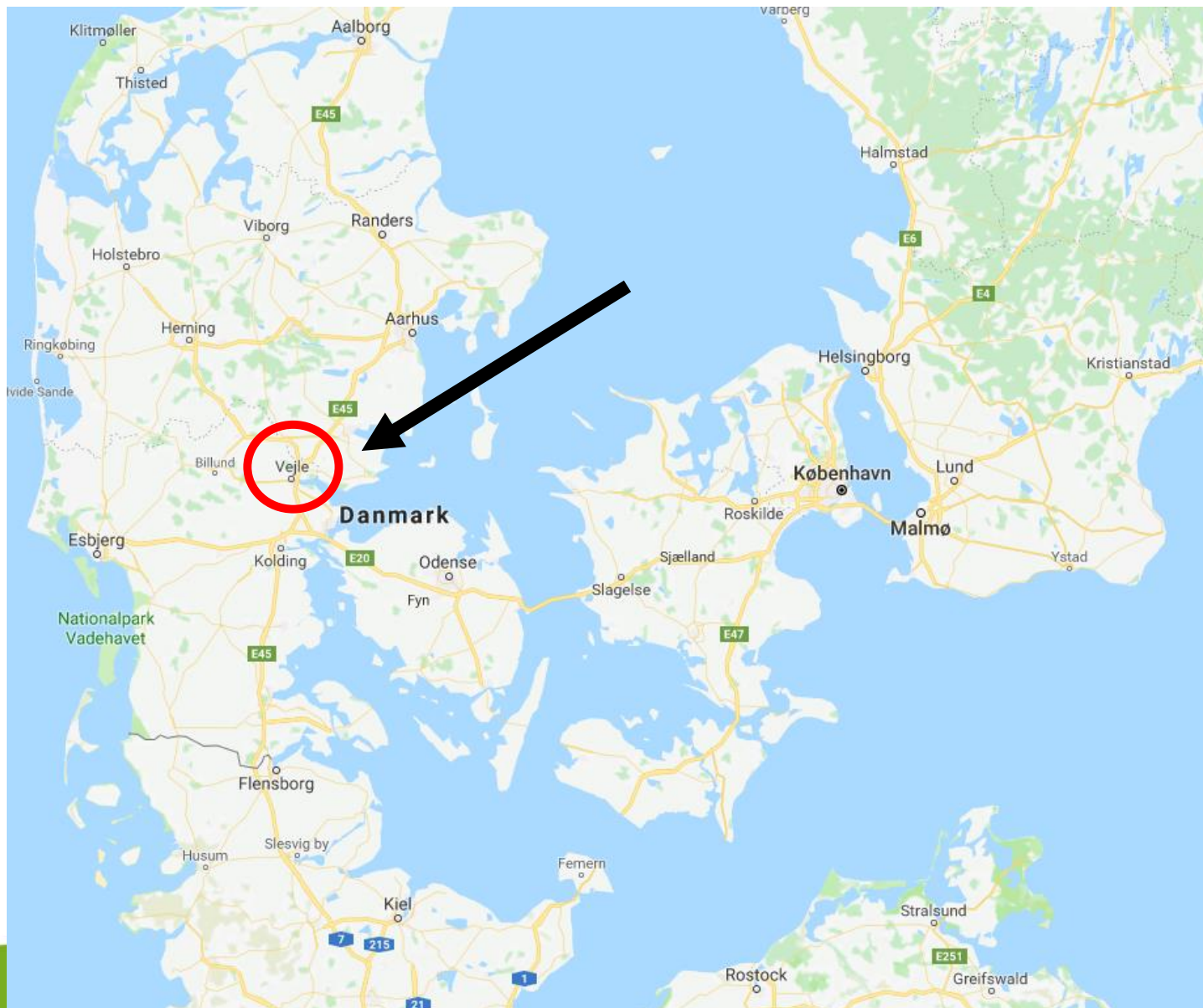


Seminar on Land-Use Planning and Industrial Safety
UNECE/Flanders/European Investment Bank
Mechelen, Belgium 16th May, 2018

Cooperating with Spatial Planners – case – a simple societal risk tool.

