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AVIATION FUEL PIPELINE

Planning Application 2552/15
Further Information

Fingleton.ie

Client:	Independent Pipeline Company	**Client Ref:**	
Project Title:	Aviation Fuel Pipeline	**Project No.:**	0326
Subject:	PA 2552/15 Further Information	**Doc. No.:**	0362-RG-19
Prepared by:	Mary White	**21/08/2015**	Mary White
Reviewed by:	Michael Lennon	**21/08/2015**	M Lennon

Project

APPLICATION NO.	2552/15
REGISTRATION DATE:	08-Apr-2015
DECISION DATE:	02-Jun-2015
DECISION ORDER NO.	P1559
LOCATION:	Inlet Station: Team CV, Bond Drive, Dublin Port, Dublin 1 to Dublin Airport, Co. Dublin
PROPOSAL:	PROTECTED STRUCTURE: Permission for development of an aviation fuel pipeline from Dublin Port, Dublin 1 to Dublin Airport, Co Dublin. The route of the pipeline is from proposed inlet station at Team CV Ltd, Bond Drive, Dublin Port, Dublin 1 and via Bond Drive, Tolka Quay Road, East Wall Road, under the Tolka River, Alfie Byrne Road, Clontarf Road, Howth Road, Copeland Avenue, Malahide Road (R107) and R139 (formerly N32). (It then enters Fingal Co. Council administrative area at Clonshaugh Rd. and routes via AUL/FAI sports ground, under the M1 motorway via the DAA Long Term Red Carpark, adjacent to Eastlands Car Hire Compound, ALSAA complex, under the Swords Road R132 and via Corballis Road to a reception station at Dublin Airport, Co Dublin. A separate application is being lodged con-currently with Fingal County Council in respect of the development proposed in its administrative area). The development will consist of (a) single storey Control Building, pumps and ancillary pipework in a fenced compound at Bond Drive, Dublin Port, Dublin 1 (b) a 200mm diameter continuously welded steel pipeline, laid generally in the public road at a depth of circa 1.2m below surface level except where it will pass under the Tolka and Santry Rivers and culverted streams. The length of the pipeline in Dublin City Council administrative area will be circa 11.4 km (total length will be circa 14.4 km.) (c) 2no. above-ground control boxes associated with emergency shut-down valves on the pipeline, at the junction of the Malahide Road R107 and Donnycarney Road and on the R139 (formerly N32) east of the junction with Clonshaugh Road South. The pipeline will be laid in the roadway under the Clontarf Bridge which is a protected structure. An Environmental Impact Statement and Natura Impact Statement have been prepared in respect of the application and will be submitted with the planning application.
APPLICANT:	Fingleton White
APPLICATION TYPE:	Permission

1) Planning Authority notes that National Transport Authority (NTA) have concerns regarding the potential impacts of the proposal on a number of transport objectives in the NTA's Integrated Implementation Plan 2013-2018, including a proposed Bus Rapid Transit (BRT) line – Clongriffin to Tallaght which is proposed to run along the Malahide Road. The Malahide Road is also a potential route for future Light Rail Transport (LRT). In this regard the NTA request that the accommodation of the pipeline on the Malahide Road would need to demonstrate that the proposal does not conflict with, or compromise, the BRT scheme and other public transport planned for this route. The NTA request that 1.2 m cover to top of concrete casing be provided to allow for the BRT scheme and potential future LRT along the route.

In this regard the applicant is requested to submit revised drawings and details regarding how this requirement shall be achieved. The applicant shall liaise with the NTA prior to any formal response.

Response: The proposed BRT line coincides with the pipeline from the juction at Clarehall to the the junction of the Malahide Road and Copeland Avenue. The BRT will use articulated buses which will be subject to the same impacts as the existing buses during the 10 month construction period for this pipeline. Prior to construction a detailed
Traffic Management Plan, which will take account of pedestrians and all transport modes, including the BRT, will be submitted to Dublin City Council by Fingleton White. Following agreement the Plan will then be submitted by DCC to the NTA.

During discussions with the NTA Fingleton White advised that the pipe would not be encased in concrete. The NTA then requested that the cover from the road level to the top of the pipe be 1.5m. Fingleton White were subsequently informed by the NTA that 1.5m cover to the top of the pipe is required to remove the pipeline from the construction zone of any possible future light rail provision along the Malahide Road Corridor. Fingleton White are in agreement with this requirement.

Refer to Drawing No 0362/D/14/C/0006 in Appendix A which shows a typical cross section of pipeline trench with 1.5m cover.

It should be noted that a BRT along the Malahide Road is included in the Greater Dublin Area Draft Transport Strategy 2011 to 2030. However a future light rail along the Malahide Road is not included in the Strategy. If, prior to construction of the pipeline, a decision is made not to proceed with light rail transport on the Malahide Road, Fingleton White request that they be informed accordingly.
Refer to correspondence with the NTA in Appendix A.

2. The applicant is requested to address the concerns of the National Roads Authority(NRA) who are of the opinion that insufficient data has been submitted with the planning application to demonstrate that the proposed development will not have a detrimental impact on the capacity, safety or operational efficiency of the national road network in the vicinity of the site. The NRA advises that it remains seriously concerned that the applicant has not clearly demonstrated that its proposal would not reduce the structural safety, integrity and durability of the Tunnel and notes the following in relation to the EIS documentation submitted:

a) No reference/evidence is included in the Planning Application to demonstrate that the design of the Aviation Fuel Pipeline adheres to the specific requirements prescribed in the "Guidance notes for Developers in respect of the assessment of surface and sub-surface developments in the vicinity of the Dublin Port Tunnel". (See

also Appendix 9 of the 2011-2017 Development Plan. In particular the Authority would refer to:

i. minimum clearance requirements to the DPT

ii. surcharge loading on the Tunnel both during construction and when complete; and

iii. proposed sequencing of excavation works.

