



A90/A937 Laurencekirk Junction Improvement Scheme
Environmental Impact Assessment Report
Volume 2 - Assessment
December 2019

Glossary of Abbreviations

3D	3 Dimensional
AADT	Annual Average Daily Traffic
AEP	Annual Exceedance Probability
AHLV	Area of High Landscape Value
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
AQS	Air Quality Standard
BAP	Biodiversity Action Plan
BGS	British Geological Society
BPM	Best Practicable Means
BS	British Standard
CA	Conservation Area
CEMP	Construction Environmental Management Plan
CIRIA	Construction Industry Research and Information Association
CoPA	Control of Pollution Act
COSHH	Control of Substances Hazardous to Health
CRTN	Calculation of Road Traffic Noise
CWS	County Wildlife Site
DAL	Differential Acceleration Lane
DEFRA	Department of Environment, Food and Rural Affairs
DM	Do-Minimum
DMRB	Design Manual for Roads and Bridges
DS	Do-Something
EA	Environmental Agency
eDNA	Environmental deoxyribonucleic acid
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
END	Environmental Noise Directive
EPA	Environmental Protection Act
EPS	European Protected Species
EQS	Environmental Quality Standards
FRA	Flood Risk Assessment
GCN	Great Crested Newt
GPP	Guidance for Pollution Prevention
GSJ	Grade Separated Junction
Ha	Hectares
HADDMS	Highways Agency Drainage Data Management System
HAWRAT	Highways Agency Water Risk Assessment Tool
HDV	Heavy Duty Vehicle
HE	Historic England
HERs	Historic Environment Records

Glossary of Abbreviations

HGV	Heavy Goods Vehicles
HLA	Historic Landscape Assessment
Hz	Hertz
IAN	Interim Advice Note
IAQM	Institute of Air Quality Management
IT	Interim Target
km	kilometres
LDP	Local Development Plan
LDV	Light Duty Vehicle
LTT	Long-Term Trend
MAGIC	Multi Agency Geographic Information for the Countryside
MMP	Materials Management Plan
MoU	Measure of Uncertainty
NAEI	National Atmospheric Emissions Inventory
NHBC	National House Building Council
NISR	Noise Insulations (Scotland) Regulations
NMRS	National Monument Record of Scotland
NMU	Non-Motorised User
NNG	Night Noise Guidelines
NO ₂	Nitrogen Dioxide
NO _x	Oxides of Nitrogen
NPPF	National Planning Policy Framework
NSR	Noise Sensitive Receptor
NTS	Non-Technical Summary
OS	Ordnance Survey
PAN	Planning Advice Note
PM ₁₀	Particulate Matter
PPG	Pollution Prevention Guideline
RCAHMS	Royal Commission on the Ancient and Historical Monuments of Scotland
S2	Two-Lane Single Carriageway
SAC	Special Area of Conservation
SAM	Scheduled Ancient Monument
SEPA	Scottish Environment Protection Agency
SHEP	Scottish Historic Environment Policy
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SPP	Scottish Planning Policy
SRP	Soil Resource Plan
SSSI	Site of Special Scientific Interest
STAG	Scottish Transport Appraisal Guidance
SuDS	Sustainable Urban Drainage System
SWMP	Site Waste Management Plan
TRL	Transport Research Laboratory

Glossary of Abbreviations

TS	Transport Scotland
WHO	World Health Organisation

Table of Contents

1	Introduction	1
1.1	Background to the Scheme	1
1.2	Need for Environmental Impact Assessment	1
1.3	Scheme Location	2
1.4	Scheme Description	4
1.5	Environmental Impact Assessment Report Structure	4
1.6	Environmental Team	6
1.7	Review and Comments	10
2	The Scheme and Alternatives Considered	11
2.1	Introduction	11
2.2	No Development Alternative	11
2.3	Alternatives Considered at Stage 2 assessments	11
2.4	Stage 3 Design Development	18
3	Planning Policy	23
3.1	National Policy	23
3.2	Regional Policy	23
3.3	Local Policy	24
4	Environmental Impact Assessment Process and Method	25
4.1	Introduction	25
4.2	EIA Process	26
4.3	Environmental Assessment General Methodology	27
4.4	Structure of Technical Chapters	28
4.5	Cumulative Effects	31
5	Consultation	33
5.1	Introduction	33
5.2	Consultation	33
5.3	Methodology	33
5.4	Key Issues Raised by Consultees	34
6	Air Quality	41
6.1	Introduction	41
6.2	Policy and Legislative Background	42
6.3	Assessment Methodology	45
6.4	Baseline Conditions	56
6.5	Impact Assessment	63
6.6	Sensitivity Analysis	90
6.7	Greenhouse Gases	91
6.8	Mitigation	92
6.9	Residual Effects	95
6.10	Summary	96

