



**METRO NORTH
ORAL HEARING**

**Stage 2A Preliminary Building
Response Report
Rev3_Part7_PartE**

Item	Utilities Drawing No.	Affected Utility / Utility Details	Owner	Approx. Chainage	
				From	To
371	MN-000-UC-7006	2 x 75mm	EIRCOM	17+405	17+405
372	MN-000-UC-7006	1Way 1 x lv	ESB	17+405	17+405
373	MN-000-UC-7006	1Way 1 x lv	ESB	17+435	17+435
374	MN-000-UC-7006	1Way 1 x lv	ESB	17+425	17+425
375	MN-000-UC-7006	1Way 1 x lv	ESB	17+425	17+425
376	MN-000-UC-7006	1Way 1 x lv	ESB	17+415	17+415
377	MN-000-UC-7006	Unknown	ESB	17+395	17+415
378	MN-000-UC-7006	Water Unknown	DCC	17+405	17+410
379	MN-000-UC-7006	Water 400mm 2005	DCC	17+395	17+455
380	MN-000-UC-7006	Unknown	ESB	17+395	17+485
381	MN-000-UC-7006	Water Unknown	DCC	17+405	17+455
382	MN-000-UC-7006	Unknown	BGE	17+312	17+555
383	MN-000-UC-7006	Drainage (Combined) 1050 x 620mm	DCC	17+385	17+435
384	MN-000-UC-7006	Water Unknown	DCC	17+405	17+455
385	MN-000-UC-7006	Unknown	ESB	17+405	17+465
386	MN-000-UC-7006	1Way 1 x lv	ESB	17+435	17+435
387	MN-000-UC-7006	12Way 4 x LV 3 x Tel 4 x Dead 1 x Unknown	ESB	17+475	17+495
388	MN-000-UC-7006	Traffic Ducting	DCC	17+310	17+535
389	MN-000-UC-7006	9 x 85mm	EIRCOM	17+345	17+455
390	MN-000-UC-7006	12 x 85mm	EIRCOM	17+345	17+455
391	MN-000-UC-7006	1 x 85mm	EIRCOM	17+455	17+455
392	MN-000-UC-7006	35 x 100mm	EIRCOM	17+455	17+455
393	MN-000-UC-7006	Water Unknown	DCC	17+455	17+455
394	MN-000-UC-7006	Unknown	BGE	17+475	17+485
395	MN-000-UC-7006	1Way 1 x lv	ESB	17+475	17+475
396	MN-000-UC-7006	2 x 50mm	EIRCOM	17+455	17+485
397	MN-000-UC-7006	Drainage (Combined) 910 x 490mm	DCC	17+435	17+525
398	MN-000-UC-7006	Unknown	ESB	17+465	17+545
399	MN-000-UC-7006	12 x 85	EIRCOM	17+455	17+475
400	MN-000-UC-7006	2 x 110	BT	17+455	17+535
401	MN-000-UC-7006	1 x 110	BT	17+445	17+445
402	MN-000-UC-7006	Water 450mm 2002	DCC	17+455	17+545
403	MN-000-UC-7006	6 Way 3 x LV/2 x mv/1 x Arc	ESB	17+425	17+495
404	MN-000-UC-7006	1 x 50mm 1 x 100mm 4 x 100mm	EIRCOM	17+455	17+465
405	MN-000-UC-7006	90 (4") 25m Bar	BGE	17+395	17+555
406	MN-000-UC-7006	Drainage Combined 1750 x 620mm	DCC	17+335	17+545
407	MN-000-UC-7006	180mm 2006	DCC	17+445	17+495
408	MN-000-UC-7006	250mm 2006	DCC	17+445	17+515
409	MN-000-UC-7006	1Way 1 x lv	ESB	17+495	17+555
410	MN-000-UC-7006	9 Way 7 x LV 1 x Arc 1 x Dead	ESB	17+535	17+555
411	MN-000-UC-7006	Unknown	ESB	17+535	17+555
412	MN-000-UC-7006	3 x 100mm	EIRCOM	17+455	17+555
413	MN-000-UC-7006	Water 250mm 2006	DCC	17+515	17+555