Response: Refer to report on the Assessment of Impact on the Dublin Tunnel in Appendix B

b) The application details that a proposed 200mm diameter Aviation Fuel Pipeline will run under the Alfie Byrne Road and will cross above the Dublin Port Tunnel adjacent to Fairview Park on the Eastern side of the railway line. At the point where the pipe crosses the tunnel, it is understood that the pipeline will be approximately 1.2m beneath the surface of the road, which will leave approximately 1.4m of clearance between the top of the pipeline and the tunnel roof.

Response: The clearance between the pipe and the crown of the tunnel varies from 0.67m to 0.98m. Refer to Drawing No 0362-D-07-C-0002 in Appendix B.

c) Contrary to what is stated in the EIS, "that the clearance of the Port Tunnel at the proposed crossing is adequate to take the proposed 200mm pipeline", the NRA note that the application fails to demonstrate that the development does not incur a surcharge loading on the tunnel in excess of 22.5kNm2 either during construction or at completion as prescribed in the"DPT Guidance notes for Developer".

Response: *The max surcharge loading at completion will be 3.66kN/$m^{2.}$ There will be an intermittent additional surcharge of 5.94kN/m^2 during construction. Refer to Appendix B.*

d) Evidence is also required by the NRA to demonstrate that the proposed works within Zones 1&2 (as prescribed in the "DPT Guidance notes for Developer") have been assessed by a qualified engineer with experience in the design of underground structures.

Response: The proposed works have been assessed by Noel Maher, Chartered Engineer who is responsible for leading the structural design on various energy projects carried out by Fingleton White. RPS Group have verified the assessment. Refer to Appendix B.

e) The NRA require further evidence to demonstrate that the method and sequencing of construction of the development minimises or eliminates the potential for tunnel deformation and will not be detrimental to the performance of the DPT lining.

Response: Refer to Appendix B.

f) It is queried by the NRA whether particular attention been made to the groundwater and hydro-geological conditions that may prevail in the vicinity of the tunnel? Any development sited in the vicinity of the tunnel has the potential to affect the groundwater regime.

Response: *This section of the pipeline is routed through made ground. The Dublin Tunnel as built drawings indicate that the water table level is at 1.0m OD which is considerably lower than the pipeline. In addition trail hole investigations, to a depth of 2m, carried out in*

Alfie Byrne Open Space close to the Tunnel crossing indicated no evidence of a water table. Refer to Appendix B.

g) The NRA notes that no details are presented with the application to identify the interaction of the Aviation Fuel Pipeline with any adjacent services. (i.e. clearance/proximity to adjacent Gas Pipeline).

Response: *Drg No 0362-D-7-C-002 in Appendix B has been revised to include the existing services, including gas mains, in the vicinity of the Tunnel Crossing.There are no proximity issues.*

h) Appropriate evidence is required by the NRA to confirm what standards/guidance documents has the proposed Aviation Fuel Pipeline been or will be designed to. The submission should contain details of the relevant national and international standards and should demonstrate compliance with these standards.

Response: The Irish governing standard for fuel pipelines is I.S. EN 14161:2011 - Petroleum and natural gas industries – Pipeline transportation systems (ISO 13623:2009 modified). This pipeline and associated facilities will, as required, be designed, built and operated in accordance with this standard. This standard makes reference to the additional specifications/standards required to design, construct and operates the pipeline.

The Design Basis Document 0362-RT-0002 submitted with the planning application demonstrates compliance with these standards and codes. The pipeline operation will be evaluated on an annual basis by an independent body acceptable to Dublin City Council and Fingal Council.

i) The NRA is not convinced that cognisance been given to the following technical issues/requirements, for the design the pipeline over the Tunnel:

i. No mechanical joints,

Response: There are no mechanical joints in the pipeline at the location of the Tunnel. It will be a fully welded pipeline

ii. Double containment

Response: The pipeline has been designed not to require double containment at any location. Double containment does not provide any appreciable additional protection and will have the potential to interfere with cathodic protection and hence the integrity of the pipe. For buried pipelines the increased risk of corrosion outweighs the benefits of double containment.

iii. Leak detection

Response: As set out in the Design Basis Report 0362-RT-002 two computational models are proposed for leak detection.

Negative Pressure Wave API Method B.5. Analysis of the pressure and flow measurements to detect negative pressure and rarefaction

Flow/Pressure Model API Method B.4. Analysis of flow and pressure measurements using signature recognition to detect an imbalance anomaly which would indicate a leak.

Flow/Pressure model will incorporate Mass Balance, Static Pressure (shut-in), and Leak Location functions. This system will detect any leak.

Fortnightly inspections will be carried out on the pipeline route. An operator will survey the route on foot to detect factors that could affect the safety and the operation of the pipeline. These inspections will focus on leaks and any third party activities along the route which may encroach on the pipeline.
In addition the fibre optic communications cable on top of the pipe will provide a means of detecting interference to the pipeline. Any disturbance to the pipeline will also break this cable which will automatically initiate an emergency shutdown of the pumps and closure of Section Isolation Valves.
Appendix B of the Safety and Environmental Report analyses the risk of a leak in the pipeline in the vicinity of the tunnel and states that the frequency of a leak, at I in $3.7x10^{-7} year^{-1}$*, is extremely low.*

iv. Corrosion protection.

Reponse: Section 5.2 of the Design Basis Report covers Cathodic Protection and states the following:
The pipe will have a 3 ply external coating in accordance with DIN 30670 with no internal coating. All welds shall be grit blasted on completion of x-ray and have 3 ply external shrink wrap sleeve applied.
An impressed current cathodic protection system with deep well anode groundbeds will be installed to prevent external corrosion of the pipe. This is to avoid and minimise sensitivity to stray currents e.g. as compared with a sacrificial anode system.
Deep well groundbeds rather than remote groundbeds will be employed to minimise the risk of interference with other buried services. There will be two groundbeds consisting of a borehole with silicon iron anodes and a mains powered transformer rectifier.
As the pipeline route is through an urban environment, major potential stray current interference proximities have been taken into account in the design of cathodic protection.

j) Whereas a schematic location drawing (ref: 0362-D-07-G-0005) is presented to advise the location of the proposed Aviation Fuel Pipeline, together with details of clearance to tunnel structure presented in drawing (ref: 0362-D-07-C-0002), the NRA note that no drawing presented gives the precise location to the chainage or superstructure locations of the Dublin Port Tunnel and adjacent services or utilities.