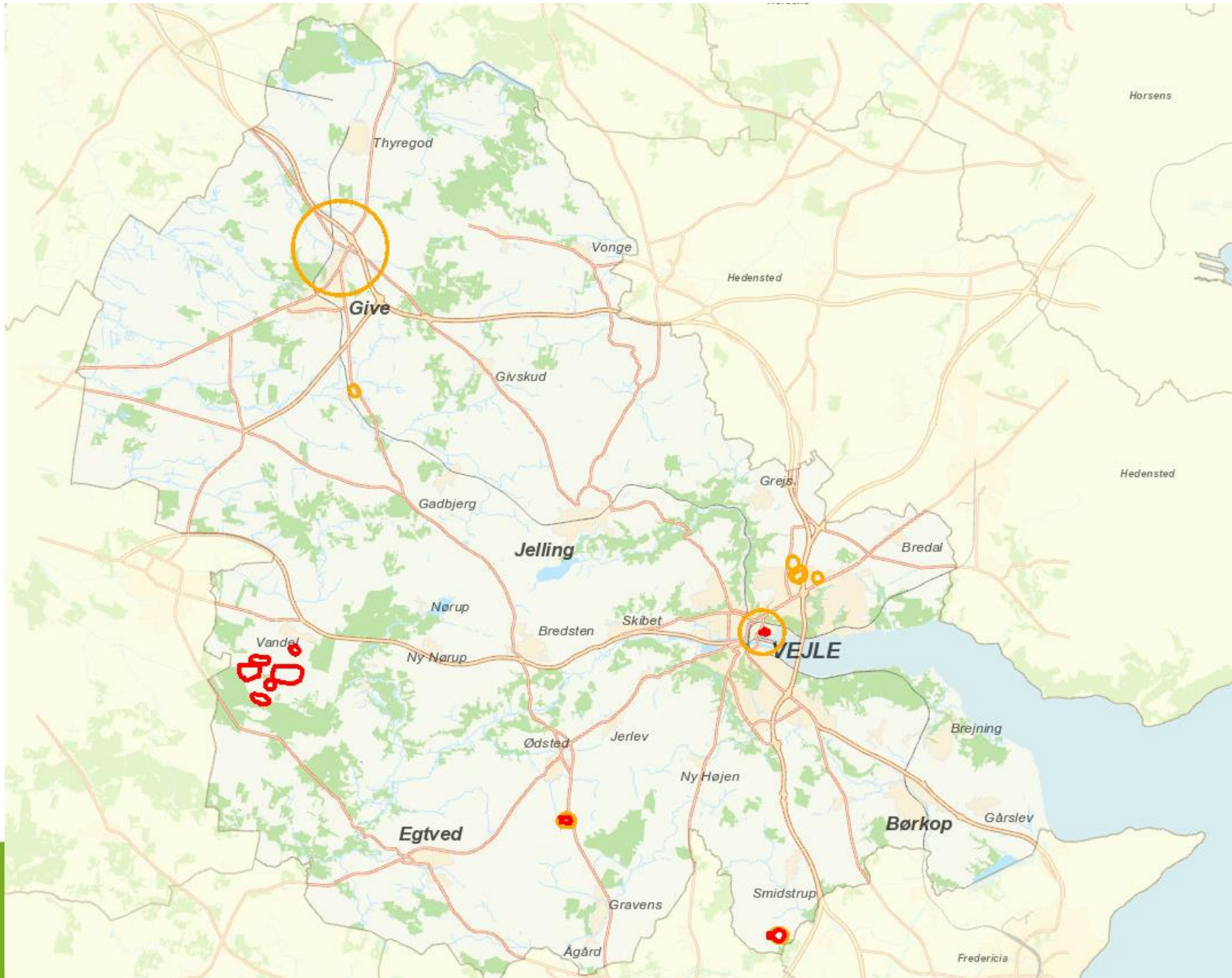
Peter Wade

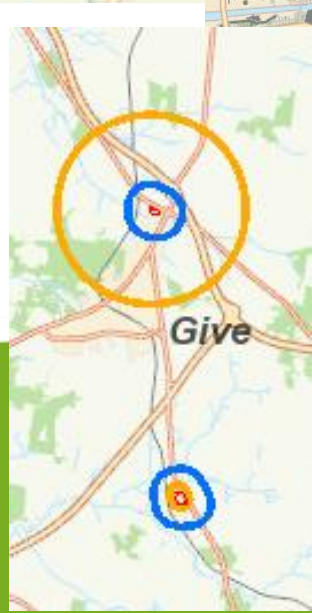
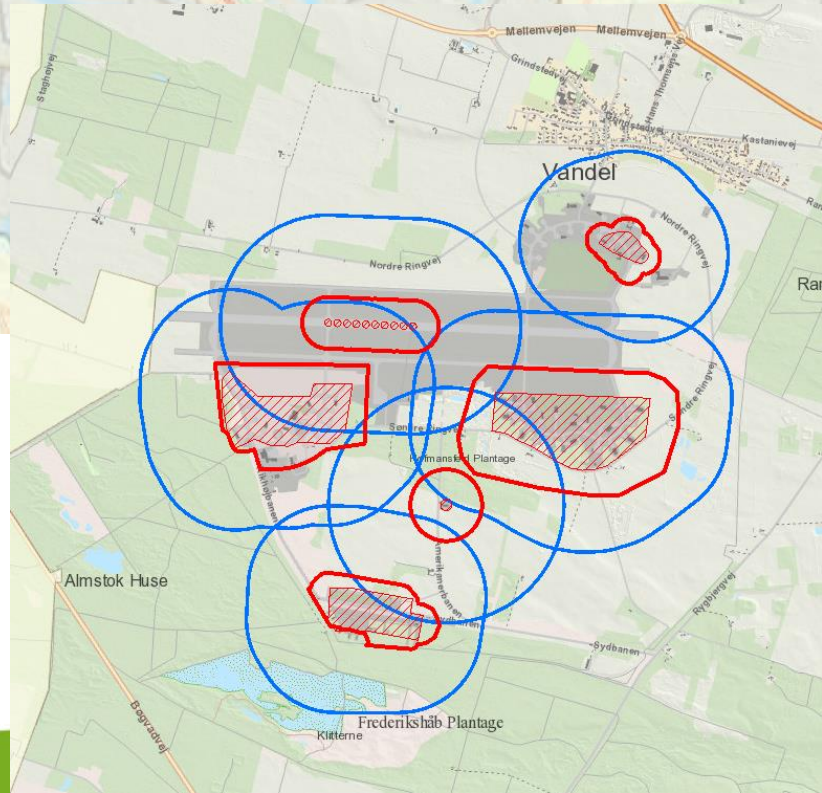
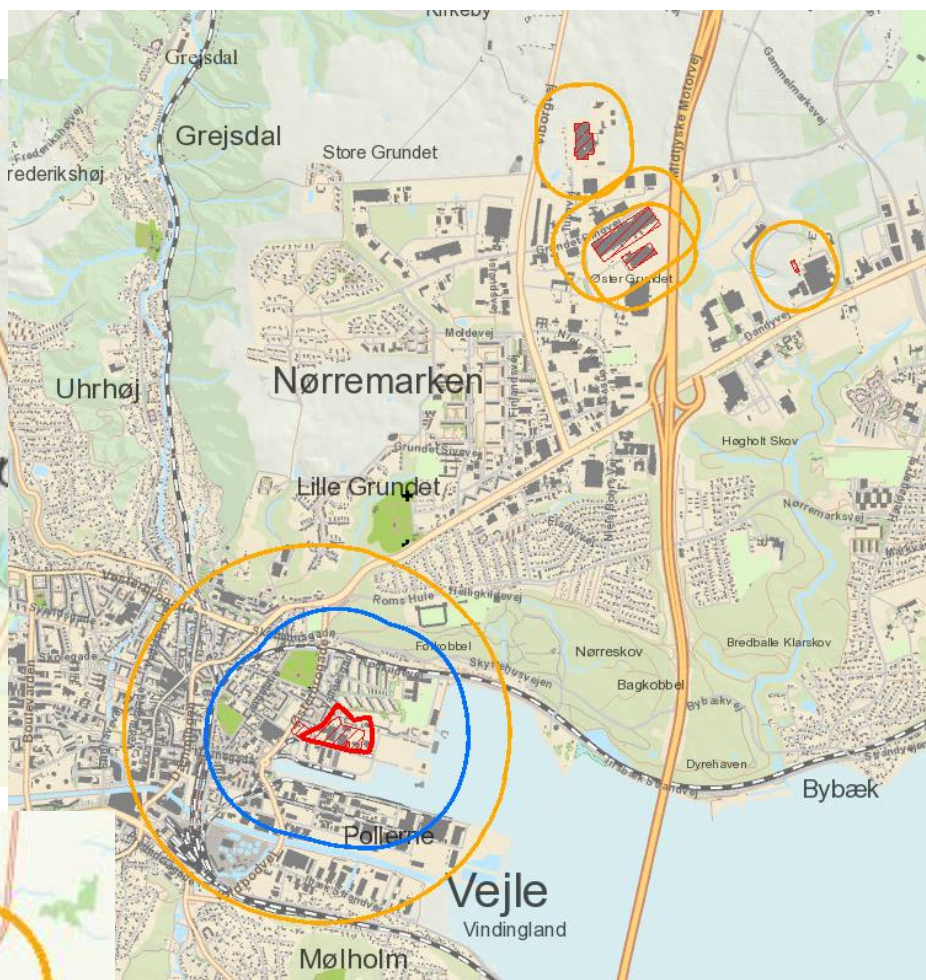
Environmental Technician
Industrial Environment Caseworker
Technic & Environment
Municipality of Vejle, Denmark
tel. 45 76812416
mail: petwa@vejle.dk