7	Cultural Heritage	97
7.1	Introduction	97
7.2	Policy and Legislative Background	97
7.3	Methodology	100
7.4	Consultation Responses	104
7.5	Baseline Conditions	105
7.6	Impact Assessment.....	113
7.7	Impacts on Policy and Legislation	119
7.8	Recommended Mitigation Measures	120
7.9	Residual Effects	121
7.10	Limitations.....	121
7.11	Conclusions	121
8	Landscape	122
8.1	Introduction	122
8.2	Policy and Legislative Background	124
8.3	Methodology	128
8.4	Baseline Conditions	143
8.5	Impact Assessment.....	154
8.6	Summary of Residual Effects	180
8.7	Impacts on Policy and Legislation	183
8.8	Mitigation.....	185
8.9	Limitations.....	190
8.10	Summary.....	190
9	Noise and Vibration	192
9.1	Introduction	192
9.2	Policy and Legislative Background.....	192
9.3	Methodology	194
9.4	Baseline Conditions	203
9.5	Impact Assessment.....	204
9.6	Recommended Mitigation	211
9.7	Residual Impacts	213
9.8	Significance of Effect	213
9.9	Assumptions and Limitations	216
9.10	Impacts on Policy and Legislation	216
9.11	Conclusion	217
10	Nature Conservation and Biodiversity	219
10.1	Introduction	219
10.2	Policy and Legislation Background.....	219
10.3	Methodology	222
10.4	Consultation Responses	227
10.5	Baseline Conditions	228

10.6	Impact assessment.....	236
10.7	Mitigation Measures.....	241
10.8	Residual Effects.....	244
10.9	Limitations.....	246
10.10	Conclusion.....	246
11	Road Drainage and the Water Environment	247
11.1	Introduction.....	247
11.2	Policy and Legislative Background.....	247
11.3	Methodology.....	251
11.4	Baseline Conditions.....	262
11.5	Impact Assessment.....	271
11.6	Mitigation Measures.....	283
11.7	Residual Effects.....	285
11.8	Impacts on Policy and Legislation.....	285
11.9	Limitations and Assumptions.....	287
11.10	Conclusion.....	287
12	People and Communities.....	289
12.1	Introduction.....	289
12.2	Policy and Legislative Background.....	290
12.3	Methodology.....	292
12.4	Baseline Conditions.....	307
12.5	Impact Assessment.....	319
12.6	Impacts on Policy and Legislation.....	326
12.7	Mitigation Measures.....	328
12.8	Residual Effects.....	329
12.9	Limitations.....	330
12.10	Conclusion.....	330
13	Geology and Soils.....	331
13.1	Introduction.....	331
13.2	Policy and Legislative Background.....	331
13.3	Methodology.....	333
13.4	Baseline Conditions.....	342
13.5	Impact Assessment.....	350
13.6	Impacts on Policy and Legislation.....	360
13.7	Mitigation Measures.....	360
13.8	Residual Effects.....	362
13.9	Limitations.....	364
13.10	Conclusions.....	364
14	Materials	365
14.1	Introduction.....	365
14.2	Policy and Legislative Background.....	366

