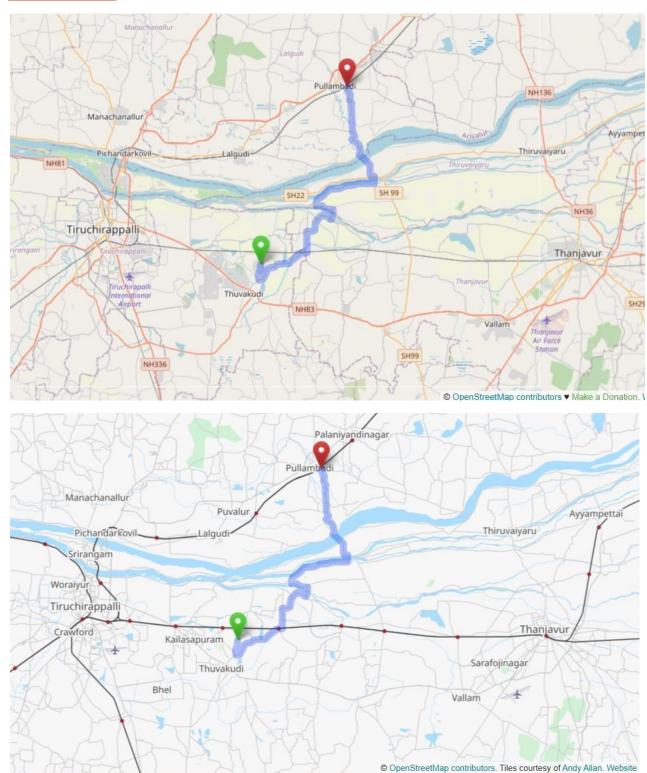


# WELCOME TO JOURNEY RISK MANAGEMENT (JRM) STUDY USING ARTIFICIAL INTELLIGENCE (AI) FOR IOCL TRICHY TERMINAL

# <u>IOCL TIRCHY TERMINAL (10.7753, 78.8368) TO VKG AMUTHA</u> <u>AGENCIES (11.229923, 79.315655) TOTAL DISTANCE – 114 KM KM</u>



# Welcome to the Journey Risk Management Study for VKG AMUTHA AGENCIES

Total distance: 114 KM; Start with: (10.7753, 78.8368), End with: (11.229923, 79.315655)

## **Route Safety Analysis Report**

## 1. Overview of the Route Map

The route from Trichy Terminal (T.N) TO VKG AMUTHA AGENCIES-Take SIDCO to Indian oil Storage to NH 83 in Thuvakudi, Head south on SIDCO to Indian oil Storage, At Jude Digital Studios, continue onto Thuvakudi toSIDCO& Indian oil Storage, Follow NH 83, NH 38 and NH 81, Drive to SH 217 in Elaiyur East, and Total distance from Trichy Terminal To VKG AMUTHA AGENCIES is 114 KM for heavy, vehicles carrying hazardous materials.

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

Weather Conditions: Trichy Terminal (T.N) To VKG AMUTHA AGENCIES 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.

