

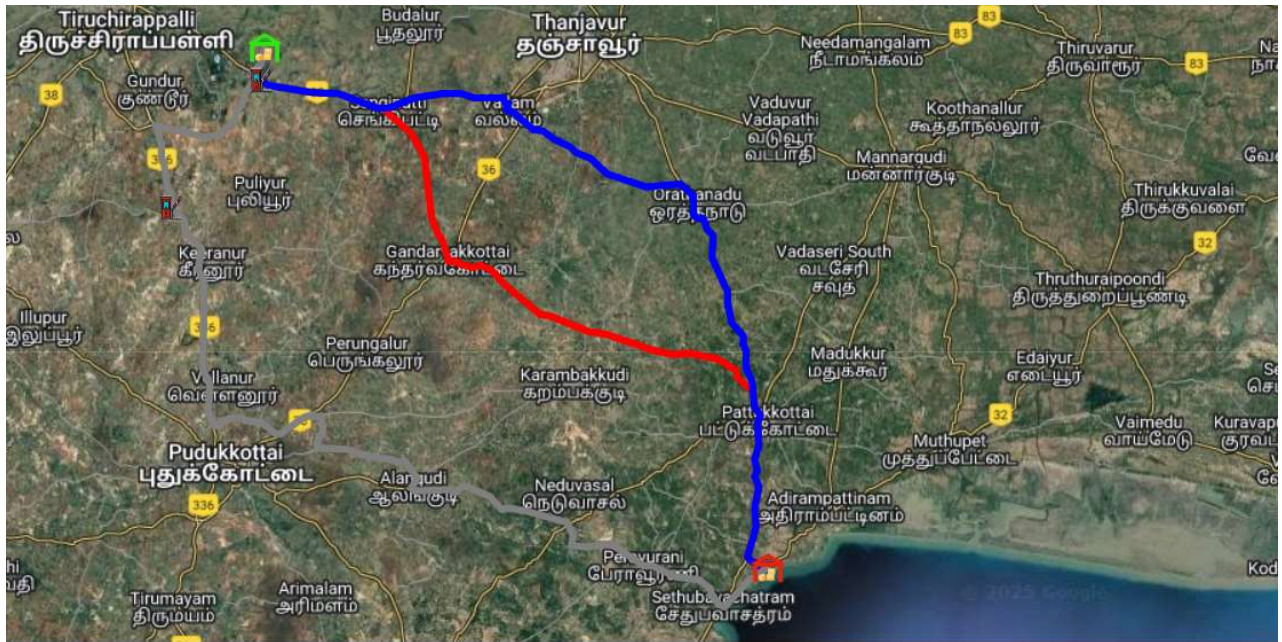
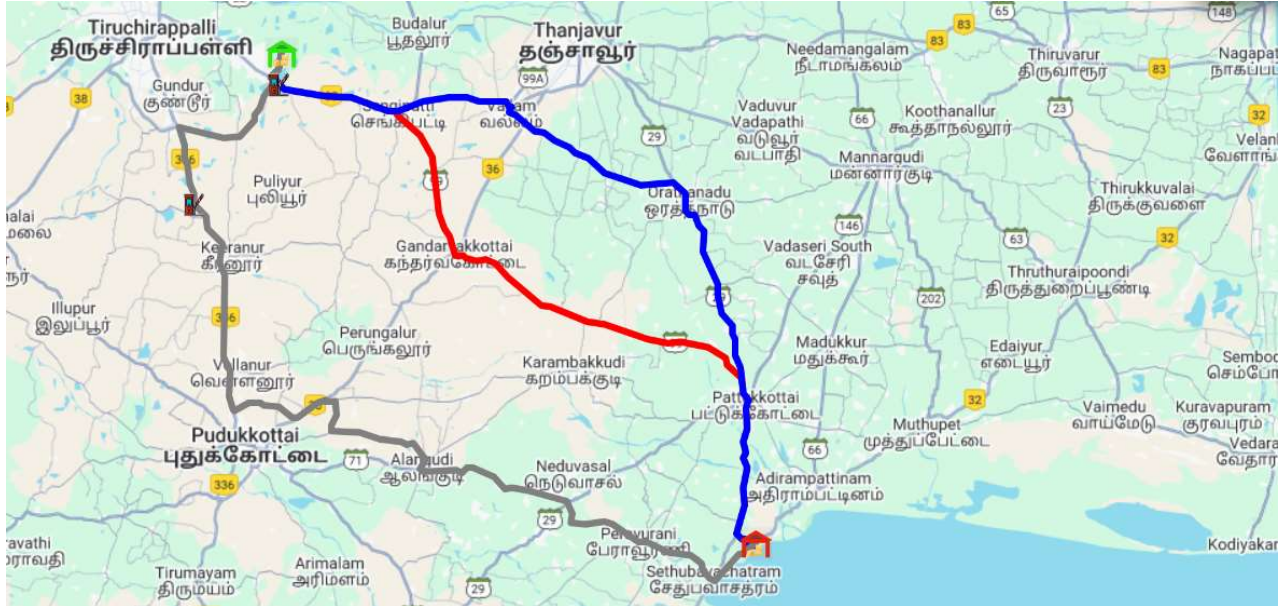