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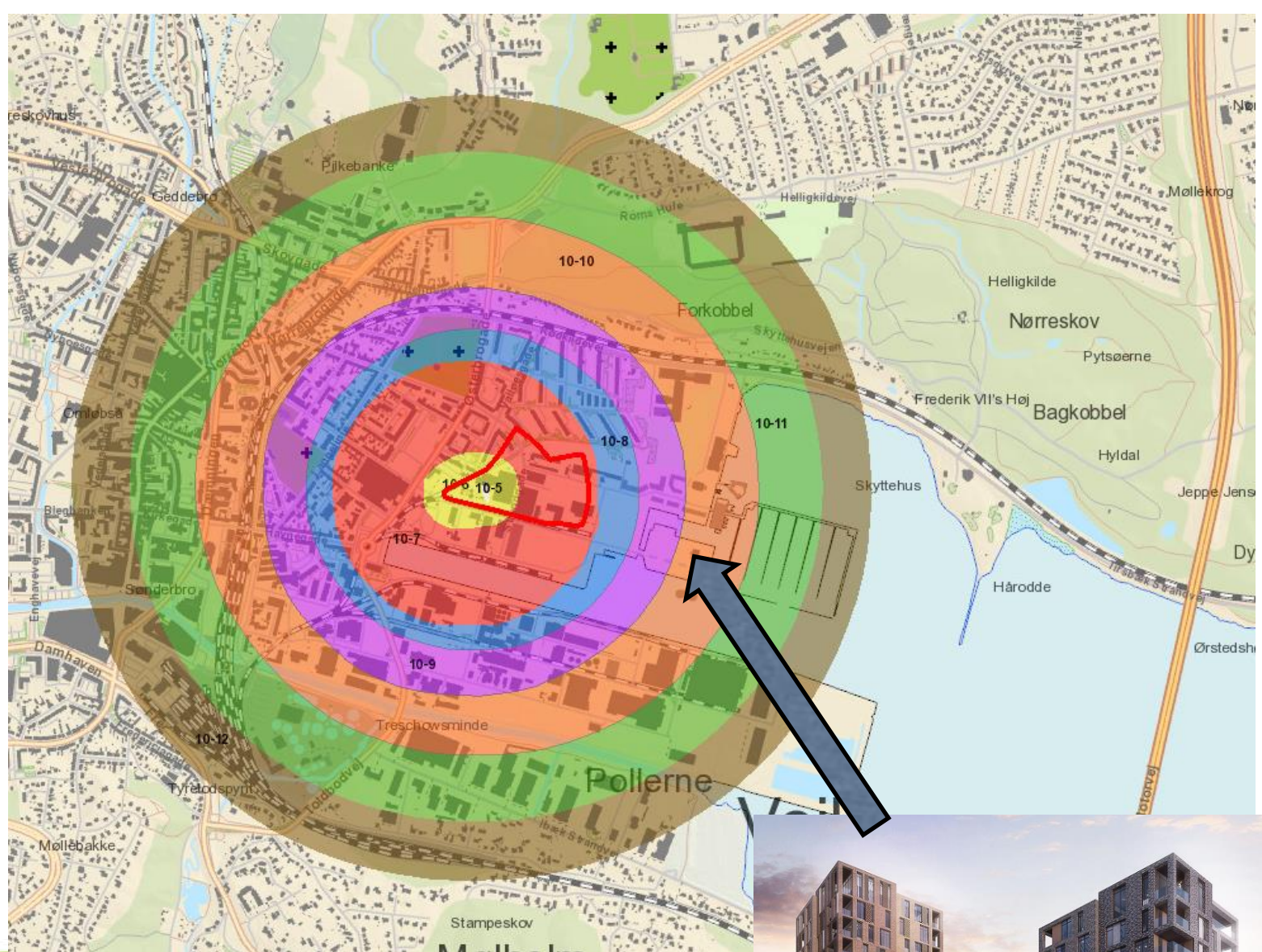
en del af **trekantområdet**





en del af **trekantområdet**

Individual risk levels around hazardous industry



5

en del af trekantomraadet



Housing, offices, recreative,
community activities

Harbour area, heavy industry and
hazardous industry



A Modern Classic Planning Dilemma

Example – simple tool - **quick, conservative (restrictive) societal risk assessments for land use planning**

tips and hints

Spread ownership - of societal risk aspects of planning near hazardous industry.

