

APPENDIX 4 – POSSIBLE ENVIRONMENTAL INDICATORS AND DATA SOURCES FOR WEST YORKSHIRE

SEA OBJECTIVE	POSSIBLE INDICATORS	DATA REQUIREMENTS ✓ = currently available ✗ = currently unavailable ? = unknown availability	DATA SOURCES
1. Reduce transport related impacts on local/regional noise climate.	Traffic / rail / air movements.	<ul style="list-style-type: none"> ⌘ Classified traffic counts (✓) ⌘ Classified rail movements (✓) ⌘ Aircraft movements (✓) 	<ul style="list-style-type: none"> ⌘ LTP Annual Progress Report. ⌘ Metro. ⌘ Strategic Rail Authority. ⌘ Leeds Bradford Airport.
	Train sound event level.	<ul style="list-style-type: none"> ⌘ Train speeds, gradient and rail type (?) ⌘ Rail acoustic models (✓) 	<ul style="list-style-type: none"> ⌘ Metro / Train Operators.
	Aircraft noise footprint.	<ul style="list-style-type: none"> ⌘ Aircraft footprints (✓) ⌘ Aircraft acoustic models (✓) 	<ul style="list-style-type: none"> ⌘ Civic Aviation Authority. ⌘ In-house model.
	Road basic noise level.	<ul style="list-style-type: none"> ⌘ Speeds & gradients of roads (✓) ⌘ Road surface type (✓) ⌘ Road acoustic models (✓) 	<ul style="list-style-type: none"> ⌘ SATURN / Strategic Traffic Model. ⌘ Highway Design / Maintenance facility. ⌘ CRTN / AIRVIRO noise mapping
	Noise Mapping data (e.g. L(DEN) criteria).	<ul style="list-style-type: none"> ⌘ Noise mapping contours (✗) ⌘ Specific noise monitoring projects (✓) ⌘ Barrier effects (✓) 	<ul style="list-style-type: none"> ⌘ Noise mapping software. ⌘ District Highways / Environmental Health Depts.
	Areas of Tranquillity.	<ul style="list-style-type: none"> ⌘ Areas of tranquillity (✓) ⌘ UDP parkland/ green space (✓) 	<ul style="list-style-type: none"> ⌘ Campaign for Rural England (CPRE). ⌘ Countryside Agency. ⌘ Unitary Development Plans.
2. Improve local/regional air quality and mitigate transport related AQMAs.	Compliance of air quality standards (NO ₂ & PM ₁₀).	<ul style="list-style-type: none"> ⌘ AQ data (real-time & passive) at road, rail and airport sites (✓) ⌘ Air quality models (includes transport movements, meteorological data & emissions database) (✓) ⌘ Nos. of dwellings affected (?) 	<ul style="list-style-type: none"> ⌘ District Air Quality Review and Assessments. ⌘ LTP Annual Progress Report. ⌘ Regional Air Quality Groups.
	Number of AQMA's.	<ul style="list-style-type: none"> ⌘ Air quality models (✓) ⌘ Findings of Air Quality Detailed Assessment Round 1 & 2 (✓) ⌘ Declaration of AQMAs (✓) ⌘ Nos. of dwellings affected (✗ - data for Leeds only) ⌘ Areas of air quality concern (✓) 	<ul style="list-style-type: none"> ⌘ District Air Quality Management Teams.
	Number of moderate/high pollution days.	<ul style="list-style-type: none"> ⌘ DEFRA air quality bands (✓) 	<ul style="list-style-type: none"> ⌘ DEFRA. ⌘ NETCEN.
	Long-term air quality trends.	<ul style="list-style-type: none"> ⌘ AURN monitoring sites (✓) ⌘ Other air quality monitoring programmes (✓) 	<ul style="list-style-type: none"> ⌘ Districts Env Health Depts. ⌘ NETCEN. ⌘ Leeds Bradford Airport.