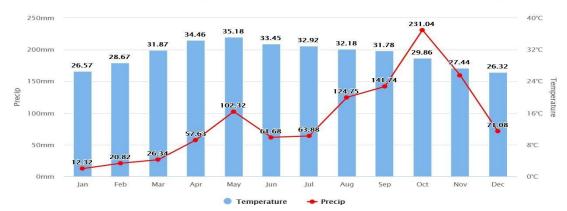
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Nov	Oct	Dec	Year
Record high °C (°F)	33.0	38.0	41.0	43.0	43.0	42.0	40.0	39.0	38.0	37.0	34.0	33.0	43.0
	(91.4)	(100.4)	(105.8)	(109.4)	(109.4)	(107.6)	(104.0)	(102.2)	(100.4)	(98.6)	(93.2)	(91.4)	(109.4)
Average high °C (°F)	30.27	32.88	36.0	38.27	38.79	36.78	36.17	35.4	35.03	32.9	30.38	29.34	34.35
	(86.49)	(91.18)	(96.8)	(100.89)	(101.82)	(98.2)	(97.11)	(95.72)	(95.05)	(91.22)	(86.68)	(84.81)	(93.83)
Daily mean °C (°F)	26.57	28.67	31.87	34.46	35.18	33.45	32.92	32.18	31.78	29.86	27.44	26.32	30.89
	(79.83)	(83.61)	(89.37)	(94.03)	(95.32)	(92.21)	(91.26)	(89.92)	(89.2)	(85.75)	(81.39)	(79.38)	(87.6)
Average low °C (°F)	19.88	20.93	24.04	27.62	28.89	27.59	27.04	26.45	25.95	24.64	22.43	20.93	24.7
	(67.78)	(69.67)	(75.27)	(81.72)	(84.0)	(81.66)	(80.67)	(79.61)	(78.71)	(76.35)	(72.37)	(69.67)	(76.46)
Record low °C (°F)	16.0	17.0	19.0	22.0	25.0	25.0	24.0	23.0	22.0	21.0	18.0	17.0	16.0
	(60.8)	(62.6)	(66.2)	(71.6)	(77.0)	(77.0)	(75.2)	(73.4)	(71.6)	(69.8)	(64.4)	(62.6)	(60.8)
Average precipitation mm (inches)	12.32	20.82	26.34	57.63	102.32	61.68	63.88	124.75	141.74	231.04	159.62	71.08	89.44
	(0.49)	(0.82)	(1.04)	(2.27)	(4.03)	(2.43)	(2.51)	(4.91)	(5.58)	(9.1)	(6.28)	(2.8)	(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

<u>Weather-Related Hazards:</u> Trichy Terminal (T.N) To VKG AMUTHA AGENCIES 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 VKG AMUTHA AGENCIES 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:**

Typically, Trichy Terminal (T.N) To VKG AMUTHA AGENCIES peak traffic hours are from 9:00 AM to 11:00 AM and 4:00 PM to 8:00 PM on weekdays.

## **Congestion-Prone Areas:**

- Womens SIDCO Industrial Park
- Malar Mahal
- P.selvamani Madhu's Mahal
- State Institute Of Hotel Management and Catering Technology
- National Institute of Technology Tiruchirappalli
- Govt Polytechnic
- Krishna Engineering Co Private Limited
- SESHASAYEE INSTITUTE OF TECHNOLOGY
- stitute of Agriculture, TNAU

# 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-). The route from Trichy Terminal (T.N) TO VKG AMUTHA AGENCIES-Take SIDCO to Indian oil Storage to NH 83 in Thuvakudi, Head south on SIDCO to Indian oil Storage, At Jude Digital Studios, continue onto Thuvakudi toSIDCO& Indian oil Storage, Follow NH 83, NH 38 and NH 81, Drive to SH 217 in Elaiyur East.

Alternative Route 2 -) Take Valavanthankottai to Thirunedukulam temple road, Thirunedukulam To Paper Mill road, Indalur to Solakampatti Village, Solakampatti Railway Station - Katachamangalam Rd and MDR782 to Kollidam - Kallanai Main Rd/Poondi Matha Temple to Thirukattupalli in Puduchatram, Turn right onto Kollidam - Kallanai Main

ALARP/JRM/TNSO/VKGAMUTHA

Rd/Poondi Matha Temple to Thirukattupalli, Turn left at Hotel SVS to stay on Kollidam - Kallanai Main Rd, Follow NH 136 and NH 81 to Sooriyamanal, Turn left onto SH 217.

## ❖ Summary of Local Regulations Affecting Hazardous Material Transport

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.

## erview 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: Womens SIDCO Industrial Park, Malar Mahal, P. selvamani Madhu's Mahal, State Institute Of Hotel Management and Catering Technology, National Institute of Technology Tiruchirappalli, Govt Polytechnic, Krishna Engineering Co Private Limited, SESHASAYEE INSTITUTE OF TECHNOLOGY, PSP OIL MILL (ORGANIC CRUSHED EDIBLE OIL,).
- Educational institutions: State Institute Of Hotel Management and Catering Technology, National Institute of Technology Tiruchirappalli, Govt Polytechnic, SESHASAYEE INSTITUTE OF TECHNOLOGY, Institute of Agriculture, TNAU.
- **Hospital:** Dr Kamali's Home Clinic, Meenakshi Hospital, Sivapreethi Hospital, Sugalaya Varmakalai Treatment Center.
- **Gas Station:** Jagdish filling station, Nayara Petrol Pump Nayara Petrol Pump, Indianoil S. Ashok kumar, BPCL Masiya Fuels, Gayatri Agency.
- **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
- 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.