Response: It is assumed that the schematic drawing referred to is 0362-D-01-C-0005. Drawing No 0362-D-07-C--0002 has been revised to include the details above. Refer to Appendix B

3. It is also noted that the site is near a road scheme objective in the Development Plan for the proposed M50 Eastern bypass (and protection corridor for same). It is requested that this constraint be factored into the applicant's proposal and EIS.

Response: There is no constraint associated with the proposed M50 Eastern Bypass. In 2005 approximately 200m of pipeline was laid at the junction of Tolka Quay Road and East Wall road to facilitate the Port Tunnel and future road development in the area. Refer to Strip Map 05, Drg. No 0362/D/02/G/005 in Appendix D.

4. The Planning Authority notes that further detail on the criteria that will be used to assess whether noise monitoring is required and what exactly is meant by the phrase "ensure the site is operating without undue noise impact" (section 10.6) is required. The applicant's assessment already shows that the site will be causing significant

noise impacts when operational. It is recommended that further detail on the proposed absorbent screening to be used at the site boundary be provided. The applicant is requested to address the above.

Response: Refer to Appendix C

5. The Planning Authority notes that the submission does not highlight the crossing and importance of the North Dublin Drainage Scheme (NDDS) trunk sewer at Nazareth House on the Malahide Road and North Fringe Trunk sewer crossing along the R139 between Clonshaugh Road and the Northern Cross. The applicant is requested to address this issue.

Reponse: The crossing drawings at Nazareth House 0362-D-07-C-0011 and at two locations on the R139, 0362-D-07-C-0012 and 0362-D-07-C-013 are included in Appendix D. Open cut trenching will be used at these crossings on the R139. The Construction Plan submitted with the application sets out the methodology proposed from route proofing to close down of traffic management.

6. **The Planning Authority notes that the EIS does not make reference to the existence of hazardous or contaminated lands along the preferred route. It has also been alleged that some of the proposed route contains or had contained such waste. The applicant is requested to reflect this issue in the construction plan and EIS.**

Response: While there are records of contaminated lands in the vicinity of the pipeline there is no record of contaminated lands along the route of the pipeline. Not withstanding that, contaminated land has been included in Section 12.6 of the EIS as a possible construction impact and has been amended as indicated in bold below

*"12.6 Where contaminated material is encountered, it will be left in-situ while testing to determine its characteristics is carried out. The material will be covered to minimise rainfall ingress**/dust emissions**. The material will be excavated and transported by a permitted waste contractor to an appropriate facility for treatment or disposal. All contaminated materials encountered along the proposed scheme will be excavated, **temporarily stored, transported,** disposed of or recovered in accordance with the requirements of the Waste Management Act 1996 as amended4 and the Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.Run-off will be diverted, collected and removed off site for treatment and/or disposal **at an authorised facility".***

7. It is noted that under the previous An Bord Pleanala permission there were a number of conditions attached relating to protective measures including a requirement for the construction plan to account for the impact and interaction of power lines and other underground structures with the proposed cathodic protection design. The applicant is requested to assess the above measures in relation to current proposed measures.

Response: The proposed cathodic protection is included in Section 5.2 of the Design Basis Document 0362-RT-0002-R1 and states as follows;

An impressed current cathodic protection system with deep well anode groundbeds will be installed to prevent external corrosion of the pipe. This is to avoid and minimise sensitivity to stray currents e.g. as compared with a sacrificial anode system.

Deep well groundbeds rather than remote groundbeds will be employed to minimise the risk of interference with other buried services. There will be two groundbeds consisting of a borehole with silicon iron anodes and a mains powered transformer rectifier.

As the pipeline route is through an urban environment, major potential stray current interference proximities have been taken into account in the design of cathodic protection

Additional details are as follows,
One groundbed will be located near the Dublin Airport end of the pipeline and the second will be in the vicinity of Oscar Traynor Road. Anode groundbed locations will be chosen to ensure that there are no buried services within the anode field. No groundbeds will be installed near the Port end of the pipeline because this area has the concentration of proximities with other services and potential interference issues.
Cathodic Protection and Interference design co-operation and information exchange in accordance with IS EN 50162:2004 will be completed.

Pipeline Coating

The design objective is that the overall installed pipeline will have no detectable coating defects and a very high impedance to earth resulting in cathodic protection current density of less than 50 micro-amps per square meter.
Pipes will have a high quality factory applied PE (polyethylene) coating. Compatible and electrically comparable coating will be field applied at weld joints. The pipeline will be carefully protected against coating damage and an effective coating defect (“holiday detector”) detection will be completed immediately before laying and back-filling.
A DC Voltage Gradient (DCVG) close interval potential survey will be completed after installation and allowing for soil compaction and “settling” to detect any residual coating defects. Defects detected will be excavated and repaired.

Potential Interference Sources

The pipeline route is an urban environment and includes the following major potential stray current interference proximities that have been taken into account in the design of cathodic protection:

Iarnrod Eireann DART to Malahide.	*Separated grade crossing on Clontarf Road and parallel proximity along Alfie Byrne Road*
300mm BGE 19 Bar NG Pipeline.	*Crossing at Fairview Park. Closest point 20m.*
ESB 38kV Cables	*Crossing Alfie Byrne Road*

The design is based on 50μA/m^2 for deteriorated pipe, gives a requirement for 272mA, for a total pipe surface area of 5,449 m^2. The initial current requirement based on a well-insulated pipe should be approximately 1μA/m^2 requiring a total 5mA.

DART Electric Railway

A drainage current bond connection point will be installed at the proximity with the DART substation in Fairview Park to enable installation of a drainage bond if necessary after commissioning and completing interference tests vis-a-vis the electric railway.
Heightened coating defect detection will be applied within the part of the route that is within 250 meters proximity with the electrical railway.