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3. Reduce transport-related emissions of greenhouse gases.	Transport related emissions of CO ₂ (all modes).	<ul style="list-style-type: none"> ⌘ Modelled CO₂ emissions from West Yorkshire principle road network (Airviro/EDB) (✓) 	<ul style="list-style-type: none"> ⌘ District air quality models. ⌘ Strategic traffic model.
	Transport growth rates by district.	<ul style="list-style-type: none"> ⌘ Traffic growth rates by district and road type (✓) 	<ul style="list-style-type: none"> ⌘ LTP Annual Progress Report / Leeds Transport Policy Monitoring (covers all of West Yorkshire).
	Number of vehicles commuting into/out of urban centres during peak times.	<ul style="list-style-type: none"> ⌘ Central cordon traffic flows at peak times (am/pm/interpeak) (✓) 	<ul style="list-style-type: none"> ⌘ LTP Annual Progress Report / Leeds Transport Policy Monitoring (covers all of West Yorkshire).
	Changes to commuting modal split.	<ul style="list-style-type: none"> ⌘ % modal split (✓) 	<ul style="list-style-type: none"> ⌘ LTP Annual Progress Report / Leeds Transport Policy Monitoring (covers all of West Yorkshire).
	CO2 mitigation initiatives for District vehicle fleets.	<ul style="list-style-type: none"> ⌘ Use of renewable energy fuels (e.g. biodiesel, Biogas) (✓) ⌘ Driver training (✓) ⌘ Utilisation of modern diesel technology (✓) 	<ul style="list-style-type: none"> ⌘ District Transport Agencies / vehicle fleet management..
4. Improve the ability of transport systems to adapt to climate change.	Actions to reduce transportation flooding / disruption.	<ul style="list-style-type: none"> ⌘ Transport Design Changes (?) ⌘ Use of SUDS / balancing ponds (✓) ⌘ Improved gully cleaning / maintenance (?) ⌘ Use of UTC for emergency diversions (?) 	<ul style="list-style-type: none"> ⌘ District Highway Design and Drainage Sections. ⌘ Highway Maintenance Depots. ⌘ Leeds/ Bradford Airport. ⌘ Network Rail.
	Transport design measures to reduce thermal stress.	<ul style="list-style-type: none"> ⌘ Appropriate adaptation of transportation infrastructure and associated structure design (?) ⌘ Kilometres of alternative road, rail or runway surfaces laid (✗) 	<ul style="list-style-type: none"> ⌘ Districts Engineering / Design Services. ⌘ Highway Maintenance Services. ⌘ TRL ⌘ LTP Annual Progress Report. ⌘ Leeds/ Bradford Airport. ⌘ Network Rail.
	Transport Infrastructure design measures to reduce subsidence.	<ul style="list-style-type: none"> ⌘ Modifications to transport foundation design (?) ⌘ Identification of clay or other shrinkage prone soils (✓) 	<ul style="list-style-type: none"> ⌘ District Highway Design Sections. ⌘ Geotechnical Laboratory. ⌘ Leeds/ Bradford Airport. ⌘ Network Rail.
	Actions to reduce wind damage / transport disruption.	<ul style="list-style-type: none"> ⌘ Planting of shelter belts along exposed transport routes (?) ⌘ Improvements to design and foundations of transportation signs & lighting (✓) ⌘ Number of accidents caused by high winds (?) ⌘ Number of accidents caused by twisted/damaged UTC signs (?) 	<ul style="list-style-type: none"> ⌘ District Highway Design Sections. ⌘ District Landscape Design Teams. ⌘ District Accidents Studies Teams. ⌘ District Urban Traffic Control Services. ⌘ Leeds/ Bradford Airport. ⌘ Network Rail.

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5. To protect and enhance landscape and townscape diversity.	Number of mitigation measures taken that acknowledge the presence of landscape features and character.	<ul style="list-style-type: none"> ⌘ Environmental Impact Assessments / Environmental Statements (✓) 	<ul style="list-style-type: none"> ⌘ Local Transport Plan. ⌘ Planning Development Control.