**IndianOil**

**WELCOME TO JOURNEY**  
**RISK MANAGEMENT**  
**(JRM) STUDY USING**  
**ARTIFICIAL**  
**INTELLIGENCE (AI)**  
**FOR IOCL TRICHY**  
**TERMINAL**

## JOURNEY RISK MANAGEMENT STUDY

### **IOCL TIRCHY TERMINAL (10.7753, 78.8368) TO MAHADEEN AGENCY (10.28463 , 79.3203) TOTAL DISTANCE -98.8 KM**



**ALARP SERVICES/JRM/TNSO/MAHADEEN**

## **Welcome to the Journey Risk Management Study for MAHADEEN AGENCY**

**Total distance: 95.9 km; Start with: (10.7753, 78.8368), End with: (10.28463 , 79.3203)**

### **❖ Route Safety Analysis Report**

#### **1. Overview of the Route Map**

The route from Trichy Terminal (T.N) TO MAHADEEN AGENCY. The route passes through several key points including Thuvakudi to SIDCO& Indian oil Storage Pass by Jude Digital Studios, NH 83, Follow Vallam Rd to Thanjavur - Kalayarkoil - Sayalkudi Rd/Thanjavur - Karaikudi - Kalaiyarkoil - Sayalkudi Rd/Thanjavur - Orathanadu - Pattukkottai Rd/Thanjavur - Pattukkottai Rd in Thennamanadu North, Kalayarkoil - Sayalkudi Rd/Thanjavur - Karaikudi - Kalaiyarkoil - Sayalkudi Rd/Thanjavur - Orathanadu - Pattukkottai Rd and Pattukkottai - Manamelkudi Rd to Thowheed Markas St in Mallipattinam, Kalayarkoil - Sayalkudi Rd/Thanjavur - Karaikudi - Kalaiyarkoil - Sayalkudi Rd/Thanjavur - Orathanadu - Pattukkottai Rd/Thanjavur - Pattukkottai Rd, and Total distance from Trichy Terminal To MAHADEEN AGENCY is 98.8 km for heavy vehicles carrying hazardous materials.

### **Typical Weather Conditions and Potential Weather-Related Hazards**

**Weather Conditions:** Trichy Terminal (T.N) To MAHADEEN AGENCY experiences a tropical climate with heavy monsoon rains from June to September, high humidity, and moderate temperatures throughout the year ,The summers are short and sweltering; the winters are short, cool, and dry; and it is mostly clear year-round. Over the course of the year, the temperature typically varies from 60.8°F to 110°F and is rarely below 60.8°F to 110°F.