Ground level accessible pipeline potential test connections, e.g. in surface junction boxes, will be installed at proximities of potential interference and at the ends of the parallel proximity.

Electrical Isolation at Fuel Terminals

The pipeline will be an isolated structure. Galvanic isolation will be installed between the fuel pipeline and above ground piping and equipment at both ends of the route. This is to minimise the risk of interference with equipment at Dublin Port or Dublin Airport. A proprietary pipeline insulation joint with approved surge arrester will be specified. Galvanic isolation will be installed between the pipeline and ESBN supply at the remote controlled block valve.

CORROSION AND INTERFERENCE TESTS

A specialist pipeline Cathodic Protection contractor, will be employed to provide corrosion protection installation services, coating quality supervision, DCVG close interval surveys, interference testing and interference mitigation if any is required. Our experience includes a track record on stray current interference measures for BGE gas pipelines in conjunction with DART specifically in and around Fairview Park.

CATHODIC PROTECTION MONITORING

Permanent pipe to soil potential measurement transmitters connected to telemetry / SCADA with continuous data logging will be installed at both ends of the pipeline and the intermediate block valves. These will be used to supervise the correct operation of the pipeline cathodic protection and will also detect intermittent or periodic interference is any. Corrosion monitoring coupons will be installed at the proximity with the electrified railway. Scheduled preventive maintenance 3 and 6 monthly interval transformer/rectifier and pipe/soil potential testing will also be carried out.

8. The applicant is requested to assess the need for additional Block Valves along the route with regard to the previous conditioned spacing by An Bord Pleanála and a 3rd party suggestion of an additional valve should be located between the currently proposed southern block valve uphill from East Wall Road. The applicant is requested to address the above.

*Response: Following the Grant of Permission from An Bord Pleanala a report, IPC/362/RP/1/052 was submitted by Fingleton White on 3rd December 2003 to Dublin City Council detaling how they would comply with the conditions. In relation to the condition to have Block Valve every 2.5km. Fingleton White subitted a report by the British Pipeline Association. In December 2002 BPA had carried out a design review which examined the area of block valves in particular. The report stated that block valves are added to a pipeline to limit the the amount of product released. They are usually placed at 16km intervals. They may be added at a lesser interval if it is felt that the risks to the environment warrant the installation of extra blocks. Fingleton White proposed that two block valves would be included in the pipeline.This was acceptable to Dublin City Council.
In this current proposal the pipeline wall thickness has been increased from 11.91mm to 12.7mm increasing the protection against third party risk.*

The installation of intermediate section isolation valves is not required for a pipeline of this length and also would not be typical practice on UK Aviation Fuel Pipelines, even on *pipelines with a larger diameter than 8" where potential volume loss is much greater per unit pipeline length.*

The main benefit of installing a block valve is to reduce the volume of product which may escape in the event of a pipeline leak / rupture

The additional leak paths (flanges, valve stems) which arise as a result of installing additional valve chambers must be considered.

In accordance with the governing code (IS EN14161) 'Section isolation valves should be installed at the beginning and end of a pipeline and where required for

- *Operation and maintenance;*
- *Control of emergencies;*
- *Limiting potential spill volumes.'*

	200mm Pipeline		Road Tanker Transport	
	No intermediate Section Isolation valve(s)	**Two intermediate Section Isolation valves at 4.5 and 11km**	**Projected 1500 Ml/yr**	**Max Capacity 2700 Ml/yr**
Total Failure Frequencies	1 in 5,130 years*	1 in 5,130 years*	1 in 57 years	1 in 32 years
Failure Frequencies (yr^{-1})	1.95×10^{-4}	1.95×10^{-4}	0.017	0.031
Average Spill Rate (litres/yr)	37	14	51.1	91.9
Maximum Spill size (litres)	278,702	103,128	38,000	38,000

* For breakdown in failure frequencies, see table below

Table 1 - Extract from AMEC Safety & Environmental Impact Evaluation

The maximum spill size of a pipeline with two Section Isolation Valves is less than 3 times that for a road tanker but the release frequency (all releases sizes) is approximately a factor of 90 times lower or 1 in 5,130 years.

In practice, it is likely that the leak would be identified before substantial volumes would be released. The leak should be detected by the on-line monitoring system but could also be identified by inspection and public observation. It is concluded that the optimum solution for transfer of aviation fuel is by pipeline with two section isolation valves. This has both a low likelihood of release and also limits the potential volume released.

The location of section isolation valves has to take into account not just topography but also ease of access, maintenance and security.

Given all these considerations, the locations selected by Fingleton White are on Malahide Road (R107)about 400m prior to the Wad river (4.5 km from Pumping Station) and again on Malahide Road (R139)approximately 500 m prior to crossing the Mayne River crossing (11 km from pumping Station). These two locations have enough space to safely accommodate the valve chamber.

The pipeline ascends between the docks and the airport approximately 50m AOD, and this is spread fairly evenly over the route but the isolation valves are near the top of the two longest steep inclines and approximately splits the route into three to minimise potential release volumes.

With regards to a third section isolation valve between the Port and the current first section isolation valve on the Malahide Road, the first section of the line undulates towards East Wall Road followed by a rise across Alfie Byrne road and down to its lowest point after which the pipeline profile rises continuously to the first section isolation valve.

These undulations in the pipeline profile mean that in the unlikely event of a pipeline rupture (1 in 5,130 years), on average 1/3 of the section contents would be released.

Any leaks would be identified by the on-line monitoring system and/or inspection and public observation.

A valve chamber is in itself a more likely source of a leak on a fluid pipeline due to the additional leak paths and greater potential for third party interference.

As stated in the AMEC Safety and Environmental Report submitted as part of the planning application; "The table B2 includes the releases in the valve chambers. It has been included as it demonstrates that although the inclusion of section valves has a strong benefit, there is also a small negative effect. The frequency of releases increases and this results in the average release volume per year increasing. However, as these additional releases are small, the average spill size is also much reduced."