14.3	Methodology	369
14.4	Baseline Conditions	374
14.5	Impact Assessment.....	379
14.6	Impacts on Policy and Legislation	382
14.7	Mitigation Measures.....	383
14.8	Residual Effects	385
14.9	Limitations.....	386
14.10	Conclusions	387
15	Interactions and Cumulative Effects.....	388
15.1	Introduction	388
15.2	Methodology	389
15.3	Intra-project cumulative effects.....	391
15.4	Inter-project cumulative effects.....	392
16	Schedule of Environmental Commitments	398
16.1	Summary of Effects.....	398
16.2	Schedule of Environmental Commitments	402
16.3	Construction Mitigation	402
16.4	Operational Mitigation	406
17	Summary and Conclusions	409
18	References.....	411

Tables

Table 1-1: EIAR Authors 7

Table 4-1: Sensitivity Descriptors for Receptors 29

Table 4-2: Assigning magnitude of impact..... 30

Table 4-3: Significance of Effect Categories..... 31

Table 5-1 Summary of consultation responses 35

Table 6-1: Air quality legislation 42

Table 6-2: Objectives of the UK Air Quality Strategy..... 44

Table 6-3: Key representative receptors..... 49

Table 6-4: Local Air Quality Receptors Informing Scheme Significance 55

Table 6-5: NO₂ Monitoring Locations..... 57

Table 6-6: NO₂ Monitoring Results..... 58

Table 6-7: Pollutant Background Concentrations in Study Area..... 59

Table 6-8: Dust Emission Magnitude 64

Table 6-9: Sensitivity of the Area to Potential Impacts from Construction Dust 65

Table 6-10: Summary of Dust Risk 66

Table 6-11: 2023 Opening Year NO₂ Results..... 67

Table 6-12: 2023 Opening Year PM₁₀ Results..... 71

Table 6-13: 2023 Opening Year PM_{2.5} Results 74

Table 6-14: 2030 Future Year NO₂ Results 77

Table 6-15: 2030 Future Year PM₁₀ Results 80

Table 6-16: 2030 Future Year PM_{2.5} Results..... 84

Table 6-17: 2023 Summary of Significance Criteria 88

Table 6-18: 2030 Summary of Significance Criteria 89

Table 6-19: Predicted Regional Results for the Opening Year (2023) 89

Table 6-20: Predicted Regional Results for the Future Year (2030) 90

Table 6-21: Predicted Change in Total Greenhouse Gas Emissions..... 91

Table 6-22: Assessment of the scheme against policy 92

Table 7-1 Statutory and planning context..... 98

Table 7-2: Value of cultural heritage assets 102

Table 7-3: Magnitude of impact..... 103

Table 7-4: Significance of effect 104

Table 7-5: Archaeological remains within the study area..... 107

Table 7-6: Listed Buildings within the study area 108

Table 7-7: Undesignated historic buildings & structures within the study area 110

Table 7-8: Historic Land-use Assessment areas..... 110

Table 7-9: Value of archaeological assets..... 113

Table 7-10: Value of Listed Buildings 113

Table 7-11: Value of undesignated historic structures	114
Table 7-12: Value of HLA areas	114
Table 7-13: Significance of effects	118
Table 7-14: Compliance with legislation, policy and guidance.....	119
Table 8-1: Landscape susceptibility criteria.....	130
Table 8-2: Landscape value criteria	131
Table 8-3: Landscape sensitivity criteria	132
Table 8-4: Magnitude of effect – Landscape receptors.....	133
Table 8-5: Visual sensitivity criteria.....	135
Table 8-6: Magnitude of effect – visual receptors.....	137
Table 8-7: Landscape and visual significance of effect	138
Table 8-8: Significance categories	139
Table 8-9: Landscape and visual receptors significance of effects.....	141
Table 8-10: Summary of Landscape susceptibility, value and sensitivity	145
Table 8-11: Summary of Landscape susceptibility, value and sensitivity	146
Table 8-12: Summary of Landscape susceptibility, value and sensitivity	148
Table 8-13: Summary of Landscape susceptibility, value and sensitivity	149
Table 8-14: Residential receptors: baseline description.....	151
Table 8-15: Recreational receptors: baseline description.....	151
Table 8-16: Motorists and public transport users: baseline description	152
Table 8-17: Assessment locations and viewpoints used in the Stage 3 LVIA	153
Table 8-18: Summary of Construction Impacts LCT 24 costal Farm Ridges and Hills.....	156
Table 8-19: Summary of Construction Impacts LCT 35 Garvock and Glenbervie.....	156
Table 8-20: Summary of Construction Impacts Landscape fabric	157
Table 8-21: Summary of Construction Impacts Proposed development site	158
Table 8-22: Summary of Construction Impacts Viewpoint 1 West Burnside & Gardenston Street	160
Table 8-23: Summary of Construction Impacts Viewpoint 2 Core path Route 3 and minor road connecting the A937 (north of the A90) to the A90	161
Table 8-24: Summary of Construction Impacts Viewpoint 3 Core Path at Beattie Lodge.....	162
Table 8-25: Summary of Construction Impacts Viewpoint 4 Track leading to Johnston Mains Core path Route 2 / Frain Drive.....	162
Table 8-26: Summary of Construction Impacts Viewpoint 5 Oatyhill and A90.....	163
Table 8-27: Summary of Construction Impacts Viewpoint 6 A937 south of the A90	164
Table 8-28: Summary of Construction Impacts Viewpoint 7 B9120 on Kirkburn	164
Table 8-29: Summary of Construction Impacts Viewpoint 8 Private access on the A90 west bound	165
Table 8-30: Summary of Operation Impacts LCT 22 Broad Valley Lowlands – Aberdeenshire	167
Table 8-31: Summary of Operation Impacts LCT 35 Garvock and Glenbervie.....	168
Table 8-32: Summary of Operation Impacts Landscape fabric	169