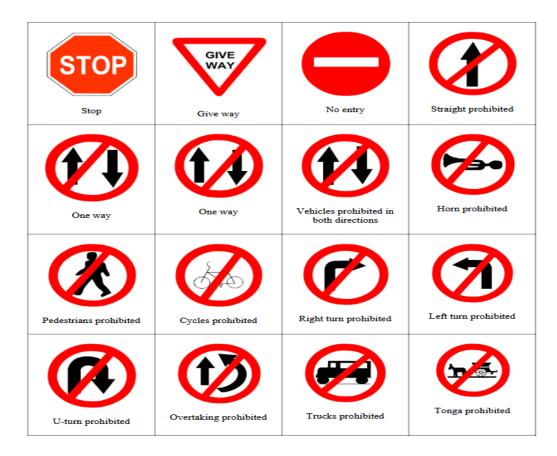
### • Estimated Emergency Response Times:

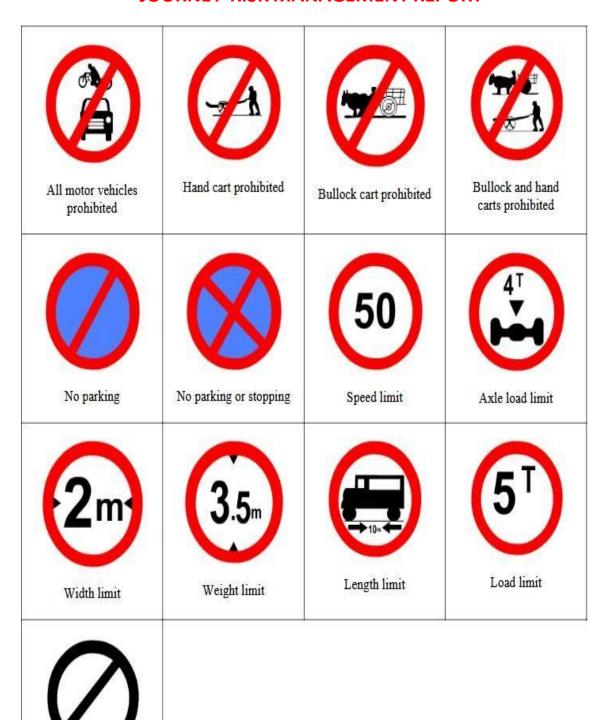
Womens SIDCO Industrial Park, Malar Mahal, P. selvamani Madhu's Mahal, State Institute Of Hotel Management and Catering Technology, National Institute of Technology Tiruchirappalli, Govt Polytechnic, Krishna Engineering Co Private Limited, SESHASAYEE INSTITUTE OF TECHNOLOGY, PSP OIL MILL (ORGANIC CRUSHED EDIBLE OIL,). 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