This is demonstrated by the summary Table 2 below for the release volumes for various section isolation valve volumes. (Refer to Table 3 for detailed calculation)

	No Valves	1 Valve	2 Valves	3 Valves
Total Failure Frequencies YR	5130	3661	1321	1195
Failure Frequencies /yr	1.950E-04	2.7E-04	7.6E-04	8.4E-04
Average Spill Rate (L/yr)	37	31	44	57
Av Spill size (L)	193524	114597	58576	67551

Table 2 - Section Isolation Valve Comparison

Table 2 demonstrates that the inclusion of a third section isolation valve will have the effect of increasing the average spill size above that of two section isolation valves and also increasing the failure frequency.

Fingleton White considers that the appropriate number of section isolation valves have been selected taking cognisance of the applicable design standard, urban nature of the pipeline and the environmental sensitivities surrounding it.

Variable	Frequency (3) (/1000km years)	Release Rate (L/s) (1) Forward+Back	Back only	Time to detect (s)	Vol released before detection (L)	Leak at 0 - 1.8km: valve at 1.8 km (L)	Leak at 0 - 1.8km: valve at 4.5 km (L)	Vol released after detection: Leak at 1.8 - 4.5 km: valve at 4.5 km (L)	Leak at 1.8 - 4.5 km: valve at 11 km (L)	Leak at 4.5-11 km: valve at 4.5 km (L)	Leak at 4.5-11 km: valve at 11 km (L)	Leak at 11-14.4 km: valve at 4.5 km (L)	Leak at 11-14.4 km: valve at 11 km (L)	Total Volume Released: Release Volume per year (L / year): valve at 4.5 km (L)	Total Volume Released: valve at 11 km (L)
8in diameter pipeline at pressure of 40barg - Single Valve at Either 4.5 km or 11 km															
Distance						1.8	3	4.471	11.042	9.929	6.571	3.358	3.358		
Major)						50%	50%	50%	50%	50%	50%	50%	50%		
Percentage in section which drains (Minor)						50%	50%	50%	50%	25%	25%	50%	50%		
Leak rate per m of pipeline	(/ 1000 km years)														
Full bore rupture	0.0020	2008	1873	5	10041	28250	41920	70170	276426	208532	103128	52702	52702	4	4
Major leak	0.0049	187	187	30	5620	28250	41920	70170	276426	208532	103128	52702	52702	9	11
Minor leak	0.0066	19	19	180	3372	28250	41920	70170	276426	183319	51564	52702	52702	11	12
Leak frequency from valve	/ million years														
Major leak	0	187	187	30	5620			0	0	311660	0	0	52702	0	0
Minor leak	65	19	19	180	3372			0	0	234883	0	0	52702	15	4
Leak from flange	/ million years														
Major leak	0	187	187	30	5620			0	0	311660	0	0	52702	0	0
Minor leak	15	19	19	180	3372			0	0	234883	0	0	52702	4	1
TOTAL	0.000273	/ year										Release Vol. per year		44	31
										Av spill size				160840	114597

Variable	Frequency	Release Rate Forward+Back	Back only	Time to detect	Vol released before detection	Leak at 0 - 1.8km: valve at 1.8 km	valve at 4.5 km	Leak at 1.8 - 4.5 km		Leak at 4.5-11 km		Leak at 11-14.4 km		Total Volume Released	
Valves at both 4.5 km & 11 km															
Major)								50%		50%		50%			
Percentage in section which drains (Minor)								50%		25%		50%			
Leak rate per m of pipeline	(/ 1000 km years)														
Full bore rupture	0.0020	2008	1873	5	10041			70170		103128		52702		3	
Major leak	0.0049	187	187	30	5620			70170		103128		52702		6	
Minor leak	0.0066	19	19	180	3372			70170		51564		52702		6	
Leak frequency from valve	/ million years														
Major leak	0	187	187	30	5620			70170		103128		52702		0	
Minor leak	130	19	19	180	3372			70170		51564		52702		23	
Leak from flange	/ million years														
Major leak	0	187	187	30	5620			70170		103128		52702		0	
Minor leak	30	19	19	180	3372			70170		51564		52702		5	
Leak from thermal relief conn.	/ million years														
Major leak	41	187	187	30	5620									0	
Minor leak	363	19	19	180	3372									1	
TOTAL	0.000757	/ year										Release Vol. per year		44	
										Av spill size				58576	

Variable	Frequency (3) (/1000km years)	Release Rate (L/s) (1) Forward+Back	Back only	Time to detect (s)	Vol released before detection (L)	Leak at 0 - 1.8km: valve at 1.8 km (L)	Leak at 0 - 1.8km: valve at 4.5 km (L)	Vol released after detection: Leak at 1.8 - 4.5 km: valve at 4.5 km (L)	Leak at 1.8 - 4.5 km: valve at 11 km (L)	Leak at 4.5-11 km: valve at 4.5 km (L)	Leak at 4.5-11 km: valve at 11 km (L)	Leak at 11-14.4 km: valve at 4.5 km (L)	Leak at 11-14.4 km: valve at 11 km (L)	Total Volume Released: Release Volume per year (L / year): valve at 4.5 km (L)	Total Volume Released: valve at 11 km (L)
Valves at 1.8km, 4.5 km & 11 km															
Percentage in section which drains (FB / Major)						50%		50%		50%		50%			
Percentage in section which drains (Minor)						50%		50%		25%		50%			
Leak rate per m of pipeline	(/ 1000 km years)														
Full bore rupture	0.0020	2008	1873	5	10041	28250		41920		103128		52702		2	
Major leak	0.0049	187	187	30	5620	28250		41920		103128		52702		5	
Minor leak	0.0066	19	19	180	3372	28250		41920		51564		52702		5	
Leak frequency from valve	/ million years														
Major leak	0	187	187	30	5620	28250		41920		103128		52702		0	
Minor leak	195	19	19	180	3372	28250		41920		51564		52702		35	
Leak from flange	/ million years														
Major leak	0	187	187	30	5620	28250		41920		103128		52702		0	
Minor leak	45	19	19	180	3372	28250		41920		51564		52702		8	
Leak from thermal relief conn.	/ million years														
Major leak	41	187	187	30	5620									0	
Minor leak	363	19	19	180	3372									1	
TOTAL	0.000837	/ year										Release Vol. per year		57	
										Av spill size				67551	
NO VALVES															
Major)								50%		50%		50%			
Percentage in section which drains (Minor)								50%		25%		50%			
Leak rate per m of pipeline	(/ 1000 km years)														
Full bore rupture	0.0020	2008	1873	5	10041			278702		208532		52702		6	
Major leak	0.0049	187	187	30	5620			278702		208532		52702		14	
Minor leak	0.0066	19	19	180	3372			278702		183319		52702		18	
TOTAL	0.00019	/ year										Release Vol. per year		37	
										Av spill size				193524	