## JOURNEY RISK MANAGEMENT STUDY

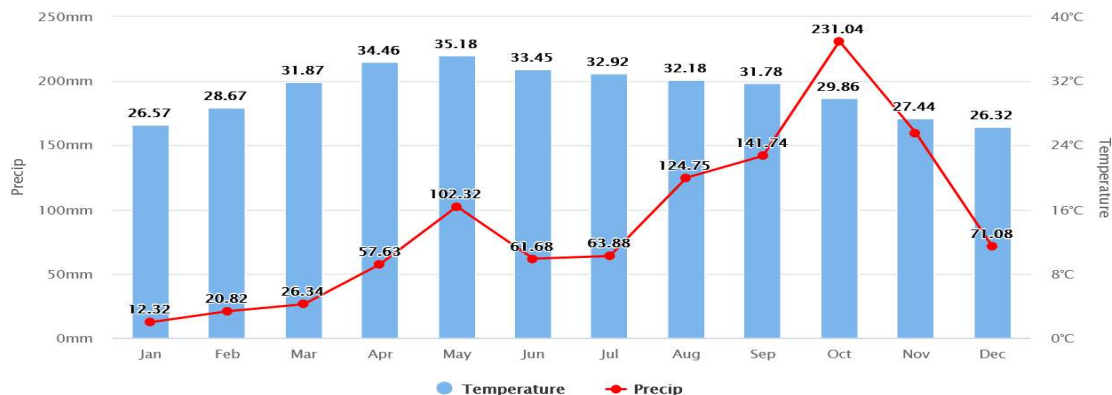
| Month                                 | Jan              | Feb              | Mar              | Apr               | May               | Jun              | Jul              | Aug              | Sep              | Nov              | Oct              | Dec              | Year             |
|---------------------------------------|------------------|------------------|------------------|-------------------|-------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Record high °C (°F)                   | 33.0<br>(91.4)   | 38.0<br>(100.4)  | 41.0<br>(105.8)  | 43.0<br>(109.4)   | 43.0<br>(109.4)   | 42.0<br>(107.6)  | 40.0<br>(104.0)  | 39.0<br>(102.2)  | 38.0<br>(100.4)  | 37.0<br>(98.6)   | 34.0<br>(93.2)   | 33.0<br>(91.4)   | 43.0<br>(109.4)  |
| Average high °C (°F)                  | 30.27<br>(86.49) | 32.88<br>(91.18) | 36.0<br>(96.8)   | 38.27<br>(100.89) | 38.79<br>(101.82) | 36.78<br>(98.2)  | 36.17<br>(97.11) | 35.4<br>(95.72)  | 35.03<br>(95.05) | 32.9<br>(91.22)  | 30.38<br>(86.68) | 29.34<br>(84.81) | 34.35<br>(93.83) |
| Daily mean °C (°F)                    | 26.57<br>(79.83) | 28.67<br>(83.61) | 31.87<br>(89.37) | 34.46<br>(94.03)  | 35.18<br>(95.32)  | 33.45<br>(92.21) | 32.92<br>(91.26) | 32.18<br>(89.92) | 31.78<br>(89.2)  | 29.86<br>(85.75) | 27.44<br>(81.39) | 26.32<br>(79.38) | 30.89<br>(87.6)  |
| Average low °C (°F)                   | 19.88<br>(67.78) | 20.93<br>(69.67) | 24.04<br>(75.27) | 27.62<br>(81.72)  | 28.89<br>(84.0)   | 27.59<br>(81.66) | 27.04<br>(80.67) | 26.45<br>(79.61) | 25.95<br>(78.71) | 24.64<br>(76.35) | 22.43<br>(72.37) | 20.93<br>(69.67) | 24.7<br>(76.46)  |
| Record low °C (°F)                    | 16.0<br>(60.8)   | 17.0<br>(62.6)   | 19.0<br>(66.2)   | 22.0<br>(71.6)    | 25.0<br>(77.0)    | 25.0<br>(77.0)   | 24.0<br>(75.2)   | 23.0<br>(73.4)   | 22.0<br>(71.6)   | 21.0<br>(69.8)   | 18.0<br>(64.4)   | 17.0<br>(62.6)   | 16.0<br>(60.8)   |
| Average precipitation mm (inches)     | 12.32<br>(0.49)  | 20.82<br>(0.82)  | 26.34<br>(1.04)  | 57.63<br>(2.27)   | 102.32<br>(4.03)  | 61.68<br>(2.43)  | 63.88<br>(2.51)  | 124.75<br>(4.91) | 141.74<br>(5.58) | 231.04<br>(9.1)  | 159.62<br>(6.28) | 71.08<br>(2.8)   | 89.44<br>(3.52)  |
| Average precipitation days (≥ 1.0 mm) | 3.09             | 3.27             | 5.36             | 7.36              | 16.73             | 12.36            | 13.55            | 18.91            | 19.64            | 22.73            | 17.55            | 9.73             | 12.52            |
| Average relative humidity (%)         | 72.01            | 65.19            | 58.27            | 53.97             | 51.56             | 50.59            | 51.14            | 56.11            | 60.33            | 70.18            | 77.39            | 76.61            | 61.95            |
| Mean monthly sunshine hours           | 11.19            | 11.34            | 11.34            | 11.63             | 12.65             | 12.68            | 11.83            | 11.24            | 11.05            | 9.11             | 7.68             | 8.29             | 10.84            |