#### Road Traffic Signs in India

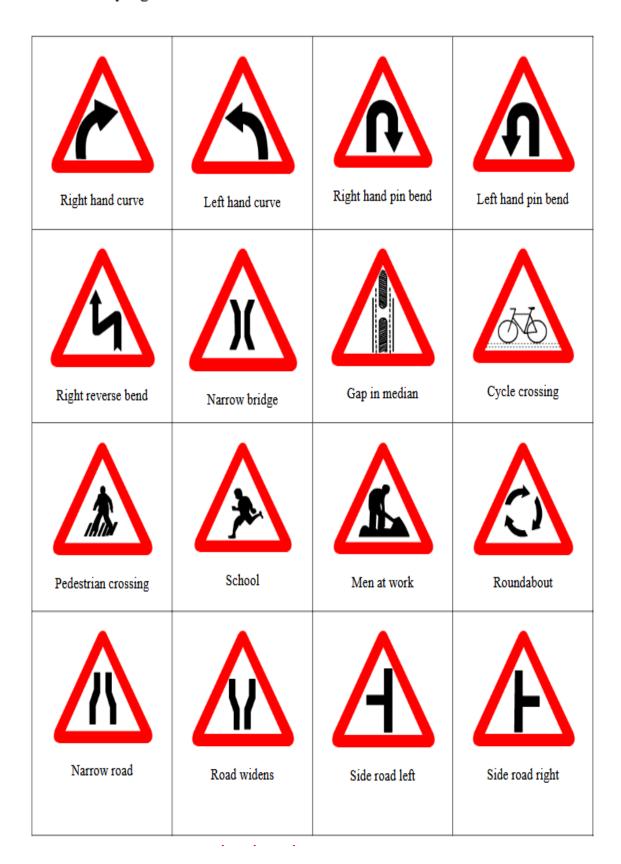
#### Mandatory/Regulatory Signs



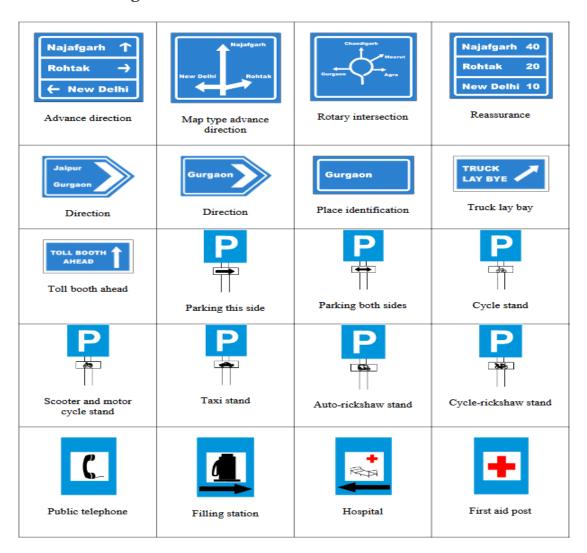


Restriction ands

# Cautionary signs



#### Information signs



#### **Conclusion**

The route for Trichy Terminal (T.N) To VKG AMUTHA AGENCIES 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.

# • Risk Assessment - Sharp Turns

Risk Type	Risk Level	Coordination	Distance From Start	Recommendation Speed
Sharp turn	Medium	10.769517372474736, 78.83735063199906	650 M	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.76584461192607, 78.8361700257199	1.1 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.764182189802032, 78.83459588401435	1.3 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.75826698538096, 78.83349398474651	2 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.756372549032195, 78.83034570133539	2.4 KM	20km/hr TO 30 Km/Hr
Sharp turn	High	10.751346435623256, 78.8252297405902	3.2 KM	10km/hr TO 15 Km/Hr
Sharp turn	High	10.749451955814655, 78.83046376176118	3.8 KM	10km/hr TO 15 Km/Hr
Sharp turn	Medium	10.739322086318483, 78.83809834927386	5.2 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.73638358720799, 78.85765706064745	7.4 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.732981078965743, 78.87520874109956	9.4 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.732865083664377, 78.88929730997383	10.9 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.730622499591515, 78.90775412216747	12.9 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.720904924338443, 78.93805787452602	16.4 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.71823691532396, 78.94246547130157	17 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.71690507655357, 78.94798176089265	17.6 KM	20km/hr TO 30 Km/Hr

Sharp turn	Medium	10.717137481731783, 78.95400634061058	18.3 KM	20km/hr TO 30 Km/Hr
Sharp turn	High	10.724822618517969, 78.9767159328364	20.9 KM	10km/hr TO 15 Km/Hr
Sharp turn	Medium	10.729882461351261, 79.00023354091847	23.6 KM	20km/hr TO 30 Km/Hr
Sharp turn	High	10.730894419758593, 79.01997459879757	25.8 KM	10km/hr TO 15 Km/Hr
Sharp turn	High	10.730388440978299, 79.02701271508492	26.5 KM	10km/hr TO 15 Km/Hr
Sharp turn	Medium	10.72785853437635, 79.03593910647373	27.5 KM	20km/hr TO 30 Km/Hr
Sharp turn	High	10.727084939556493, 79.06554150725997	30.8 KM	10km/hr TO 15 Km/Hr
Sharp turn	High	10.723822902909419, 79.06929459251997	31.3 KM	10km/hr TO 15 Km/Hr
Sharp turn	High	10.72091540581739, 79.06756239932304	31.7 KM	10km/hr TO 15 Km/Hr
Sharp turn	High	10.721908212843593, 79.07066591213419	32.1 KM	10km/hr TO 15 Km/Hr
Sharp turn	High	10.715809489668976, 79.06922241780342	32.8 KM	10km/hr TO 15 Km/Hr
Sharp turn	Medium	10.887181547655278, 78.76530903742895	33.9 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.886479913753597, 78.77133119465272	34.6 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.889186206839419, 78.77929269064343	35.5 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.890288763639541, 78.78776453894127	36.5 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	10.896001947468296, 78.79337841467152	37.3 KM	20km/hr TO 30 Km/Hr
Sharp turn	High	10.906125038337622, 78.79725709220546	38.6 KM	10km/hr TO 15 Km/Hr
Sharp turn	Medium	10.907728664685097, 78.80123784020083	39 KM	20km/hr TO 30 Km/Hr