7

SD GOALS, SENDAI, INDUSTRIAL ACCIDENTS CONVENTION

SUSTAINABLE DEVELOPMENT GOAL 11

Make cities and human settlements inclusive, safe, resilient and sustainable



- reduce the **number of deaths** and the **number of people affected** and substantially **decrease the direct economic losses**

- increase the number of cities and human settlements adopting and implementing integrated policies and plans towards....
.....resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030,
holistic disaster risk management at all levels

11.B.1

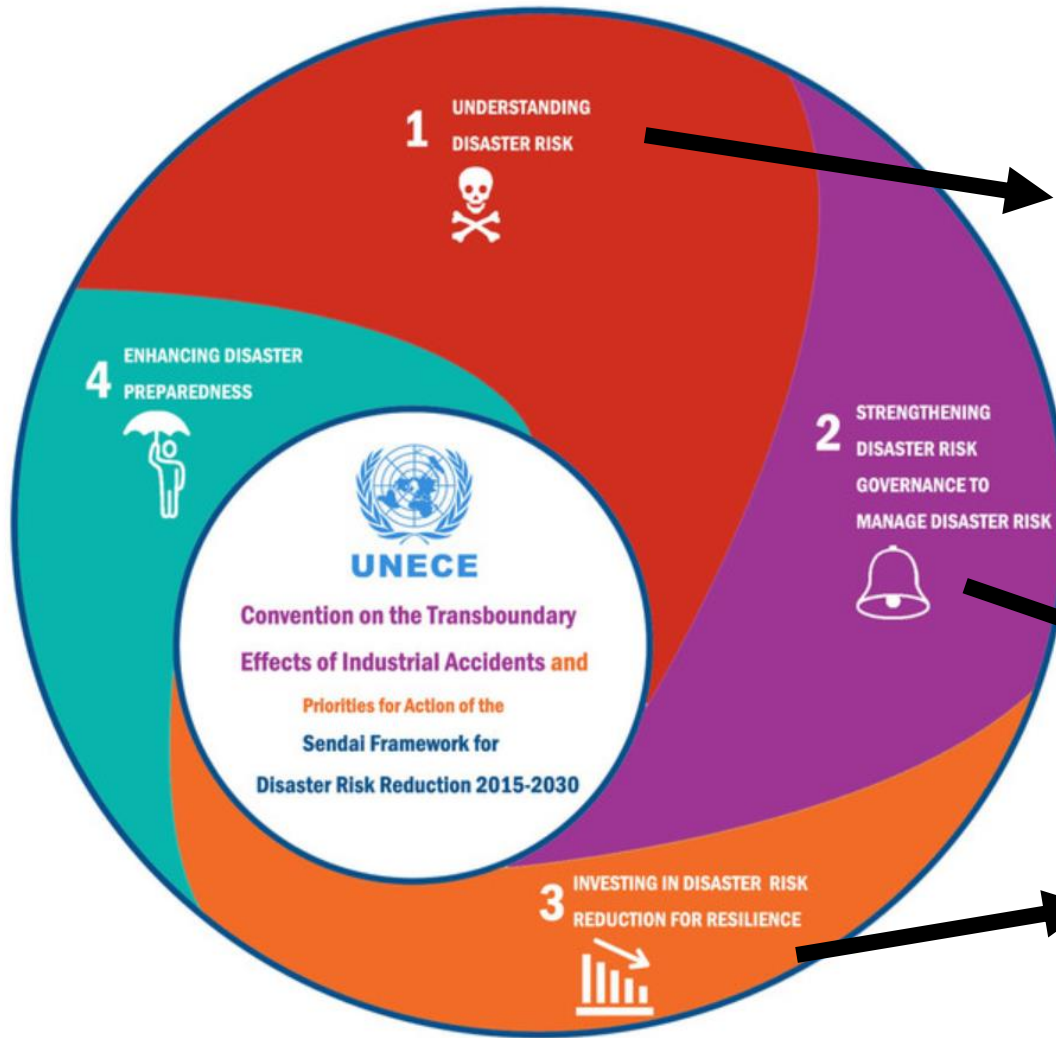
Proportion of local governments that adopt and **implement local disaster risk reduction strategies** in line with the Sendai Framework for Disaster Risk Reduction 2015-2030

Chart of the Sendai Framework for Disaster Risk Reduction 2015-2030

Priorities for Action

Priority 1
Understanding disaster risk

Priority 2
Strengthening disaster risk governance
to manage disaster risk



Good planning tools help in understanding of risk level in beginning of planning process.

Allowing development or restricting development at beginning of planning process.