**Weather-Related Hazards:** Trichy Terminal (T.N) To MAHADEEN AGENCY Providing a local hourly weather forecast of rain, sun, wind, humidity and temperature.

The Long-range 12 day forecast also includes detail for weather today. Live weather reports from Trichy Terminal (T.N) To MAHADEEN AGENCY weather stations and weather warnings that include risk of thunder, high UV index and forecast gales.

### Climate Graph

The chart below shows the mean monthly temperature and precipitation of Tiruchirappalli in recent years.



## Analysis of Traffic Patterns

### Peak Hours:

## JOURNEY RISK MANAGEMENT STUDY

Typically, Trichy Terminal (T.N) To MAHADEEN AGENCY peak traffic hours are from 7:00 AM to 11:00 AM and 4:00 PM to 8:00 PM on weekdays.

### **Congestion-Prone Areas:**

- State Institute Of Hotel Management and Catering Technology
- Valavanthankottai Toll Plaza
- The Urban Coffee House | coffee shop | Cafe | restaurant
- Navaladian Medical Centre
- Vasantha Virundhu Pure Veg
- Velmurugan Heavy Engg. Inds. Pvt. Ltd Thanjavur
- NILA SERVICE APARTMENT
- Thangavel Nagar

### **❖ Assessment of Road Quality and Infrastructure**

**Road Quality:** Generally, the roads are well-maintained but can suffer from potholes and waterlogging on State Highway during the monsoon season.

**Infrastructure:** Adequate signage, street lighting, and traffic signals are present, but some areas may lack proper drainage systems, leading to waterlogging.

### **❖ Suggestions for Alternative Routes for Emergencies**

**Alternative Route 1**-Follow NH 83, SH 99 and Pattukkottai - Manamelkudi Rd to Thowheed Markas St in Mallipattinam.

**Alternative Route 2**-Follow Vallam Rd to Thanjavur - Kalayarkoil - Sayalkudi Rd/Thanjavur - Karaikudi - Kalaiyarkoil - Sayalkudi Rd/Thanjavur - Orathanadu - Pattukottai Rd/Thanjavur - Pattukkottai Rd in Thennamanadu North, Follow Thanjavur - Kalayarkoil - Sayalkudi Rd/Thanjavur - Karaikudi - Kalaiyarkoil - Sayalkudi Rd/Thanjavur - Orathanadu - Pattukottai Rd and Pattukkottai - Manamelkudi Rd to Thowheed Markas St in Mallipattinam.

### **❖ Summary of Local Regulations Affecting Hazardous Material Transport**

## JOURNEY RISK MANAGEMENT STUDY

Regulations: Transport of hazardous materials is regulated by the Petroleum and Explosives Safety Organization (PESO) and the Motor Vehicles Act. Specific routes and timings may be restricted for hazardous material transport.

Permits: Ensure all necessary permits and documentation are in place.

### ❖ Overview of Historical Incidents

Historical Incidents: There have been occasional incidents involving heavy vehicles, particularly during the monsoon season due to waterlogging and poor visibility. No major incidents involving hazardous materials have been reported recently.