	Sensitive sites affected by traffic congestion.	<ul style="list-style-type: none"> ⌘ Traffic flows (✓) 	<ul style="list-style-type: none"> ⌘ Flow data (LTP Annual Progress Report).
	Number of desirable 'streetscene' and other urban character features.	<ul style="list-style-type: none"> ⌘ Extent of urban green space (✓) ⌘ Number of Homezones (✓) ⌘ Pedestrianised areas (✓) 	<ul style="list-style-type: none"> ⌘ Local Transport Plan. ⌘ District urban design teams (Design Statements, etc).
	Number of undesirable 'streetscene' and other urban character features.	<ul style="list-style-type: none"> ⌘ Street clutter (posts, signage, guard rails, etc.) (✓) ⌘ On-street parking/car parking (✓) 	<ul style="list-style-type: none"> ⌘ Local Transport Plan ⌘ District urban design teams.
	Quiet areas or Areas of Tranquillity.	<ul style="list-style-type: none"> ⌘ Noise mapping data (✗) ⌘ Areas of Tranquillity (✓) 	<ul style="list-style-type: none"> ⌘ Areas of tranquillity. ⌘ Noise mapping contours. ⌘ Countryside Agency.
	Light pollution.	<ul style="list-style-type: none"> ⌘ Light pollution satellite maps and data (✓) 	<ul style="list-style-type: none"> ⌘ CPRE
	Landscape features potentially affected by transportation schemes.	<ul style="list-style-type: none"> ⌘ Woodland cover (✓) ⌘ Urban trees (✓) ⌘ Protected meadows (✓) ⌘ Conservation Areas (✓) ⌘ Watercourses/bodies (✓) ⌘ Viewpoints (✓) ⌘ Register of applications to remove hedgerows under the Hedgerow Regulations 1997 (?) 	<ul style="list-style-type: none"> ⌘ LA urban design teams. ⌘ LA landscape design teams. ⌘ In-house GIS database. ⌘ District planning departments.
	Potential degradation of Landscape Character Areas in the county.	<ul style="list-style-type: none"> ⌘ Number of projects / developments in each Landscape Character Area (?) 	<ul style="list-style-type: none"> ⌘ Local Transport Plan ⌘ Other plans in the area. ⌘ In-house GIS database.
6. Avoid loss or damage to historic buildings, land, structures, Conservation Areas and archaeological areas or their setting.	Number of losses and/or damage to historical resources and structures as a result of transportation proposals and schemes.	<ul style="list-style-type: none"> ⌘ Local Transport Plan (✓) ⌘ Scheduled Ancient Monuments (✓) ⌘ Listed Buildings (✓) ⌘ Areas of Archaeological Importance (✓) ⌘ Conservation Areas (✓) ⌘ Register of Battlefields (✓) ⌘ Historic Parks and Gardens (✓) ⌘ World Heritage Sites (✓) 	<ul style="list-style-type: none"> ⌘ District Conservation Teams. ⌘ In-house GIS databases. ⌘ Countryside Agency. ⌘ West Yorkshire Archaeological Service. ⌘ English Heritage.
	Number of mitigation measures implemented for highway schemes in sensitive areas, e.g. use of appropriate materials	<ul style="list-style-type: none"> ⌘ Number of mitigation measures implemented for highway schemes in sensitive areas (?) 	<ul style="list-style-type: none"> ⌘ Local Transport Plan. ⌘ Highways Design Teams.

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7. To help protect and enhance habitats and species of local, European or international importance.	Effects of transport system on designated sites of ecological importance (including fragmentation).	<ul style="list-style-type: none"> λ Transport Infrastructure (✓) λ SPAs/SACs boundaries (✓) λ SSSIs boundaries (✓) λ SEGIs boundaries (✓) λ LNRs boundaries (✓) λ BAP habitats (✓) λ Net change in: <ul style="list-style-type: none"> - Hedgerow length (?) - Area of woodland (?) - Land-take (?) - SUDS/balancing ponds (✓) λ Measure of quality of designated sites (?) 	<ul style="list-style-type: none"> λ English Nature. λ West Yorkshire Ecology (records centre). λ In-house ecological advice / Local Biodiversity Action Plans.