SOCIETAL RISK

UK HSE definition:

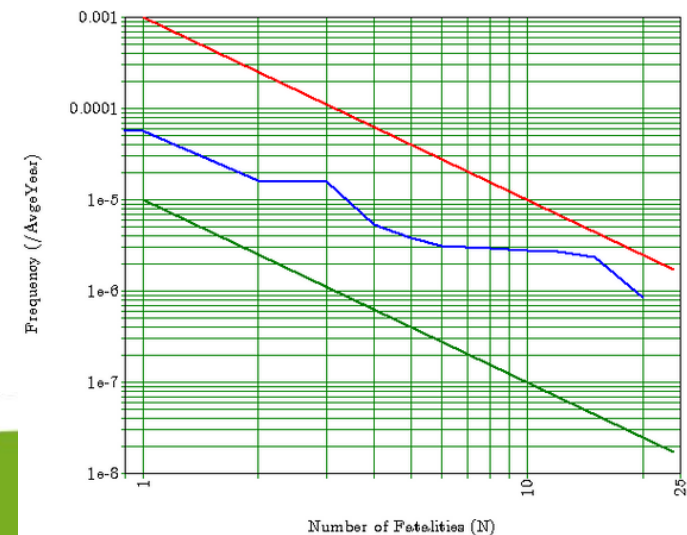
Estimating the chances of people being harmed from an industrial incident

Societal risk sets out to provide a single measure of the chance of accidents that could harm a number of people in one go, around onshore non-nuclear major hazard sites.”

Typically expressed in the form of an FN graph:

F - cumulative frequency of accident scenarios

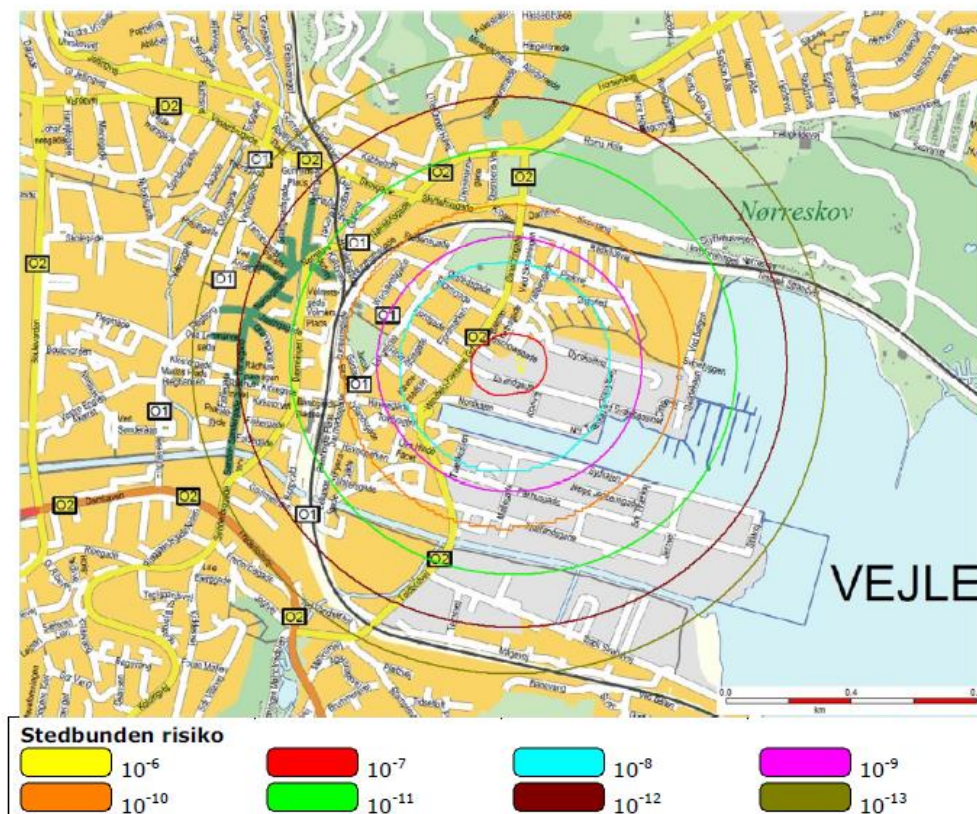
N – numbers of people killed in one accident



VURDERING AF SAMFUNDSRISIKO I VEJLE BY

4.2 Stedbunden risiko

Som baggrund til beregning af samfundsrisikoen, er der taget udgangspunkt i den stedbundne risikoberegning, som ses på nedenstående figur 4-1.



Resulterende FN-kurve
ligger i følgende område:
Tilladelig

Resulterende FN-kurve
ligger i følgende område:
ALARP

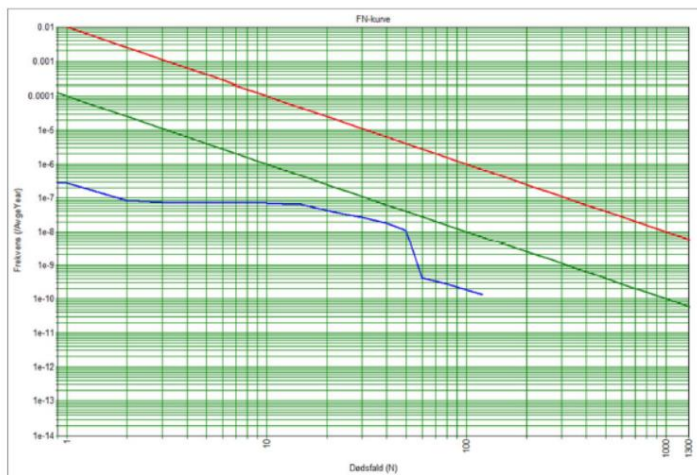
Resulterende FN-kurve
ligger i følgende område:
Uacceptabelt

Figur 5-4 Mulige resultater for den resulterende FN-kurve

BACKGROUND FOR THE VEJLE MODEL FOR QUICK RISK ASSESSEMENT

- Need for better, quicker tools.
- Too much reliance on industrial risk inspectors (knowledge not based in planning department)
- Planners felt that risk assesment was not their "field".
- Land-use planners and industry inspectors find risk assessment, including societal risk, hard to understand and discuss.

- Need for quick evaluations in a fast working, politically controlled environment.
- Need for professional quantitative evaluations – both as quick, draft, evaluations and as final conclusions.



Figur 4-3 FN-kurve med udgangspunkt i stedbundne risiko fra figur 4-1 og befolkningsdata og -eksponering fra Bilag 1.



