    |    |    |    |    |   |   |   |
|----------------------|----|----|----|----|----|----|----|----|----|----|----|---|---|---|
| Oct /Nov<br>2015     | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 1 | 2 | 3 |
| ASSET                |    |    |    |    |    |    |    |    |    |    |    |   |   |   |
| PERS                 |    |    |    |    |    |    |    |    |    |    |    |   |   |   |
| OPTICS               |    |    |    |    |    |    |    |    |    |    |    |   |   |   |
| IR DEVICE            |    |    |    |    |    |    |    |    |    |    |    |   |   |   |
| C3                   |    |    |    |    |    |    |    |    |    |    |    |   |   |   |
| MOBILITY<br>TRACKED  |    |    |    |    |    |    |    |    |    |    |    |   |   |   |
| MOBILITY<br>WHEELED  |    |    |    |    |    |    |    |    |    |    |    |   |   |   |
| MOBILITY<br>FOOT     |    |    |    |    |    |    |    |    |    |    |    |   |   |   |
| HELI<br>RECON        |    |    |    |    |    |    |    |    |    |    |    |   |   |   |

|  |              |                                     |
|--|--------------|-------------------------------------|
|  | FAVOURABLE   | NO EFFECT                           |
|  | MARGINAL     | EFFECTIVENESS REDUCED BY 25%        |
|  | UNFAVOURABLE | EFFECTIVENESS REDUCED MORE THAN 25% |

**Note: For helos, flyable in the morning and weather deteriorating in the afternoon**



## Key deductions / assessments on climate - Weather's Effects on Mil Ops

### ☐ Evaluate the weather's effects on:

- Pers
- Eqpt
- Mil Ops

### ☐ Revise weather effects on Terrain Analysis as the weather changes



**Example:** Panti River Valley gets dark very quickly. Around 0620/1825 use of NVG between sunset and midnight will be impacted by lack of moon illumination. Fog may impact on observation in the first hour after sunrise



# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)



**Changes in IPOE...**



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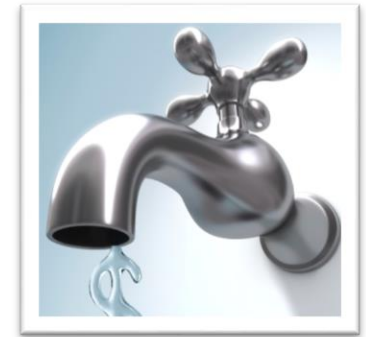


## ACTY 3. Analyze Other OE Characteristic

❖ Other characteristics include any other aspects of the OE not addressed by terrain and weather analysis

❖ Other characteristics vary and will depend on the situation

❖ The following two mnemonics can be useful in analyzing other operational environment characteristics:



### ASCOPE

- (1) A = area
- (2) S = structure
- (3) C = capabilities and communication
- (4) O = organisation
- (5) P = people
- (6) E = events

### PMESII

- (1) P = political
- (2) M = military
- (3) E = economic
- (4) S = social
- (5) I = infrastructure
- (6) I = information



|                    | P<br>Political                                                                                           | E<br>Economic                                                                                          | M<br>Military/Security                                                  | S<br>Social                                                                         | I<br>Infrastructure                                                            | I<br>Information                                                                 |
|--------------------|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| A<br>Areas         | District/Provincial boundary, Party affiliation areas, INS shadow govt influence area                    | Bazaars, farming areas, livestock dealers, auto repair shops, smuggling routes, illicit exchange areas | Coalition bases, historic ambush/IED sites/ Insurgent bases             | Traditional picnic areas, bazaars, outdoor shura sites                              | Irrigation networks, water tables, areas with medical services                 | Radio/TV/paper coverage areas, word of mouth gathering points, graffiti, posters |
| S<br>Structures    | Provincial/District Centres, Shura halls, polling sites, Court Houses, Mobile Courts                     | Bazaar, wheat storage, banks, mining structure, industrial plants                                      | Provincial/District Police HQ's, INS known leader house/business        | Mosques, wedding halls, popular restaurants                                         | Roads, bridges, electrical lines, gabion walls, dams                           | Cell, radio and TV towers, print shops                                           |
| C<br>Capabilities  | Dispute resolution, INS local leadership, INS impact on Judiciary capacity                               | Access to banks, ability to withstand drought, development, size of black market, irrigation potential | provide 24/7 security? QRF? INS strength/wpns? INS recruiting potential | Strength of tribal/village, traditional structures, mullahs, means of justice       | Ability to build/maintain roads, walls, check dams, irrigation systems, sewage | Literacy rate, availability of electronic media, phone service                   |
| O<br>Organisations | Political parties, INS group affiliations, GOV & NGO, Court system, trainers                             | Banks, large landholders, cooperatives, economic NGO's, Major illicit industry                         | Coalition present, INS groups present, outside stakeholders             | Tribal, clans, families, sports shuras, youth shuras                                | Government Ministries, Construction companies                                  | News organisations, influential mosques, INS IO groups                           |
| P<br>People        | Governors, councils, shura members, elders, mullahs, parliamentarians, Judges, prosecutors, TB Ombudsman | Bankers, landholders, merchants, money lenders, illegal facilitators, smuggling chain                  | Coalition, INS military leaders                                         | Mullahs, maliks, elders, shura members, influential families, entertainment figures | Builders, road contractors, local development councils                         | Media owners, mullahs, maliks, elders, heads of families                         |
| E<br>Events        | Elections, shuras, jirgas, provincial council meetings, speeches                                         | Drought, harvest, business opening, loss of business                                                   | Kinetic events, unit RIPs                                               | Friday prayers, holidays, weddings, festivals                                       | Road/bridge construction, well digging                                         | Friday prayers, publishing dates, IO campaigns                                   |



# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)



## Analyze other OE Characteristic

- ❖ Determine the EFFECTS, in term of its impact on broad friendly & threat COA
- ❖ In mil sp ops or MOOTW, these effects may be more important than terrain & weather factors itself





# MALAYSIAN JOINT WARFARE CENTRE (PESAMA)



## ACTY 4. Combine The OE Effect

- ❖ Combine the evaluation of the effects (terrain, weather & other characteristics) into MCOO

- ❑ **Operational environment total effects**

- Terrain
  - Physical,
  - Human,
  - Informational
  - Weather
  - Stakeholders
- Combine all above

- ❖ Focus on the battlefield environment's total effects on threat & friendly broad COAs.



## ACTY 4. Combine The OE Effect

- ☐ Produce a simple narrative of broad threat COAs based on the effects of the environment (MCOO) only
- ☐ Produce a recommendation indicating which of the broad threat & friendly COAs (options) based on MCOO
- ☐ Update the RSI plan – further collection



# STEP 2 OUTPUT

- ☐ COO
- ☐ MCOO (Initial & Refined)
- ☐ Weather Matrix
- ☐ Broad Threat COA (Battle Effects based on MCOO)



**HOW**

**to conduct IPOE?**

- 1** Define the Operational Environment
- 2** Describe the Operational Environment Effects
- 3** Evaluate the Threat



# Clarification and Questions