

Table S1 Theory of Change: Accelerating the shift to sustainable modes

Objective	Interventions	Outputs	Mechanism of Change	Short/Medium Term Outcomes	Long Term Outcomes
Create Sustainable Systems					
1. Integrate transport and land use planning	Review policies and data systems in place Regulate for compact growth , the 10 minute city and city centre living.	Objectives incorporated in Development Plan Improved and integrated data systems	Reshaping environment through prioritisation of sustainable transport infrastructure Informed decision making	Investment and new development in line with compact growth Enhanced capacity to monitor effectiveness	Reduction in travel demand and reduced car dependency Appropriate investment in sustainable mobility
<p>Assumptions: Planning objectives will address dispersed population patterns and land use, leading to greater transport efficiency and progress towards the 10 minute city. People will choose to live in and visit a more attractive, accessible city centre, thereby supporting retail in the city.</p> <p>Risks: Population growth in rural areas and population sprawl outside of city centre. Loss of retail and other services from the city centre. Political will</p>					
2. Encourage multi-sectoral engagement	Explore partnership work with other cities Establish multi-sectoral teams and encourage citizen engagement Establish pre-planning communication channels and forums	Participation in European projects Multi-sectoral team established Enhanced public consultation Enhanced Advocacy	Greater awareness within the community of proposed developments Shared learnings, motivations and actions	Enhanced efficiencies and application of learning Greater sense of ownership and citizen involvement in the community	Effective, sustainable partnerships in place Cohesive decision making and strong civic and social communities Designs that reflect the needs of the community
<p>Assumptions: Relevant stakeholders will engage and assign resources to the process.</p> <p>Risk: Lack of human or financial resources to deliver interventions. Relationship tensions resulting in non-performing partnerships.</p>					
Design Healthy Built Environments					
3. Reallocate and prioritise space in urban centres for pedestrians, cyclists, sustainable transport options, public uses and green spaces	Reallocation of space to prioritise pedestrians, cyclists, collective transport, public uses and green spaces	Reduction in space allocated to cars in urban centres Introduction of pedestrianisations and traffic calming	Redesign of urban spaces	Priority of pedestrians and cyclists in city centre Reduction in car-centric design	Enhanced use of public realm Sustainable urban centres Enhanced liveability of urban centres
<p>Assumptions: Reallocation of space will encourage city centre living and increase attractiveness of city centre, reduce noise pollutions, improve air quality and lead to improved health and wellbeing</p> <p>Risks: Political will. Lack of accessibility to city centre. Availability of expertise</p>					

Objective	Interventions	Outputs	Mechanism of Change	Short/Medium Term Outcomes	Long Term Outcomes
4. Design and build a strategic cycling network	Connect population densities, workplace densities, daytime populations and retail, health and recreational services	A network of cycle paths based on the five needs of cyclists; safety, coherence, directness, attractiveness and comfort	Facilitation of modal shift through provision of infrastructure	Greater modal share of cycling	Reduced car dependency, reduced emissions, greater levels of physical activity and well being

Assumptions: Funding made available will deliver quality cycling infrastructure that will drive modal shift

Risks: Quality infrastructure not delivered due to insufficient funding, environmental constraints, resistance from the community to reallocation of space or prolonged planning processes. Modal shift not achieved as other transport options remain more attractive, key links not delivered, social norms remain entrenched

5. Integrate all modes and develop wayfinding, legibility and MAAS	Develop a multi-modal hub to link all transport modes, allowing for easy transfer and access Use smart, real time applications and enhance wayfinding	Multi-modal hub developed Smart technologies integrated across all platforms Wayfinding and legibility of infrastructure enhanced	Facilitate end user through enhanced provision, access to and clarity of information	Greater offering of accessible, integrated transport options	Reduction in car dependency Greater mobility choices
---	--	---	--	--	---

Assumptions: People will adapt mode to available solutions, solutions will meet the needs of the population

Risks: Social norms and car dependency remain entrenched; Other modes remain more attractive; Those with literacy or technological challenges are left behind

6. Strengthen and improve city, inter city and rural public transport links	Ensure adequate public transport and Park and Stride/Ride/Pedal provision Ensure rural connectivity with community and demand responsive transport	Partnerships established with Irish Rail, NTA, Private Bus Providers and Local Link Bus and rail schedule and routes reviewed and recommendations made	Facilitation of modal shift through provision of public transport options	Greater frequency of services of public transport Increased reach of transport services to rural areas	Reduction in car dependency and urban sprawl Rural nodes with greater access to services Reduced emissions, greater levels of physical activity and well being
--	---	---	---	---	--

Assumptions: Irish Rail, NTA and other responsible agencies will improve services; People will adapt mode to available solutions, solutions will meet the needs of the population

Risks: Social norms and car dependency remain entrenched; Other modes remain more attractive

Objective	Interventions	Outputs	Mechanism of Change	Short/Medium Term Outcomes	Long Term Outcomes
7. Develop micro-mobility and car sharing options	Explore provision of micro mobility and car sharing solutions, e-bikes, assisted trikes mobility scooters and other mobility solutions through public – private partnerships	Micro-mobility solutions available Car sharing schemes available	Facilitation of modal shift through provision of micro-mobility and car sharing options	Greater offering of accessible, integrated transport options Reduced need for car ownership for car dependent journeys	Reduced car dependency, reduced emissions, greater mobility choices