Befolkningsgruppe	Antal personer	Risikoniveau
1	-	-
2	1	-
3	3	-
4	10	-
5	100	-
6	2000	-
7	-	-
8	-	-
9	-	-
10	-	-

Resultierende FN-kurve ligger i følgende område:
Ingen befolkningsgrupper

Tilladelig
ALARP
Uacceptabelt



From complex tools

to simple tools

Case

Yacht Club area, Vejle Harbour 2008 – 2018 and onwards

- New water sports club facilities
- New high rise housing
- New office buildings
- Close to Seveso III lower tier chemical industry (hazardous)





Sensitive activities, eg. “Wild about Water”

Vejle by set fra øst, med markeret lokalplanområde (Copyright JW-luftfoto)

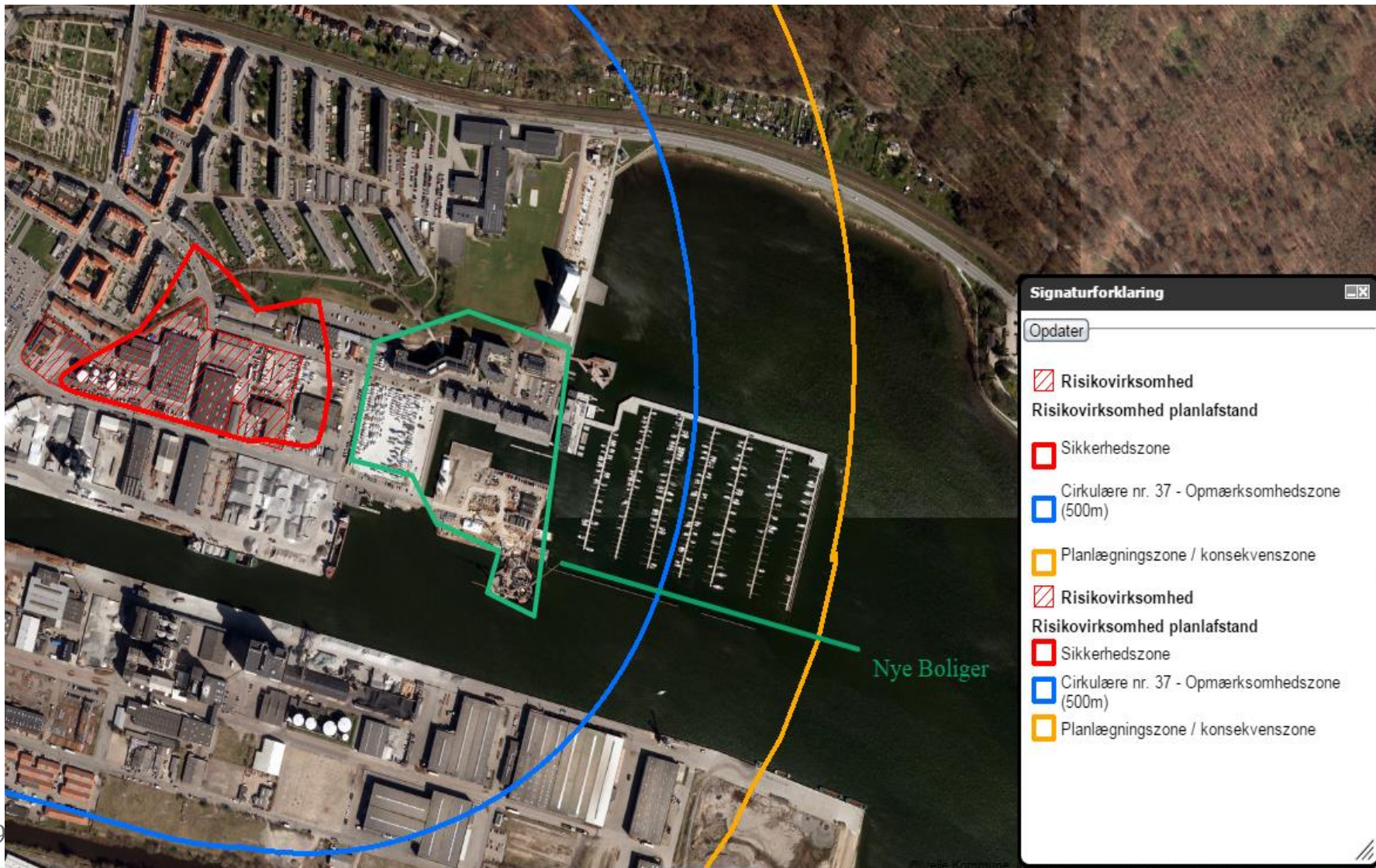


Hazardous company

Development area and Vejle Yacht Club





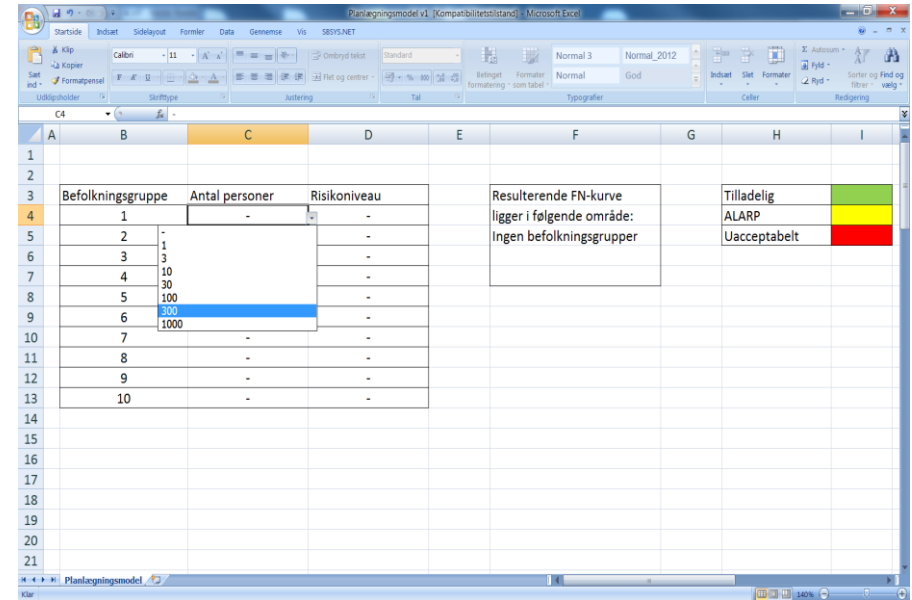


19

en del af **trekantområdet**

The tool - spreadsheet

- A spreadsheet model with drop down menus
- Tested against the direct use of Phast Risk software
- Conservative Go-No Go model
- Result – 3 possibilities:
”acceptable/maybe – needs detailed analysis (ALARP)/uacceptable”