Sharp turn	Medium	10.908430248492369,	42.9 KM	20km/hr TO 30
		78.83655421985202		Km/Hr
Sharp turn	High	10.907227532380592,	43.6 KM	10km/hr TO 15
		78.84247430661436		Km/Hr
Sharp turn	High	10.91434353213912,	45.2 KM	10km/hr TO 15
		78.85492690425629		Km/Hr
Sharp turn	Medium	10.925167542674744,	46.4 KM	20km/hr TO 30
		78.85809108856029		Km/Hr
Sharp turn	Medium	10.926169745913759,	47.1 KM	20km/hr TO 30
		78.86370496393836		Km/Hr
Sharp turn	Medium	10.924265556866464,	48.2 KM	20km/hr TO 30
		78.87401408054174		Km/Hr
Sharp turn	Medium	10.936692675932377,	51.2 KM	20km/hr TO 30
		78.89738821748767		Km/Hr
Sharp turn	Medium	10.938797217058465,	51.6 KM	20km/hr TO 30
		78.90055240179167		Km/Hr
Sharp turn	Medium	10.940581311177203,	52.1 KM	20km/hr TO 30
		78.90408046434668		Km/Hr
Sharp turn	High	10.940104324037351,	52.4 KM	10km/hr TO 15
		78.90702763198205		Km/Hr
Sharp turn	Medium	10.938912552421439,	53.2 KM	20km/hr TO 30
		78.91382507544337		Km/Hr
Sharp turn	Medium	10.938644403147572,	53.5 KM	20km/hr TO 30
		78.91664722830899		Km/Hr
Sharp turn	Medium	10.955305321451934,	55.2 KM	20km/hr TO 30
		78.92361371180965		Km/Hr
Sharp turn	Medium	10.976371192590952,	58.5 KM	20km/hr TO 30
		78.94301144664475		Km/Hr
Sharp turn	Medium	11.004512852606288,	63.1 KM	20km/hr TO 30
		78.97391049390393		Km/Hr
Sharp turn	Medium	11.024227265361207,	66.6 KM	20km/hr TO 30
		78.99811474770428		Km/Hr
Sharp turn	Medium	11.033157290838167,	68.0 KM	20km/hr TO 30
		79.00704113895583		Km/Hr
Sharp turn	High	11.03416822002298,	69.3 KM	20km/hr TO 30
		79.01716915979893		Km/Hr

		JOURNET MISK WIANAG	EIMEIM REI G	
Sharp turn	Medium	11.039222813768454, 79.02369229186736	70.1 KM	20km/hr TO 30 Km/Hr
Sharp turn	Medium	11.04141311071118,	70.9 KM	20km/hr TO 30
		79.03073040804647		Km/Hr
Sharp turn	Medium	11.036864014177263,	72.3 KM	20km/hr TO 30
_		79.04206005848114		Km/Hr
Sharp turn	High	11.042087044945191,	73.2 KM	10km/hr TO 15
_		79.04841152917935		Km/Hr
Sharp turn	Medium	11.0434349087724,	74.2 KM	20km/hr TO 30
-		79.05699459769046		Km/Hr
Sharp turn	Medium	11.054217596549499,	76.0 KM	20km/hr TO 30
-		79.07004086182732		Km/Hr
Sharp turn	High	11.048657822645502,	77.4 KM	10km/hr TO 15
_		79.0805122054109		Km/Hr
Sharp turn	Medium	11.07493946190913,	83.5 KM	20km/hr TO 30
_		79.12909237524342		Km/Hr
Sharp turn	Medium	11.08942704962464,	85.2 KM	20km/hr TO 30
_		79.13304058769411		Km/Hr
Sharp turn	Medium	11.10980953179035,	89.3 KM	20km/hr TO 30
_		79.16411129570429		Km/Hr
Sharp turn	Medium	11.12213666622717,	93.7 KM	20km/hr TO 30
		79.20246707459003		Km/Hr
Sharp turn	Medium	11.127019853748802,	95.6 KM	20km/hr TO 30
		79.21824685405377		Km/Hr
Sharp turn	Medium	11.139287012993861,	97.8 KM	20km/hr TO 30
		79.2342694010451		Km/Hr
Sharp turn	Medium	11.143931724540193,	99.2 KM	20km/hr TO 30
		79.24677184169714		Km/Hr
Sharp turn	Medium	11.146075412767383,	101 KM	20km/hr TO 30
		79.26121641021376		Km/Hr
Sharp turn	High	11.171560270181622,	105 KM	10km/hr TO 15
		79.28512884608496		Km/Hr
Sharp turn	Medium	11.183587392732388,	107 KM	20km/hr TO 30
		79.29957341344023		Km/Hr
Sharp turn	Medium	11.19576965232355,	109 KM	20km/hr TO 30
		79.31402799372307		Km/Hr
	· · · · · · · · · · · · · · · · · · ·	·		