	Changes in populations of important species of plants or animals affected by transport infrastructure.	<ul style="list-style-type: none"> λ Ecological records (protected/BAP species) (✓) λ Roadkill data for protected species (e.g. badgers) (?) 	<ul style="list-style-type: none"> λ English Nature. λ West Yorkshire Ecology. λ Transport authorities' records/surveys. λ District Env Health Departments.
	Extent of 'invasive or injurious' weeds on transport infrastructure.	<ul style="list-style-type: none"> λ Location of invasive / injurious weeds (?) λ Records of 'clean-up' activity/costs (?) 	<ul style="list-style-type: none"> λ Environment Agency? λ West Yorkshire Ecology? λ District ecologists / biodiversity divisions. λ Metro/Strategic Rail Authority.
	Number of transportation schemes that incorporate the needs of biodiversity in their design and implementation.	<ul style="list-style-type: none"> λ Local Transport Plan schemes (✓) λ Environmental Statements (for projects requiring EIA) (✓) λ Use of SUDS (✓) 	<ul style="list-style-type: none"> λ Local Transport Plan. λ Planning Departments. λ District Highways Design Teams.
8. Reduce the detrimental impact of transport on water quality.	Use of SUDS and interceptor measures.	<ul style="list-style-type: none"> λ Number and location of sustainable urban drainage systems (SUDS) in the study area (✓) 	<ul style="list-style-type: none"> λ District Highways Design / Maintenance Teams.
	Frequency of winter maintenance / salting.	<ul style="list-style-type: none"> λ Quantity of salt used (✓) 	<ul style="list-style-type: none"> λ District Transport Agencies / vehicle fleet management.
	Number of identifiable pollution incidents relating to transport.	<ul style="list-style-type: none"> λ Number of measurable pollution incidents related to transport (e.g. highways spillage events, disturbance of contaminated land in construction schemes) (✓) λ Changes in GQA scores as a result of transport-related pollution incidents (?) 	<ul style="list-style-type: none"> λ District Highway Departments. λ Police. λ Environment Agency.
9. To secure improvements to health	Levels of respiratory illness and physical exercise that can be attributed to transport.	<ul style="list-style-type: none"> λ Standardised mortality ratio (SMR) for respiratory disease (✓) λ Levels of physical fitness (?) 	<ul style="list-style-type: none"> λ Office of National Statistics. λ WY Primary Care Trust. λ Social Services Depts.
	Changes in air quality for PM ₁₀ and NO ₂ .	<ul style="list-style-type: none"> λ PM₁₀ and NO₂ air quality trends / compliance (✓) λ Number of days where air quality is classed moderate / high (✓) 	<ul style="list-style-type: none"> λ District Air Quality Monitoring. λ DEFRA air pollution bands.
	Levels of pedestrian and cyclist activity.	<ul style="list-style-type: none"> λ Pedestrian activity statistics (centres, towpaths) (✓) λ Cycling activity statistics (cycle to work surveys, cycle volumes) (✓) 	<ul style="list-style-type: none"> λ LTP Annual Progress Reports.
	Reliance on cars to commute to work/school.	<ul style="list-style-type: none"> λ Changes in modal split (✓) 	<ul style="list-style-type: none"> λ LTP Annual Progress Reports.

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10. Reduce the number of vehicular, pedestrian, and other transport-user casualties.	Number of transport-related accidents.	<ul style="list-style-type: none"> ⌘ Transport accidents statistics (✓) 	<ul style="list-style-type: none"> ⌘ LTP Annual Progress Reports. ⌘ West Yorkshire Road Injuries 2003 report.