(1) Assume maximum forward flow (no back pressure on pump) is 135 L/s (50% increase on normal maximum flow rate). Pump rate at future maximum pressure (40barg).
(2) Assume volume in 14.4 km pipeline is 452,000 litres
(3) Assume pipeline is protected with concrete slabs and minimum depth of cover is 1.2 m
(4) Leak in km 0 - 4.5 section have backflow driven by 5 bar; km 4.5 - 11 by 1.5 bar, and km 11 - 14.4 by 0.5 bar (as liquid head above release reduces). This affects how quickly pipe will drain.
(5) Thermal relief only required if there are two block valves. After detection no loss occurs on assumption block valve closes.
(6) Block valve locations 1.8 km
4.471 km
11.042 km

Table 3 - Table B2 from AMEC Safety & Environmental Report extended to 3 section isolation valves

9. The applicant is requested to clarify estimated set backs from residential frontages along the route i.e. identify closest points and whether there is comparable internal best practice standard for such developments.

Response: As shown in the Route Selection Report there are 11 residences less than 5m from the pipeline.
There is a house on Copeland Avenue 4m from the pipeline, ref Strip Map 14, 10 houses in Artane, between 4- 5m from the pipeline ref Strip Map 18. All other occipied buildings are greater than 5m from the pipeline.
There is no hazardous proximity issue associated with this pipeline and there is no set back requirement. Set back proximity requirements are based on the Category of the Product and the material of the pipe. Category B product i.e. aviation fuel does not require any proximity whereas Category D product (termed hazardous) e.g. natural gas requires proximity to be taken into consideration in accordance with the relevant standards.

Product	***Pressure***	***Typical operating pressure***	***Applicable Standard***	***Minimum Proximity Distance to normally occupied buildings***
Natural Gas	*>16barg*	*19barg*	*IS328*	*3m for heavy wall pipe and <19barg (typical for an urban transmission line)*
Natural Gas	*<16barg*	*4barg*	*IS329*	*3-7m depending on pipe diameter and <5barg (typical of urban distribution line)*
Aviation Fuel	*40barg*		*I.S. EN 14161:2011*	*None required*

Table 4 – Proximity Requirements

10. The applicant is requested to consider providing a comparative risk study between the subject proposal and the recently constructed East Wall Road –Coolock gas line (as also noted by the NRA) and also any similar aviation fuel pipes with the UK etc.

IS EN 14161:2011 categorises the fluid being transported according to its hazard potential. As outlined in the design basis, Aviation Fuel is categorised as Category B substance. Natural gas would be categorised with a higher hazard potential as Category D.

Under IS EN 14161:2011, a category D substance has more stringent criteria to meet to comply with the code. These additional criteria are outlined mainly in Appendix B of the standard.

Routing of a category D type pipeline requires cognisance of the local population density in proximity to the pipeline and places increased requirements on radiography, pressure testing and pipe design factor (which affects pipe wall thickness).

Table 5 & Table 6 below outline the fluid classification and a comparison between a fuel pipeline and natural gas pipeline to IS EN 14161:2011.

It should be noted that onshore gas pipelines are excluded from IS EN 14161:2011 and would be designed in accordance with IS 318:2003 – Code of Practise for Gas Transmission Pipelines and Pipeline Installations, with which the aviation fuel pipeline design is also compared.

Table 6 also demonstrates that the proposed design meets or exceeds the design requirements for a pipeline containing a more hazardous substance, natural gas.

I.S. EN 14161:2011

EN 14161:2011 (E)

Table 1 — Classification of fluids with respect to potential hazard to public safety

Category A	Non-flammable, water-based fluids.
Category B	Flammable and/or toxic fluids that are liquids at ambient temperature and at atmospheric pressure conditions. Typical examples are oil and petroleum products. Methanol is an example of a flammable and toxic fluid.
Category C	Non-flammable fluids that are non-toxic gases at ambient temperature and atmospheric pressure conditions. Typical examples are nitrogen, carbon dioxide, argon and air.
Category D	Non-toxic, single-phase natural gas.
Category E	Flammable and/or toxic fluids that are gases at ambient temperature and atmospheric pressure conditions and are conveyed as gases and/or liquids. Typical examples are hydrogen, natural gas (not otherwise covered in category D), ethane, ethylene, liquefied petroleum gas (such as propane and butane), natural gas liquids, ammonia and chlorine.

Table 5 Classification of Fluids

There is an extensive hydrocarbon pipeline network in operation in the UK for many decades. . An overview of the extent of the network can be seen on http://www.linewatch.co.uk/pipeline_network.php

There are a number of those pipeline systems which transport Aviation fuel by pipeline to airports located densely populated areas such as Heathrow, Gatwick, London City and Manchester Airports. Available details of these pipelines are shown in Appendix D.

Any of these pipelines constructed in the past 10 years would have been designed in accordance with BS EN 14161 - Petroleum and natural gas industries. Pipeline transportation systems and supported in the design by PD 8010 - Code of Practise for pipelines.

Prior to this fuel pipelines would have been designed in accordance with BS 8010. The development of the current standard EN 14161 (ISO 13623 modified) was based on BS 8010.