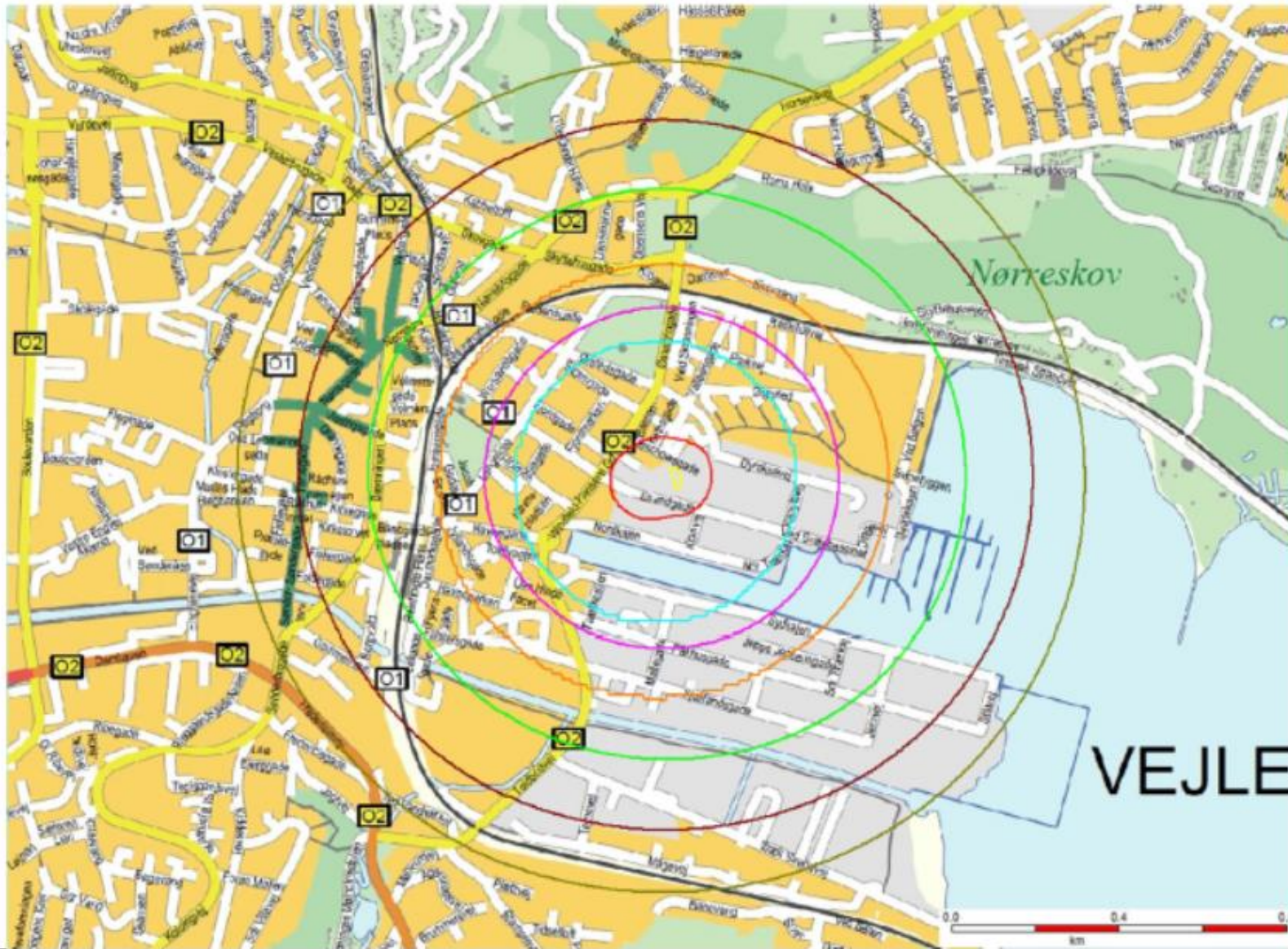
Tilladelig	Green
ALARP	Yellow
Uacceptabelt	Red

	A	B	C	D	E	F	G	H	I
1									
2									
3		Befolkningsgruppe	Antal personer	Risikoniveau		<div style="border: 1px solid black; padding: 5px;"> Resulterende FN-kurve ligger i følgende område: Tilladelig </div>		Tilladelig	
4		1	30	1,00E-07			ALARP		
5		2	300	1,00E-08			Uacceptabelt		
6		3	100	1,00E-08					
7		4	300	1,00E-09					
8		5	300	1,00E-09					
9		6	300	1,00E-10					
10		7	100	1,00E-10					
11		8	-	-					
12		9	-	-					
13		10	-	-					
14									
15									

The existing status for new, sensitive developments – persons and placement on iso curves – with a good deal of development projects completed.

Location Based Individual Risk

Isocurves 10⁻⁶ is one death in one million years



Figur 4-1 Beregnet stedbunden risiko fra Brandtag Vejle Nordic, ref. 14/

A document, with the calculated societal risk for the new land use, is prepared for the land-use casework – incl. the official hearing of the coordinating industrial risk authority.