	Annual road injury statistics for road user groups.	<ul style="list-style-type: none"> ⌘ Road user casualty rates for: pedestrians, pedal cyclists, PTW rider and pillion, car driver, car passenger, goods occupant, bus occupant, and others(✓) 	<ul style="list-style-type: none"> ⌘ LTP Annual Progress Reports. ⌘ West Yorkshire Road Injuries 2003 report.
	Number of schemes including improvements to pedestrian, cyclist and vehicular safety.	<ul style="list-style-type: none"> ⌘ Local Transport Plan schemes (✓) 	<ul style="list-style-type: none"> ⌘ Local Transport Plan.
11. Reduce the risk and fear of crime for pedestrians and public transport users.	Utilisation of CCTV at transport nodes and along transport routes.	<ul style="list-style-type: none"> ⌘ Local Authority off street car parks with CCTV surveillance (✓) ⌘ Number of rail station car parks with CCTV surveillance (✓) ⌘ Security at bus stations – CCTV surveillance (✓) ⌘ % city centre streets covered by CCTV surveillance (✓) ⌘ CCTV coverage of street bus points (✓) ⌘ Local Authority off street parking with Secured Car Park Awards (✓) ⌘ Improved access to public transport public facilities, e.g. footways, lighting, landscaping (?) 	<ul style="list-style-type: none"> ⌘ LTP Annual Progress Reports. ⌘ District Urban Traffic Control Teams. ⌘ Metro.
	Number of criminal attacks or other incidents against transport users.	<ul style="list-style-type: none"> ⌘ Criminal attacks on transport system (?) 	<ul style="list-style-type: none"> ⌘ British Transport Police. ⌘ Metro. ⌘ District Road Safety Sections.
	Levels of vandalism on the transport infrastructure.	<ul style="list-style-type: none"> ⌘ Records of vandalism (?) 	<ul style="list-style-type: none"> ⌘ British Transport Police. ⌘ Metro.
12. Reduce community severance and fragmentation to aid community cohesion.	Ease of pedestrian access to jobs, services, leisure, etc.	<ul style="list-style-type: none"> ⌘ Pedestrian counts / classification (✓) ⌘ Number of improved pedestrian crossing facilities (✓) ⌘ Pedestrian desire lines and generation of pedestrian activity from major attractors (?) 	<ul style="list-style-type: none"> ⌘ LTP Annual Progress Reports. ⌘ Local Transport Plan schemes. ⌘ LTP Monitoring Team.
	Improved traffic management.	<ul style="list-style-type: none"> ⌘ Traffic flow data (✓) ⌘ Mean vehicle speeds (✓) 	<ul style="list-style-type: none"> ⌘ LTP Monitoring Team. ⌘ LTP Annual Progress Reports.
	Majors roads & rail lines through communities.	<ul style="list-style-type: none"> ⌘ Major road & rail networks (✓) ⌘ Built-up / residential areas (✓) 	<ul style="list-style-type: none"> ⌘ Local Transport Plan. ⌘ Strategic Rail Network.
	Use of local 'Hopper' services to community venues & transport nodes	<ul style="list-style-type: none"> ⌘ Routes and destinations of Hopper services (✓) ⌘ Patronage data for Hopper services (✓) 	<ul style="list-style-type: none"> ⌘ Metro.

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13. Improve access to education, jobs, leisure (including sustainable tourism), community services and the countryside.	Degree of social exclusion to places of work, educational establishments, recreation, etc.	<ul style="list-style-type: none"> ⌘ Number of Disability Discrimination Act Improvements to highway / footway, e.g. dropped kerbs, disabled parking (✓) ⌘ Accessibility Audits (✓) 	<ul style="list-style-type: none"> ⌘ District Access Officers. ⌘ LTP Monitoring Groups.
	Distance of public transport stops/stations to residential areas.	<ul style="list-style-type: none"> ⌘ Desire lines distances between public transport facilities and residential areas (✓) 	<ul style="list-style-type: none"> ⌘ LTP Monitoring Groups.