The developer of this pipeline is required to comply with EN14161 the European Standard. This European Standard was approved by CEN, European Committee for Standardization, in June 2011 and adopted, without alteration, as an Irish Standard IS EN 14161 in July 2011. CEN members, which include Ireland, are bound to comply with this standard. This also applies in the UK.

	Minimum Design requirement acc. to IS EN 14161:2011		Gas Pipeline Design acc. to IS 328:2003 – Code of Practise for Gas Transmission Pipelines	Current Aviation Fuel Pipeline Design acc. to IS EN 14161:2011	Design meets or exceeds pipeline requirements
	Aviation Fuel	Natural Gas	Natural Gas		
Fluid	Jet A1 (Kerosene)	Natural Gas	Natural Gas	Jet A1 (Kerosene)	n/a
Section 5.2 – Fluid Category	B	D	n/a	B	n/a
Section 6.2.1.2 – Safety Evaluation	Not required	Required in locations where multi-storey buildings are prevalent, where traffic is heavy or dense, and where there can be numerous other utilities underground	n/a however Environmental report & safety report generally prepared as part of design process	Provided - Refer to AMEC Safety and Environmental Impact Evaluation	Yes
Table 2 – Hoop Stress Design Factor	0.67	0.45 & 0.55	0.3	0.18	Yes, exceeds
Section 6.7 – Pressure Test Requirements Appendix B.6 – Pressure Test Requirements0	hydrostatically strength tested to 1.25 x MAOP (1.25 times Maximum Allowable Operating Pressure) for 1 hour followed by a leak test at 1.1 X MAOP for 8 hours	hydrostatically strength tested to 1.4 x MAOP (1.4 times Maximum Allowable Operating Pressure) for 1 hour followed by a leak test at 1.1 X MAOP for 8 hours	1.5 x MAOP for a duration of 24 hours.	1.5 x MAOP (i.e. 60 barg) for a duration of 24 hours.	Yes, exceeds

Section 7.6 - Buildings	n/a	n/a	n/a	n/a	n/a
Section 10.4 – Welding & Joining	All welds visually examined and 100% non-destructive examination of welds on pipeline within populated areas	All welds visually examined and 100% non-destructive examination of welds where hoop stresses >= 50% SYMS	All welds visually examined and 100% non-destructive examination of welds	All welds visually examined and 100% non-destructive examination of welds	Yes
Appendix B.2 – Location Class	n/a	Location class 4 & 5	Type S area - > 2.5 persons per hectare	n/a	n/a
Appendix B – Table B.2 Hoop Stress Design Factor	n/a	0.55 & 0.45	0.3	0.18	Yes, exceeds

Table 6 - Comparison Table

Ignition Temperatures

Product	Flash Point Temp	Auto-ignition Temp	Energy Content	LFL	UFL
Aviation Fuel	>38 degC	220 degC	34.7MJ/L	0.7	5
Natural Gas	-188 degC	537 degC	36.4 MJ/SCM	5	15

Table 7 - Ignition Temperatures

Auto Ignition Temperature
The Auto-Ignition Temperature - or the minimum temperature required to ignite a gas or vapour in air without a spark or flame being present.

Flash Point
The flash point of a volatile material is the lowest temperature at which it can vaporize to form an ignitable mixture in air.
Flash point requires an ignition source. At the flash point, the vapour may cease to burn when the ignition source is removed.

LFL & UFL
The minimum concentration of a particular combustible gas or vapour necessary to support its combustion in air is defined as the Lower Flammable Limit (LFL) for that gas. Below this level, the mixture is too “lean” to burn. The maximum concentration of a gas or vapour that will burn in air is defined as the Upper Flammable Limit (UFL). Above this level, the mixture is too “rich” to burn.
The range between the LFL and UFL is known as the flammable range for that gas or vapour.

Natural Gas Leak:
A leak on a natural gas pipeline requires an ignition source. This could potentially be any ignition source in the vicinity of a leak, i.e. electrical switch, cigarette butt, street lighting etc. As the flash point is well below 0^0C, ignition can take place at atmospheric temperature, i.e. 15^0C

Jet A1 Leak:
A leak on an aviation fuel pipeline requires the input of heat to raise the temperature of the fluid above 38^0C (Flash Point) prior to being able to ignite the fluid with an ignition source present. Unlike natural gas, an ignition event would not take place at atmospheric temperatures even with an ignition source present.

BPA Operated Pipelines

- BPA Pipeline
- Terminal
- Refinery

#	Route	Approx. Operating Pressure	Pipeline (NB=Nominal Bore)
1	Stanlow - Kingsbury	1200psi	Multiproducts 10" NB (250mm)
2	Kingsbury - Buncefield Kingsbury - Buncefield	1200psi 1200psi	Multiproducts 12" NB (300mm) Multiproducts 10" NB (250mm)
3	Buncefield - Thames	1200psi	Multiproducts 14" NB (350mm)
4	Buncefield - Heathrow Buncefield - Heathrow	1200psi 1200psi	Multiproducts 8" NB (200mm) Multiproducts 6" NB (150mm)
5	Heathrow - Walton	1300psi	Multiproducts 10" NB (250mm)
6	Walton - Gatwick	1300psi	Multiproducts 10" NB (250mm)
7	Walton - Heathrow Walton - Heathrow	720psi 720psi	Multiproducts 6" NB (150mm) Multiproducts 10" NB (250mm)
8	Bacton - North Walsham	720psi	Gas Condensates 6" NBA (150mm)
9	Bacton - Great Yarmouth	1100psi	Natural Gas 12" NB (300mm)*
10	Point of Ayr - Connahs Quay	640psi	Natural Gas 24" NB (600mm)*

*Addtional safety precautions apply to these high pressured gas pipelines. Please consult BPA.