### ❖ **Environmental Considerations and Sensitive Areas**

- **Sensitive Areas:** Valavanthankottai Toll Plaza, Pkd railway station starting point, Pkd railway station starting point, Sri Iyengar Bakery and Hotel tea, Vallam Pudursethi, G.M.Complex, Thanjavur - Pattukkottai Rd, Uranthairayan Kudikadu, Tamil Nadu 614625.
- **Educational institutions:** - TIRUCHY PUBLIC SCHOOL, Government Higher Secondary School, Natham school, Sentamil Matriculation School owner name.
- **Hospital:** - Sugalaya Varmakalai Treatment Center, Dharshana Hospital, Chindoja hospital, PVS.VELAN multi speciality Hospital.
- **Gas Station:** HP Petrol bunk — SRI JAYAM AGENCY&WATER SERVICE PATTUKKOTTAI, Bharat Petroleum, Petrol Pump -Sri Vinayaga Filling Station, MAHADEEN AGENCY Indian Oil Fuel.
- **Environmental Impact:** Minimize noise and air pollution, especially in residential and sensitive areas.
- **Air pollution:** Volatile chemicals evaporate during the filling and discharge process, or from leaks.
- **Loss of habitats:** Oil and gas operations can degrade animal habitats and disrupt migratory pathways.
- **Oil spills:** Oil spills can be devastating for animals and humans.
- **Greenhouse gas emissions:** Oil and gas operations can emit greenhouse gases like methane.
- **Analysis of Communication Coverage**

## JOURNEY RISK MANAGEMENT STUDY

Communication Coverage: Generally good throughout the route, but potential dead zones may exist densely built-up areas or underpasses.

Dead Zones: Monitor for any communication blackouts, especially in underpasses or near large buildings.

- **Estimated Emergency Response Times**

Green and Clean Technology solution, Bismi Briyani, Sri Muthumari Amman Thirukovil, Ajs Maligai, Sengipatti ,Aishwarya Medical Centre,Taj Auto Diesel Works, Sengipatti Bus Stop, areas like have quicker response times (15- 20 minutes).

- Congested areas may experience delays (up to 30-40 minutes).

- **Overall Summary of Risk Assessment**

- **Risk Level:** Moderate to High, especially during monsoon season.
- **Key Risks:** Waterlogging, traffic congestion, and potential communication dead zones.
- **Mitigation Measures:** Plan travel during non-peak hours, ensure proper vehicle maintenance, and have alternative routes and emergency contacts ready and control on the speed limit of the vehicle.

- **Road Signage for TT/PT Driver**

# JOURNEY RISK MANAGEMENT STUDY














## Road Traffic Signs in India

### Mandatory/Regulatory Signs

|   |   |  |   |
|---|---|--|---|
| <br>Stop                   | <br>Give way               | <br>No entry                               | <br>Straight prohibited  |
| <br>One way                | <br>One way                | <br>Vehicles prohibited in both directions | <br>Horn prohibited      |
| <br>Pedestrians prohibited | <br>Cycles prohibited      | <br>Right turn prohibited                  | <br>Left turn prohibited |
| <br>U-turn prohibited     | <br>Overtaking prohibited | <br>Trucks prohibited                     | <br>Tonga prohibited    |



















## JOURNEY RISK MANAGEMENT STUDY

|  |   |   |  |
|--|---|---|--|
|  <p>All motor vehicles prohibited</p> |  <p>Hand cart prohibited</p>   |  <p>Bullock cart prohibited</p> |  <p>Bullock and hand carts prohibited</p> |
|  <p>No parking</p>                    |  <p>No parking or stopping</p> |  <p>Speed limit</p>             |  <p>Axle load limit</p>                   |
|  <p>Width limit</p>                 |  <p>Weight limit</p>         |  <p>Length limit</p>          |  <p>Load limit</p>                      |
|  <p>Restriction and</p>             |   |   |  |

## JOURNEY RISK MANAGEMENT STUDY

### Cautionary signs

|  |  |   |   |
|--|--|---|---|
| <br>Right hand curve      | <br>Left hand curve | <br>Right hand pin bend | <br>Left hand pin bend |
| <br>Right reverse bend    | <br>Narrow bridge   | <br>Gap in median       | <br>Cycle crossing     |
| <br>Pedestrian crossing | <br>School        | <br>Men at work       | <br>Roundabout       |
| <br>Narrow road         | <br>Road widens   | <br>Side road left    | <br>Side road right  |