Sharp turn	High	11.202505356869299,	110 KM	10km/hr TO 15
		79.31426402810715		Km/Hr
Sharp turn	Medium	11.206672995594081,	110.5 KM	20km/hr TO 30
		79.31349155203287		Km/Hr
Sharp turn	Medium	11.215218571858095,	111 KM	20km/hr TO 30
		79.31267616054112		Km/Hr
Sharp turn	Medium	11.215302763469442,	112 KM	20km/hr TO 30
		79.31512233506677		Km/Hr
Sharp turn	High	11.226289558449421,	113 KM	10km/hr TO 15
		79.31531545414109		Km/Hr
Sharp turn	Medium	11.225637097639876,	114 KM	20km/hr TO 30
		79.3178045440093		Km/Hr
Sharp turn	Medium	11.22946765301526,	114 KM	20km/hr TO 30
		79.31804057846573		Km/Hr
Sharp turn	Medium	11.229909636891238,	115 KM	20km/hr TO 30
		79.31563731928262		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

	Descent	Low	10.993921, 78.326323	-9.28m	-6.28%	40 km/hr to
Elevation						50 km/hr
Change						

# <u>IOCL TIRCHY TERMINAL (10.7753, 78.8368) TO VKG AMUTHA</u> <u>AGENCIES (</u>11.229923 , 79.315655) TOTAL DISTANCE – 114 KM KM



10.769073692604486, 78.83720120889187



10.764113439530249, 78.83446118711721



10.758209570013967, 78.83344387884853



10.751314343624747, 78.82530656733346



10.75126610223314, 78.82518044583597



10.749591316479634, 78.83018387464983



10.739318685033433, 78.8379420178455

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10.735064036857814, 78.86553394452655



10.72580557887016, 79.0641504304304



10.721070762434657, 79.06770763454654



10.721721269051843, 79.07032492179873



10.954312798758009, 78.90587599136242



11.02116486256158, 78.99489959052856



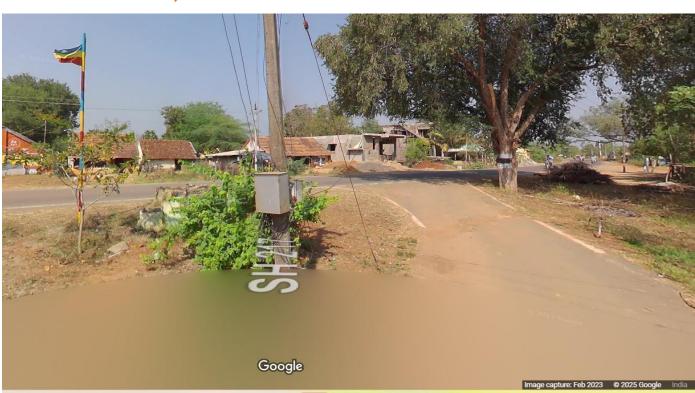
11.039828283196265, 79.02509608238519



11.21408722162799, 79.31194518737453



11.225963498564852, 79.31615330231848



11.228924041617008, 79.31809171059952

ALARP/JRM/TNSO/VKGAMUTHA



11.229697501040206, 79.31763374127735



11.229856154959377, 79.31559971647138