Table 8-33: Summary of Operation Impacts Proposed development site	170
Table 8-34: Summary of Operation Landscape Impacts	171
Table 8-35: Summary of Operation Impacts Viewpoint 1 West Burnside & Gardenston Street	172
Table 8-36: Summary of Operation Impacts Viewpoint 2 Core path Route 3 and minor road connecting the A937 (north of the A90) to the A90	173
Table 8-37: Summary of Operation Impacts Viewpoint 3 Core Path at Beattie Lodge	174
Table 8-38: Summary of Operation Impacts Viewpoint 4 Track leading to Johnston Mains Core path Route 2 / Frain Drive	175
Table 8-39: Summary of Operation Impacts Viewpoint 5 Oatyhill and A90	176
Table 8-40: Summary of Operation Impacts Viewpoint 6 A937 south of the A90	177
Table 8-41: Summary of Operation Impacts Viewpoint 7 B9120 on Kirkburn	178
Table 8-42: Summary of Operation Impacts Viewpoint 8 Private access on the A90 west bound	179
Table 8-43: Summary of Operation Visual Impacts	180
Table 8-44: Summary of Impacts on Policies and Legislation	184
Table 9-1: Example threshold values for construction noise at dwellings in dB $L_{Aeq,T}$	196
Table 9-2: PPV Guidance Criteria – human perception	197
Table 9-3: Guidance Criteria – buildings	198
Table 9-4: Noise Model Parameters and Sources	198
Table 9-5: Classification of magnitude of noise impact in the short term and long term (Table 3.1 and 3.2 from HD 213/11)	200
Table 9-6: Significance of Effect Categories	201
Table 9-7: Summary of short term measured noise levels (free-field)	204
Table 9-8: Noise sensitive receptors within 600m of the scheme	204
Table 9-9: Threshold of the adverse effects at representative receptors for different time periods in L_{Aeq} , dB	205
Table 9-10: Expected plant to be used during Phase 1 to 3 of construction	206
Table 9-11: Predicted noise levels at each construction stage	206
Table 9-12: Short-term comparison for road traffic noise	207
Table 9-13: Short-term comparison for road noise at representative receptors in dB $L_{A10,18h}$	208
Table 9-14: Do-Minimum comparison for road traffic noise	208
Table 9-15: Long-term Do-Minimum comparison for road traffic noise at representative receptors in dB $L_{A10,18h}$	209
Table 9-16: Long-term Do-Something comparison road traffic noise	209
Table 9-17: Long-term Do-Something comparison for road traffic at representative receptors in dB $L_{A10,18h}$	210
Table 9-18: Traffic noise nuisance	210
Table 9-19: Potential effect of construction under BS 5228-1 Table E.1 at representative receptors – excavation, filling and compaction	214