## JOURNEY RISK MANAGEMENT STUDY

### Information signs

|                               |                            |                      |                      |
|-------------------------------|----------------------------|----------------------|----------------------|
|                               |                            |                      |                      |
| Advance direction             | Map type advance direction | Rotary intersection  | Reassurance          |
|                               |                            |                      |                      |
| Direction                     | Direction                  | Place identification | Truck lay bay        |
|                               |                            |                      |                      |
| Toll booth ahead              | Parking this side          | Parking both sides   | Cycle stand          |
|                               |                            |                      |                      |
| Scooter and motor cycle stand | Taxi stand                 | Auto-rickshaw stand  | Cycle-rickshaw stand |
|                               |                            |                      |                      |
| Public telephone              | Filling station            | Hospital             | First aid post       |

### Conclusion

The route for Trichy Terminal (T.N) To MAHADEEN AGENCY is generally manageable but poses several risks, particularly during the monsoon season. Proper planning, adherence to regulations, and awareness of potential hazards can significantly mitigate these risks.

## JOURNEY RISK MANAGEMENT STUDY

### • Risk Assessment - Sharp Turns

| <b>Risk Type</b> | <b>Risk Level</b> | <b>Coordination</b>                      | <b>Distance From Start</b> | <b>Recommendation Speed</b> |
|------------------|-------------------|--|----------------------------|-----------------------------|
| Sharp turn       | Medium            | 10.768979492756785,<br>78.83733022245077 | 700 M                      | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.765564550522766,<br>78.83604276220456 | 1.1KM                      | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.76417326664682,<br>78.83424031791654  | 1.3KM                      | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.758312939678301,<br>78.8333390955904  | 2 KM                       | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.755867589771208,<br>78.82934796895263 | 2.4 KM                     | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.752199527738611,<br>78.8270734559225  | 3 KM                       | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | High              | 10.751271964757734,<br>78.8251851809541  | 3.2 KM                     | 10km/hr TO 15 Km/Hr         |
| Sharp turn       | Medium            | 10.749543317048815,<br>78.83029210643683 | 3.8 KM                     | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.739215915514594,<br>78.83807763864252 | 5.3 KM                     | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.732444658168607,<br>78.87590286143897 | 9.5 KM                     | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.721513396015236,<br>78.93724720969443 | 16.4 KM                    | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.718103563701893,<br>78.94265694385163 | 17 KM                      | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.717389828535552,<br>78.95466960284915 | 18.3 KM                    | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | Medium            | 10.729870739714212,<br>79.01991554725656 | 25.7 KM                    | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | High              | 10.730579866908542,<br>79.0251843020434  | 26.3 KM                    | 10km/hr TO 15 Km/Hr         |
| Sharp turn       | Medium            | 10.72790059101628,<br>79.05305655081945  | 29.6 KM                    | 20km/hr TO 30 Km/Hr         |
| Sharp turn       | High              | 10.721698933433963,<br>79.06810803194023 | 32.1 KM                    | 10km/hr TO 15 Km/Hr         |



## JOURNEY RISK MANAGEMENT STUDY

|            |        |  |         |                        |
|------------|--------|--|---------|------------------------|
| Sharp turn | Medium | 10.696413937867586,<br>79.0943267409893  | 36.5 KM | 20km/hr TO 30<br>Km/Hr |
| Sharp turn | Medium | 10.673609840838628,<br>79.13940127051431 | 42 KM   | 20km/hr TO 30<br>Km/Hr |
| Sharp turn | Medium | 10.655716897649173,<br>79.16756210615961 | 45.8 KM | 20km/hr TO 30<br>Km/Hr |
| Sharp turn | Medium | 10.650229517669525,<br>79.18407018222753 | 47.7 KM | 20km/hr TO 30<br>Km/Hr |
| Sharp turn | Medium | 10.64272486768507,<br>79.21035786578445  | 50.5 KM | 20km/hr TO 30<br>Km/Hr |
| Sharp turn | Medium | 10.424700240434309,<br>79.31181590750899 | 80.5 KM | 20km/hr TO 30<br>Km/Hr |
| Sharp turn | High   | 10.295356431319744,<br>79.30109850757123 | 96.5 KM | 10km/hr TO 15<br>Km/Hr |
| Sharp turn | Medium | 10.285665069210198,<br>79.31220304776942 | 97.6    | 20km/hr TO 30<br>Km/Hr |
| Sharp turn | High   | 10.2820495625804,<br>79.31669414782444   | 98.2 KM | 10km/hr TO 15<br>Km/Hr |