Nyt boligområde ved Vejle Lystbådehavn - i forhold til risikovirksomhed

Brenntag Nordic A/S på Vejle Havn, betegnes som en risikovirksomhed i henhold til Bekendtgørelse om kontrol med risikoen for større uheld med farlige stoffer, Bek. nr. 1666 af 14. december 2006. I forbindelse med planlægning af byudvikling skal der tages hensyn til den risiko, som Brenntag Nordic A/S påtrykker sine omgivelser, ved at vurdere planlægningsområderne/befolkningsgrupperne i forhold til den beregnede stedbundne risiko samt samfundsriskoen.

Rambøll har udarbejdet rapporten "Vurdering af samfundsrisiko i Vejle by", februar 2014. Rapporten indeholder en planlægningsmodel som giver mulighed for på forhånd at undersøge, om en ny befolkningsgruppe kan placeres på det planlagte sted, uden at acceptkriteriet for samfundsrisiko overskrides. I rapporten gennemgås de risikobegreber og definitioner samt befolkningsdata med vurdering af udendørs eksponering, der ligger til grund for modellens opbygning. Planlægningsmodellen skal af Vejle Kommune opdateres løbende med aktuelle befolkningsgrupper, så de kumulative effekter af flere områder medregnes.

I rapporten er der, som baggrund til beregning af samfundsriskoen, taget udgangspunkt i den stedbundne risikoberegning, som ses på nedenstående kortudsnit.



Kortudsnittet viser isokurverne for beregnet stedbunden risiko fra Brenntag Nordic A/S, hvor den nye bebyggelse ønskes placeret, samt hvor der vil ske ændret anvendelse:

- de **gule felter** er ny bebyggelse
- de **blå felter** skal anvendes til bådopbevaring om vinteren og parkering om sommeren og
- de **brune felter** skal anvendes til offentligt areal (vandplads med iskiosk og p-pladser)

Planlægningsmodellen er udarbejdet i Excel og anvendes, når Vejle Kommune vil have svar på, om planerne for en ny aktivitet/et nyt byggeri vil give en acceptabel samfundsrisiko. Efter at planlægningsmodellen er blevet udarbejdet, er der blevet godkendt plangrundlag til ny bebyggelse (lokalplan nr. 1083 og lokalplan nr. 1136). Bebyggelsen og aktiviteterne fra disse lokalplaner indgår i bereg-

Risikoniveau "1,00E-09"

- Halvdelen af HavneBo (der er på 119 boliger) – dvs 60 boliger – dvs 132 personer
 - Pension Dk – halvdelen af 111 boliger – dvs 55 boliger – dvs 121 personer
 - Halvdelen af Havnejen (der er på 230 boliger) – dvs 115 boliger – dvs 253 personer
 - Offentlig areal, vandplads - 50 personer. Der tages udgangspunkt i Mariaplads og justeres ift aktuelle areal
- Dvs der indtastes "ca. 550 personer" i skemaet (600 personer i skemaets linje 4 og 5)

Risikoniveau "1,00E-10"

- Halvdelen af PensionDanmark (der er på 111 boliger) – dvs 55 boliger – dvs 121 personer
 - Halvdelen af Havnejen (der er på 230 boliger) – dvs 115 boliger – dvs 253 personer
- Dvs der indtastes "400 personer" i skemaet (skemaets linje 6 og 7)

Der er således tale om meget konservative tal, i en meget konservativ beregningsmodel, idet planlægningsmodellen er meget konservativ både i udarbejdelse (100% eksponering og ved afzæning af påvirkning af FN-kurven) og i brug (antal personer rundes op, og der anvendes det højeste risikoniveau).

Befolkningsgruppe	Antal personer	Risikoniveau	Resulterende FN-kurve ligger i følgende område:	Tilladelig
1	30	1,00E-07	Tilladelig	ALARP
2	300	1,00E-08		
3	100	1,00E-08	Tilladelig	Uacceptabelt
4	300	1,00E-09		
5	200	1,00E-09		
6	300	1,00E-10		
7	100	1,00E-10		
8	-	-		
9	-	-		
10	-	-		

30.juni 2015

Konklusion

Resultatet er ifølge planlægningsmodellens beregning – "Tilladelig".

Når planlægningsmodellen angiver, at FN-kurven er i det tilladelige område, kan der uden problemer i forhold til samfundsriskoen planlægges for det nye byggeri/den nye aktivitet for den/de givne nye befolkningsgrupper på det/de planlagte steder.

/30. juni 2015 Peter Wade og Helle Thorhaug

TIP NR. 1

FOR HAZARDOUS INDUSTRY INSPECTORS

Don't feel isolated – don't keep knowledge to yourself

- **Make sure land use planners know about national and international rules and guidelines for planning around hazardous industry.**
- **Your knowledge is strategic knowledge – municipal leaders in several sectors should be made aware of risks and the need to recalculate risks - with changes at and around industry.**

TIP NR. 2

FOR HAZARDOUS INDUSTRY INSPECTORS AND LAND -USE
PLANERS/LEADERSHIP

- Planning models can be based on **industry vigilance and good inspection practises**
- Important to have **detailed check of safety management systems** and documentation in connection with approval processes.
- Rigorous inspections/inspection plan is necessary – checks of all relevant barriers in the prevention of accidents – not least education and competency at the industry. **Barriers are the basis of probability input to models.**

Hazardous companies in cities with a dynamic development profile need dynamic risk and land-use planning tools

(or continual expert consultancy assistance).

ADVANTAGES

- Quick response times
- Saves time in planning process and money.
- No need for consultant for every new development
- Common understanding
- Conservative calculation (erring on the side of caution)

LEARNING POINTS/ RECOMMENDATIONS

- **Project leadership – ensure all important elements are in the model - that it encompasses future populations in already approved land uses.**
- **Internal guidance on updating the model/ documentation of changes**
- **Information across (municipal) government sectors – about the need to use the model**

Thank you

Questions?