Table 9-20: Potential effect of construction noise under BS 5228-1 Table E.1 and at representative receptors – carriageway surfacing.....	214
Table 9-21: Potential effect of construction noise under BS 5228-1 Table E.1 at representative receptor – footway paving.....	215
Table 9-22: Summary of impact assessment long-term (LT) and short-term (ST).....	215
Table 9-23: Impact on Legislation and Policy.....	216
Table 10-1: Summary of relevant nature conservation legislation and policy.....	220
Table 10-2: Ecological resource valuation criteria.....	225
Table 10-3: Significance of effects.....	227
Table 10-4: Consultee responses.....	227
Table 10-5: Statutory designated sites.....	228
Table 10-6: Summary of nature conservation value.....	233
Table 10-7: Effect significance of scheme on ecological receptors during construction.....	239
Table 10-8: Significance of effect on ecological receptors during operation.....	241
Table 10-9: Impacts on policies and legislation.....	245
Table 11-1 Statutory and planning review.....	248
Table 11-2 Criteria for assessing the sensitivity of the water environment.....	253
Table 11-3 Criteria for assessing impact magnitude.....	255
Table 11-4: Significance of effect matrix.....	258
Table 11-5: Type A Private Water Supplies (surface water) within 2km of study area.....	266
Table 11-6: Type B Private Water Supplies (surface water) within study area.....	267
Table 11-7: Type A private water supplies (groundwater) within wider area.....	268
Table 11-8: Type B private water supplies (groundwater) within the study area.....	269
Table 11-9: Significance of effect for construction phase.....	275
Table 11-10: Method A Assessment of pollution impacts from routine runoff on surface water results.....	277
Table 11-11: Method C Assessment of pollution impacts from routine runoff on groundwater.....	277
Table 11-12: Results of Method D Assessment of pollution impacts on spillages- surface water.....	279
Table 11-13: Results of Method D Assessment of pollution impacts for spillages- groundwater.....	280
Table 11-14: Significance of effects for operation phase.....	282
Table 11-15: Construction residual effects.....	285
Table 11-16: Impacts on policies and legislation.....	286
Table 12-1: Summary of relevant legislation and policy.....	290
Table 12-2: Sensitivity of receptors for use in the case of residential and community land.....	295
Table 12-3: Magnitude of impacts on community and residential land use.....	296
Table 12-4: Sensitivity of development land.....	296
Table 12-5: Magnitude of impacts on development land.....	297
Table 12-6: Sensitivity of agricultural land.....	298

Table 12-7: Magnitude of impact on agricultural land	299
Table 12-8: Criteria for assessing NMU route sensitivity	301
Table 12-9: Criteria for assessing magnitude of impacts on NMUs	302
Table 12-10: Journey amenity route sensitivity	303
Table 12-11: Journey amenity impact magnitude	304
Table 12-12: Sensitivity of views from the road	305
Table 12-13: Magnitude of impact on view from road.....	306
Table 12-14 Driver stress levels on dual carriageways	306
Table 12-15: Community assets	308
Table 12-16: Total NMU counts	314
Table 12-17: Receptor Sensitivity	318
Table 12-18: Impact of the scheme on policy	326
Table 13-1: Regulatory and policy framework.....	332
Table 13-2: Determination of geological receptor sensitivity.....	335
Table 13-3: Criteria for assessing magnitude of impacts	337
Table 13-4: Potential contaminated land sources	338
Table 13-5: Potential contaminated land receptors.....	338
Table 13-6: Determination of risk from contaminated land.....	339
Table 13-7 Classification of consequence	340
Table 13-8: Classification of probability	341
Table 13-9: Qualitative risk assessment	341
Table 13-10: Summary of ground conditions	344
Table 13-11 Contamination sources	349
Table 13-12 Summary of receptor sensitivities.....	349
Table 13-13 Earthworks quantities for the scheme	351
Table 13-14 Significance of effects during construction	352
Table 13-15: CSM for construction.....	353
Table 13-16: Significance of effects during operation	356
Table 13-17: Potential sources of contamination.....	356
Table 13-18: Summary of conceptual site model - Operation	358
Table 13-19: Impacts on policies and legislation	360
Table 13-20: Summary of residual effects – construction.....	363
Table 13-21: Residual significance of effects - operation.....	363
Table 14-1: Regulatory and policy framework.....	366
Table 14-2: Criteria for assessing importance/ sensitivity of a receptor	371
Table 14-3 Assessment criteria for magnitude of impact	372
Table 14-4: Scale of impact magnitude for materials	373
Table 14-5: Assessment criteria for significance of effect.....	374