### • **Risk Assessment - Elevation Changes**

| Risk Type        | Specific Risk | Risk Level | Coordination             | Elevation Change | Gradient | Recommen dation Speed |
|------------------|---------------|------------|--------------------------|------------------|----------|-----------------------|
| Elevation Change | Descent       | Low        | 10.7753, 78.8368         | -3.02m           | -2.96 %  | 40 km/hr to 50 km/hr  |
| Elevation Change | Descent       | Low        | 10.993921 ,<br>78.326323 | -9.28m           | -6.28%   | 40 km/hr to 50 km/hr  |

## JOURNEY RISK MANAGEMENT STUDY

**IOCL TIRCHY TERMINAL (10.7753, 78.8368) TO MAHADEEN AGENCY (10.28463, 79.3203) TOTAL DISTANCE -98.8 KM**



**10.738951626471074, 78.83852941101452**



**ALARP SERVICES/JRM/TNSO/MAHADEEN**

## JOURNEY RISK MANAGEMENT STUDY

10.732983461001181, 78.87516207093638



10.717871937552077, 78.95331849247525



ALARP SERVICES/JRM/TNSO/MAHADEEN



## JOURNEY RISK MANAGEMENT STUDY

10.728799529005812, 78.99495636008567



10.730083110244518, 79.02544275142884



ALARP SERVICES/JRM/TNSO/MAHADEEN



## JOURNEY RISK MANAGEMENT STUDY

10.727328174586804, 79.05414386648296



10.7276025719183, 79.0578254218193



ALARP SERVICES/JRM/TNSO/MAHADEEN

## JOURNEY RISK MANAGEMENT STUDY



**10.723966805051138, 79.06917275887784**



**10.721191092249276, 79.06781049894126**

**ALARP SERVICES/JRM/TNSO/MAHADEEN**

## JOURNEY RISK MANAGEMENT STUDY



10.720787762720526, 79.06757489201655



10.721843985483716, 79.07063852289735

ALARP SERVICES/JRM/TNSO/MAHADEEN



## JOURNEY RISK MANAGEMENT STUDY



**10.715734817880703, 79.06908799690208**



**10.655771226633853, 79.16655266874093**

**ALARP SERVICES/JRM/TNSO/MAHADEEN**



## JOURNEY RISK MANAGEMENT STUDY



**10.649908539610875, 79.18458833069549**



**10.64461332751166, 79.21856225532717**

**ALARP SERVICES/JRM/TNSO/MAHADEEN**

## JOURNEY RISK MANAGEMENT STUDY



**10.645178846390385, 79.23764763892063**



**10.645133054669884, 79.237985819826**

**ALARP SERVICES/JRM/TNSO/MAHADEEN**



## JOURNEY RISK MANAGEMENT STUDY



**10.619924226492229, 79.24785564865392**



**10.61452006650209, 79.2509388578522**

**ALARP SERVICES/JRM/TNSO/MAHADEEN**

## JOURNEY RISK MANAGEMENT STUDY



**10.613267498609671, 79.25730852986955**



**10.604674082467875, 79.26154899889109**

**ALARP SERVICES/JRM/TNSO/MAHADEEN**



## JOURNEY RISK MANAGEMENT STUDY



**10.503963892612548, 79.29587592705008**



**10.427383019556933, 79.31251827504796**

**ALARP SERVICES/JRM/TNSO/MAHADEEN**

## JOURNEY RISK MANAGEMENT STUDY



10.417030689060823, 79.3100927848883



10.284650626244472, 79.32034607336152

ALARP SERVICES/JRM/TNSO/MAHADEEN