	Parking provision, and distance of parking from shop and services, etc. Number of visitors to cultural, leisure and recreational facilities.	<ul style="list-style-type: none"> ⌘ Car parking facilities (on- and off-street) (✓) ⌘ Visitor statistics from major attractions (✓) 	<ul style="list-style-type: none"> ⌘ District Parking Services. ⌘ Private car park companies. ⌘ Tourism Information Services. ⌘ District (in-house) tourism sections.
	Public transport services to cultural, leisure and recreational facilities.	<ul style="list-style-type: none"> ⌘ Frequency of relevant public transport routes and services (✓) ⌘ Distance from homes to public transport nodes (?) 	<ul style="list-style-type: none"> ⌘ Metro / bus and rail operators.
	Improvements in road access and parking facilities to cultural, leisure and recreational facilities.	<ul style="list-style-type: none"> ⌘ Road access to cultural / leisure / recreational facilities (✓) ⌘ Parking facilities at cultural / leisure / recreational facilities (?) 	<ul style="list-style-type: none"> ⌘ District Highway Design teams. ⌘ District Parking Services. ⌘ Private car park companies.
	Increased use of public transport to tourist destinations.	<ul style="list-style-type: none"> ⌘ Patronage on public transport routes serving tourist destinations (✓) 	<ul style="list-style-type: none"> ⌘ Metro.
	Levels of recreational walking and cycling.	<ul style="list-style-type: none"> ⌘ Number of cyclists using the National Cycling Network (✓) ⌘ Pedestrian activity on long distance footpaths, etc. (✓) 	<ul style="list-style-type: none"> ⌘ Sustrans. ⌘ Transport Planning Departments.
14. To support employment, economic competitiveness and the revival of priority regeneration areas.	Retail occupancy / vacancy rates in town and city centres.	<ul style="list-style-type: none"> ⌘ Retail occupancy and vacancy rates (✓) 	<ul style="list-style-type: none"> ⌘ District Economic Development Strategies. ⌘ City Centre Monitoring teams.
	Pedestrian activity in town and city centres.	<ul style="list-style-type: none"> ⌘ Footfall in town and city centres (✓) 	<ul style="list-style-type: none"> ⌘ LTP Monitoring Teams
	Economic activity rates.	<ul style="list-style-type: none"> ⌘ Unemployment figures (✓) 	<ul style="list-style-type: none"> ⌘ Labour Force Survey.
	Levels of education.	<ul style="list-style-type: none"> ⌘ Skill levels of the workforce (✓) 	<ul style="list-style-type: none"> ⌘ Office of National Statistics. ⌘ Employer surveys.
15. To protect and retain soil quality.	Soil Quality.	<ul style="list-style-type: none"> ⌘ Extent of land contamination (?) ⌘ Soil classifications (✓) ⌘ Amount of soil compaction (?) 	<ul style="list-style-type: none"> ⌘ District Land Contamination Officers. ⌘ Defra / Environment Agency. ⌘ Geotechnical Lab.
	Removal of soil in transport schemes.	<ul style="list-style-type: none"> ⌘ Net volume of soil removed (?) 	<ul style="list-style-type: none"> ⌘ Highway Design Teams.
	Risk of contamination from transport activity.	<ul style="list-style-type: none"> ⌘ Amount of road salt applied (?) ⌘ Transport accidents resulting in Pollution incidents (✓) 	<ul style="list-style-type: none"> ⌘ Highway Maintenance Departments.4 ⌘ Road Safety Teams. ⌘ Police. ⌘ Environment Agency.
16. Maximise the efficient and effective use of materials and minimise the amount of waste generated.	Tonnes of recycled construction materials used in highway schemes.	<ul style="list-style-type: none"> ⌘ Tonnes of road planings used for cold asphalt surfacing (?) ⌘ Tonnes of kerbstones / stone sets reused (?) ⌘ Composted materials for landscaping/embankments (?) ⌘ Use of crushed concrete (?) ⌘ ISO 9001, 14001 & EMAS, where verified (✓) 	<ul style="list-style-type: none"> ⌘ City Services/ Highway Maintenance