Table 14-6: Descriptors of Effect Significance	374
Table 14-7: Nearest waste infrastructure	377
Table 14-8: Material quantities.....	378
Table 14-9 Waste quantities.....	379
Table 14-10: Summary of material volume and embodied carbon emissions.....	380
Table 14-11: Materials and waste impact assessment.....	381
Table 14-12: Impacts on policies and legislation	382
Table 14-13: Mitigation measures reporting matrix	385
Table 14-14 Summary of Residual Effects	386
Table 15-1: Determining significance of cumulative effects	389
Table 15-2: Summary of significant housing developments included in traffic model	390
Table 15-3: Planning applications approved since 1st January 2019.....	393
Table 15-4: Recent applications relating to development at Blackiemuir Avenue	394
Table 16-1: Summary of significant (moderate or above) residual operational environmental effects ...	399
Table 16-2: Summary of not significant (less than moderate) residual operational environmental effects.....	400

Photographs

Photo 7-1: Fields southwest of Laurencekirk, from NE.....	106
Photo 7-2: Fields north of Newton, from NW	106
Photo 7-3: West gates, Johnston Lodge, from SW.....	109
Photo 7-4: Beattie Lodge, from SW	109
Photo 7-5: Field, site for slip road, from SE	112
Photo 7-6 Gaugers Burn, from NW.....	112
Photo 11-1: Gaugers Burn looking north west from A937	263
Photo 11-2: Kirk Burn.....	264
Photo 11-3: Typical minor drainage channel present in the study area.	265
Photo 13-1: Superficial Mill of Forest till formation deposits.....	343
Photo 13-2: Agricultural land south-east of Laurencekirk showing class 3.2 field.....	347

Plates

Plate 1-1: Scheme Location	3
Plate 2-1: Stage 2 Option Ranking	17
Plate 6-1: 2017 Windrose for Inverbervie	53
Plate 6-2: NO ₂ concentrations covering the study area.....	61
Plate 6-3: NO _x concentrations covering the study area.....	61
Plate 6-4: PM ₁₀ concentrations covering the study area.....	62
Plate 6-5: PM _{2.5} concentrations covering the study area.....	62

Plate 6-6: 2023 Modelled NO ₂ Concentrations	69
Plate 6-7: 2023 Modelled NO ₂ Concentrations	70
Plate 6-8: 2023 Modelled NO ₂ Concentrations	70
Plate 6-9: 2023 Modelled PM ₁₀ Concentrations.....	72
Plate 6-10: 2023 Modelled PM ₁₀ Concentrations.....	73
Plate 6-11: 2023 Modelled PM ₁₀ Concentrations.....	73
Plate 6-12: 2023 Modelled PM _{2.5} Concentrations	75
Plate 6-13: 2023 Modelled PM _{2.5} Concentrations	76
Plate 6-14: 2023 Modelled PM _{2.5} Concentrations	76
Plate 6-15: 2030 Modelled NO ₂ Concentrations	79
Plate 6-16: 2030 Modelled NO ₂ Concentrations	79
Plate 6-17: 2030 Modelled NO ₂ Concentrations	80
Plate 6-18: 2030 Modelled PM ₁₀ Concentrations.....	83
Plate 6-19: 2030 Modelled PM ₁₀ Concentrations.....	83
Plate 6-20: 2030 Modelled PM ₁₀ Concentrations.....	84
Plate 6-21: 2030 Modelled PM _{2.5} Concentrations	86
Plate 6-22: 2030 Modelled PM _{2.5} Concentrations	87
Plate 6-23: 2030 Modelled PM _{2.5} Concentrations	87
Plate 7-1: OS map surveyed in 1862-64.....	111