Assumptions: People will adapt mode to available solutions, solutions will meet the needs of the population

Risks: Social norms and car dependency remain entrenched; Other modes remain more attractive; Those with literacy or technological challenges are left behind

8. Develop greenway / off road facilities to encourage inexperienced / learner cyclists	Identify possible opportunities for development of greenway facilities, conduct feasibility, design and deliver	Possible routes identified, Options developed and progressed	Provision of safe environment for inexperienced cyclists Encouraging growth in cycling tourism and industry	Provision of safe, off road facilities Greater number of cyclists in the community and greater motivation for cycling	Greater number of citizens and tourists cycling
--	---	--	--	--	---

Assumptions: Funding and land available to develop greenway. Greenway will be utilised for recreation and skill development

Risks: Funding or land not available or resources not in place to deliver

Engage Society					
9. Promote cycling as a tourism offering	Promote suitable routes with on road and off road offerings	Routes identified and selected for promotion	Greater awareness of opportunities Provision of safe environment Modelling and persuasion	Enhanced tourist offering for those interested in cycling holidays	Greater number of tourists attracted by cycling offering

Assumptions: Increased number of cycling tourists

Risks: Investment exceeds cost-benefit

10. Promote cycling through community wide programmes	Develop a delivery mechanism and provide an offering of cycling education courses	Delivery mechanism in place, number of courses offered and participants on courses	Education and training, development of skills, building confidence and competency	Improved cycling confidence and skills in the community	Greater number of cyclists in the community
11. Develop cycling hubs	Identify and develop cycling hubs in the community	Feasibility of cycling hub explored and cycle hub established in the community	Facilitate growth of cycling community Facilitate roll out of innovative initiatives	Visibility of cycling and support structures for cycling available in the community	Social conditions that support cycling in the community

Objective	Interventions	Outputs	Mechanism of Change	Short/Medium Term Outcomes	Long Term Outcomes
Assumptions: Availability of programmes will lead to increased cycling confidence and competence and increased modal share of cycling Risks: Poor take up of programmes					
12. Develop safe routes to school and behaviour change campaigns for school travel	Develop safe, active travel routes to school and park and stride arrangements Discourage car traffic at the front of school environment Promote active travel to school to education and awareness	Delivery plans in place for safe routes to school infrastructure Front of school treatments to prioritise active travel Behaviour change programme in place	Facilitation of modal shift through provision of safe routes to school Education and training, development of skills, building confidence and competency	Safe routes to school infrastructure in place Front of school treatments delivered Behaviour change programme in place	Greater modal share of walking and cycling to school Improved cycling confidence and skills in the community
Assumptions: Safe routes will lead to an increase in modal share of cycling and walking to school Risks: Engrained car dependency, attractiveness of car mode necessity to carry things, presence of large traffic volumes prevents modal shift					
Empower People					
13. Provide focused training and education programmes for those with lower levels of participation in cycling	Develop delivery model for cycling education courses Provide targeted training and education for those with additional barriers	Delivery mechanism in place, number of courses offered and participants on courses	Education and training, development of skills, building confidence and competency	Improved cycling confidence and skills in the community	Greater number of cyclists in the community
Assumptions: Availability of programmes will lead to increased cycling confidence and competence and increased modal share of cycling Risks: Poor take up of programmes, participation in programmes does not result in modal share due to attractiveness of car mode					
14. Enhance attractiveness and comfort of sustainable routes using place-making techniques	Engage with local communities to enhance attractiveness and comfort of routes and open and green spaces using placemaking techniques	Engagement of community in developing green spaces	Engagement and capacity building	Ownership of community of nature based destinations and safe, off-road facilities	Enhanced liveability and social capital
Assumptions: Place-making will lead to greater attachment to place, enhanced perceptions of safety, greater use of active travel routes Risks: Greater engagement requires more staff time which may not be resourced					

Objective	Interventions	Outputs	Mechanism of Change	Short/Medium Term Outcomes	Long Term Outcomes
15. Develop and deliver communication campaigns to promote a shift to sustainable transport	Develop campaigns that increase awareness of the benefits, provide information on the opportunities and encourage a shift to sustainable transport modes	Greater awareness of the benefits and opportunities and positive encouragement and reinforcement of a shift in modes	Awareness raising, information provision and encouragement	Greater awareness in the community of benefits and opportunities	Greater number of people using sustainable transport options in the community

Assumptions : Communication campaigns will lead to greater awareness of benefits of cycling and provide more information on cycling, increasing the uptake of cycling in the community

Risks : Inappropriate / negative messaging / less credible campaigns may alienate population

Prioritise Road Safety

16. Enhance road safety of cyclists and pedestrians through reduction in traffic volumes, speeds, % of HGVs, and road design	Reduce traffic volumes through traffic management plans Introduce traffic calming Provide crossings Provide pedestrian and cyclist treatment and junction tightening at all junctions	Reduction in traffic volumes on traffic counts Reduction in traffic speeds Reduction in collisions, injuries and deaths	Provision of safe infrastructure to facilitate active modes Enhanced perception of safety	Enhanced safety of cyclists and pedestrians on routes and greater perception of safety	Enhanced safety of all road users Greater number of less confident cyclists using cycle routes Reduction in collisions, injuries and deaths
---	--	---	--	--	---

Assumptions: Enhanced road design leads reductions in injuries, collisions and deaths

Risks: Backlash from drivers leading to driver frustration and poor driver behaviour