Item	Utilities Drawing No.	Affected Utility / Utility Details	Owner	Approx. Chainage	
				From	To
414	MN-000-UC-7006	Water Unknown	DCC	17+525	17+555
415	MN-000-UC-7006	42 x 100mm	EIRCOM	17+505	17+535
416	MN-000-UC-7006	Unknown	ESB	17+515	17+530
417	MN-000-UC-7006	4 x 100mm	EIRCOM	17+710	17+525
418	MN-000-UC-7006	90 (4") 25m Bar	BGE	17+395	17+535
419	MN-000-UC-7006	11Way 7 x LV 1 x Arc 2 x Tel 1 x Dead	ESB	17+505	17+535
420	MN-000-UC-7006	Water 250mm 2006	DCC	17+415	17+545
421	MN-000-UC-7006	1 x 75	EIRCOM	17+495	17+515
422	MN-000-UC-7006	4 x 100mm	EIRCOM	17+495	17+515
423	MN-000-UC-7006	1Way 1 x lv	ESB	17+505	17+505
424	MN-000-UC-7006	1Way 1 x lv	ESB	17+505	17+505
425	MN-000-UC-7006	1Way 1 x lv	ESB	17+495	17+495
426	MN-000-UC-7006	Unknown	ESB	17+495	17+505
427	MN-000-UC-7006	Drainage (Combined) 1800 x 640mm	DCC	17+545	17+555
428	MN-000-UC-7006	6 x 100mm	EIRCOM	17+545	17+555
429	MN-000-UC-7006	Drainage Combined	DCC	17+545	17+545
430	MN-000-UC-7006	Unknown	ESB	17+495	17+495
431	MN-000-UC-7006	1Way 1 x lv	ESB	17+495	17+495
432	MN-000-UC-7006	24 x 100mm	EIRCOM	17+505	17+505
433	MN-000-UC-7006	Unknown	ESB	17+495	17+505
434	MN-000-UC-7006	Unknown	ESB	17+495	17+505
435	MN-000-UC-7006	Unknown	ESB	17+495	17+495
436	MN-000-UC-7006	9 x 85mm	EIRCOM	17+455	17+545
437	MN-000-UC-7006	Unknown	EIRCOM	17+545	17+555
438	MN-000-UC-7006	Drainage Combined 2400 x 760mm	DCC	17+545	17+555
439	MN-000-UC-7006	Water Unknown	DCC	17+545	17+545
440	MN-000-UC-7006	Water Unknown	DCC	17+535	17+535
441	MN-000-UC-7006	Water Unknown	DCC	17+495	17+535
442	MN-000-UC-7006	Drainage Combined 910 x 490mm	DCC	17+435	17+525
443	MN-000-UC-7006	150 (10") 25m Bar	BGE	17+475	17+555
444	MN-000-UC-7006	Unknown	ESB	17+515	17+515
445	MN-000-UC-7006	Water 200mm	DCC	17+495	17+535
446	MN-000-UC-7006	4 x 100mm	EIRCOM	17+505	17+525
447	MN-000-UC-7006	1 x 50mm	EIRCOM	17+505	17+535
448	MN-000-UC-7006	Traffic Ducting	DCC	17+335	17+535
449	MN-000-UC-7006	Unknown	ESB	17+495	17+505
450	MN-000-UC-7006	1 x 50mm	EIRCOM	17+505	17+505
451	MN-000-UC-7006	2 x 50mm	EIRCOM	17+485	17+505
452	MN-000-UC-7006	1 x 50mm	EIRCOM	17+505	17+505
453	MN-000-UC-7006	1Way 1 x lv	ESB	17+505	17+505
454	MN-000-UC-7006	90 (4") 25m Bar	BGE	17+505	17+505
455	MN-000-UC-7006	24 x 100mm	EIRCOM	17+505	17+505
456	MN-000-UC-7006	Drainage Combined 790 x 485mm	DCC	17+505	17+505

Item	Utilities Drawing No.	Affected Utility / Utility Details	Owner	Approx. Chainage	
				From	To
457	MN-000-UC-7006	Water 150mm 1959	DCC	17+505	17+505
458	MN-000-UC-7006	Unknown	ESB	17+495	17+495
459	MN-000-UC-7006	1 x 100mm	EIRCOM	17+495	17+495
460	MN-000-UC-7006	6Way 6 x LV	ESB	17+495	17+495
461	MN-000-UC-7010	Unknown	ESB	18+240	18+250
462	MN-000-UC-7010	Unknown	ESB	18+240	18+245
463	MN-000-UC-7010	2Way 2 x LV	ESB	18+240	18+660

Appendix E Infrastructure Validation Data Sheets



CALCULATION SHEET

JACOBS

Project Title: Dublin Metro North		Sheet No: 1	
Subject: Assessment of DMN – induced settlements on Highways		Calc No: 1	
Job No: B0307000		File: Highways	
Made By: AL	Date: 18/01/09	Revised By:	Date:
Checked By: RL	Date: 18/01/09	Checked By:	Date:

Assessment of Settlements on Highways

INTRODUCTION

The objective of this calculation is to predict if the degree of tunnel induced ground movements adversely affect the ride quality and structural performance of adjacent highways. Highways considered in this analysis were selected based on the Stage 1 predicted settlement contour drawings

REFERENCES

Document/Drawing Ref	Rev	Title
B0307000-010\Geo.02\001	0	Design Input Statement for Predicting Ground Movements and the Response of Buildings, Infrastructure and Utilities Generated by Underground Excavation
B0307000-010\Geo.360\001\1	0	Technical Note 12 'Strategy for Assessing and Managing Building, Infrastructure and Utility Response to Ground Movements Generated by Underground Excavation'
BMN/0000/TU/2050	B02	Predicted Settlement Contours Malahide underpass.
BMN/0000/TU/2051	B02	Predicted Settlement Contours Fosterstown underpass.
BMN/0000/TU/3050	B02	Predicted Settlement Contours Dublin Airport Tunnel Sheet 1 of 2
BMN/0000/TU/3051	B02	Predicted Settlement Contours Dublin Airport Tunnel Sheet 2 of 2
BMN/0000/TU/5050	B02	Predicted Settlement Contours Northwood to South of Ballymun.
BMN/0000/TU/5051	B03	Predicted Settlement Contours South of Ballymun to South of DCU
BMN/0000/TU/6050	B03	Predicted Settlement Contours Griffith Avenue.
BMN/0000/TU/6051	B03	Predicted Settlement Contours South of Griffith Ave to Drumcondra.
BMN/0000/TU/6052	B02	Predicted Settlement Contours South of Drumcondra to South of Mater.
BMN/0000/TU/7050	B05	Predicted Settlement Contours South of Mater to O'Connell Bridge.
BMN/0000/TU/7051	B05	Predicted Settlement Contours South of O'Connell Bridge to St Stephen's Green.

Project Title: Dublin Metro North		Sheet No: 2	
Subject: Assessment of DMN – induced settlements on Highways		Calc No: 1	
Job No: B0307000		File: Highways	
Made By: AL	Date: 18/01/09	Revised By:	Date:
Checked By: RL	Date: 18/01/09	Checked By:	Date:

ANALYTICAL TOOLS

The following analytical tools were used in this analysis

- Microsoft Excel.

Verification of calculations has been undertaken using hand calculations for specific roads along the alignment.

METHODOLOGY

1. Quality of the Ride

Quality of the Ride has been determined according to the evaluation criteria of Jordan (1984) which relates the highway ride quality to the induced settlement. This method assesses the vertical radius of curvature over the area of pavement affected. Where the measure of vertical radius of curvature is used as a benchmark to measure performance in terms of excessive change in gradient, cross fall and / or road drainage inefficiency; consideration is then given to vertical acceleration experienced in road vehicles for particular traffic speeds. These accelerations have been correlated with acceptable ride quality criteria.

This method requires the identification of the length of the affected road and the maximum settlement values.

Due to the irregular distribution of the settlement contours across / along the highways assessment parameters have been based on the two contour lines that denoted the maximum gradient subjected to the highway.

The maximum acceptable settlement for the entire length of affected road was then calculated and compared against the maximum predicted value within the same sector. The result of this comparison is shown as acceptable or non acceptable in terms of ride quality in Appendix F, Table F.1.

2. Highways Risk Assessment

The highways risk assessment has been undertaken in conjunction with an experienced highways engineer and consideration has been given to particular features of the highway such as surfacing material, condition (determined during site walkover) and traffic levels/ usage.

The assessment complements the previous calculations by considering:

- Likelihood of 'ponding' occurring
- Requirement for temporary repair

CALCULATION SHEET

JACOBS

Project Title: Dublin Metro North		Sheet No: 3	
Subject: Assessment of DMN – induced settlements on Highways		Calc No: 1	
Job No: B0307000		File: Highways	
Made By: AL	Date: 18/01/09	Revised By:	Date:
Checked By: RL	Date: 18/01/09	Checked By:	Date:

- Requirement for permanent repair

An assessment of the temporary and permanent situations has also been undertaken for walkways.

ASSUMPTIONS

For the purposes of this assessment it has been assumed that the roads and highways are not rigid bodies and they deform to the Greenfield settlement contour lines. Furthermore, it is also assumed all highways and footpaths are in an optimal condition of serviceability and drainage.

1. Quality of the Ride Assumptions.

When the road is parallel to the contour curves the most representative or critical section of the road was selected at perpendicular to the contour lines.

2. Highways Risk Assessment Assumptions.

The Risk Assessment assumes that values of settlement of less than 5mm are within the serviceability limits of walkways.

Settlements of up to 50mm are considered permissible for carriageways and could be managed for temporary situations providing the ground slope is not greater than 1:500. Hence remedial works would be expected to be required on the cessation of significant ground movement to reinstate and make good road surfaces.

INPUT PARAMETERS

The parameters used for the assessment of highways are presented below.

1. Quality of the Ride Parameters.

- Chainage at start and end of the section considered.
- Maximum predicted settlement within the affected length.
- The length cross-section of the road under subsidence when it is parallel or almost to the axis of the DMN alignment.

2. Highways Risk Assessment Parameters.

- Nature of the road service
- Presence of Bus routes.
- Type of road surface material.

CALCULATION SHEET

JACOBS

Project Title: Dublin Metro North		Sheet No: 4	
Subject: Assessment of DMN – induced settlements on Highways		Calc No: 1	
Job No: B0307000		File: Highways	
Made By: AL	Date: 18/01/09	Revised By:	Date:
Checked By: RL	Date: 18/01/09	Checked By:	Date:

- Level of usage of the walkway.
- Type of walkway surface material.

OUTPUT

The results of the analysis are contained in Appendix F, Tables F.1 and F.2.

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