In an emergency contact:

0800 585 387 (BPA)

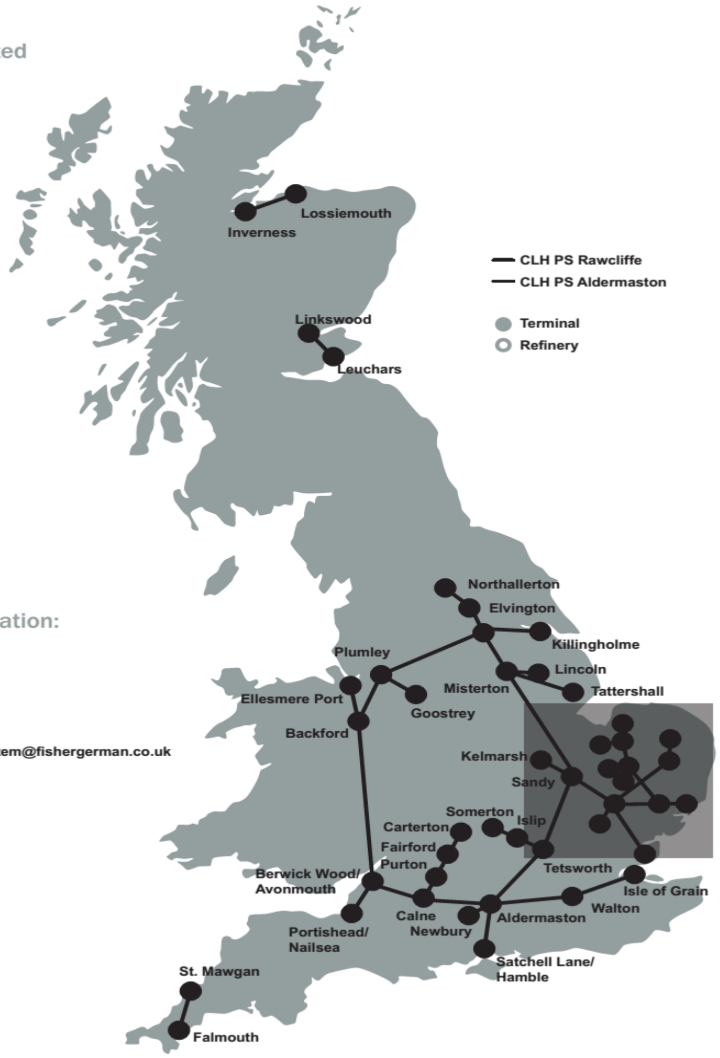
Agent:

Land and Wayleaves Department
BPA
5-7 Alexandra Road
Hemel Hempstead
Hertfordshire HP2 5BS

Tel: 01442 242200
Fax: 01442 214077
Email: reception@bpa.co.uk

Figure 1 - BPA Operated Pipelines

CLH PS Operated Pipelines



CLH PS

General Information:

CLH PS
PO Box 7273
Ashby de la Zouch
LE65 2BY

Tel: 0845 070 1245
Fax: 0845 070 1250
Email: CLHPipelinesystem@fishergerman.co.uk

In an emergency contact:

– North 01405 839 212 (Rawcliffe)
– South 0118 971 2021 (Aldermaston)

#	Route	Approx. Operating Pressure	Pipeline (NB=Nominal Bore)
1	Backford - Rawcliffe	1100psi	Multiproducts 10/12" NB (250/300mm)
2	Rawcliffe - Killingholme	1100psi	Multiproducts 12" NB (300mm)
3	Rawcliffe - Sandy	725psi	Multiproducts 6/8" NB (150/200mm)
4	Sandy - Saffron Walden	725psi	Multiproducts 8" NB (200mm)
5	Saffron Walden - Hethersett	725psi	Multiproducts 8" NB (200mm)
6	Saffron Walden - Claydon	1200psi	Multiproducts 8" NB (200mm)
7	Saffron Walden - Thames	1200psi	Multiproducts 10" NB (250mm)
8	Sandy - Aldermaston	725psi	Multiproducts 8" NB (200mm)
9	Aldermaston - Satchell Lane	725psi	Multiproducts 8" NB (200mm)
10	Satchell Lane - Hamble	725psi	Multiproducts 8" NB (200mm)
11	Aldermaston - Walton	725psi	Multiproducts 8/10" NB (200/250mm)
12	Walton - Isle of Grain	725psi	Multiproducts 8" NB (200mm)
13	Aldermaston - Berwick Wood	725psi	Multiproducts 8/10" NB (200/250mm)
14	Berwick Wood - Backford	725psi	Multiproducts 10" NB (250mm)
15	Falmouth - St Mawgan	1100psi	Multiproducts 8" NB (200mm)
16	Inverness - Lossiemouth	1100psi	Multiproducts 8" NB (200mm)
17	Calne - Fairford/Carterton	1100psi	Multiproducts 6" and 10" NB
18	Rawcliffe - Elvington/Northallerton	725psi	Multiproducts 8" NB (200mm)
19	Misterton - Lincoln/Tattershall	725psi	Multiproducts 8" NB (200mm)
20	Claydon - Thetford	1200psi	Multiproducts 8" NB (200mm)
21	Claydon - Woodbridge/Tunstall	725psi	6" NB (150mm)
22	Hethersett - Buxton	725psi	6" NB (150mm)
23	Thetford - Ingham/Barton Mills	725psi	6/8" NB (150/200mm)
24	Tetsworth - Islip/Somerton	725psi	6/8" NB (150/200mm)
25	Backford - Bromborough/Ellesmere	725psi	10" NB (250mm)
26	Berwick Wood - Portishead/Nailsea	725psi	16" NB (300mm)
27	Linkswood - Leuchars	232psi	6" NB (150mm)
28	Sandy - Kelmarsh	725psi	8" NB (200mm)
29	Thetford - Shouldham/Tattersett	725psi	8" NB (200mm)
30	Saffron Walden - Stansted	1100psi	6" NB (150mm)
31	Aldermaston - Newbury	725psi	6" NB (150mm)
32	Plumley - Goostrey	450psi	10" NB (250mm)

Figure 2 - CLH (formerly GPSS) Operated Pipelines

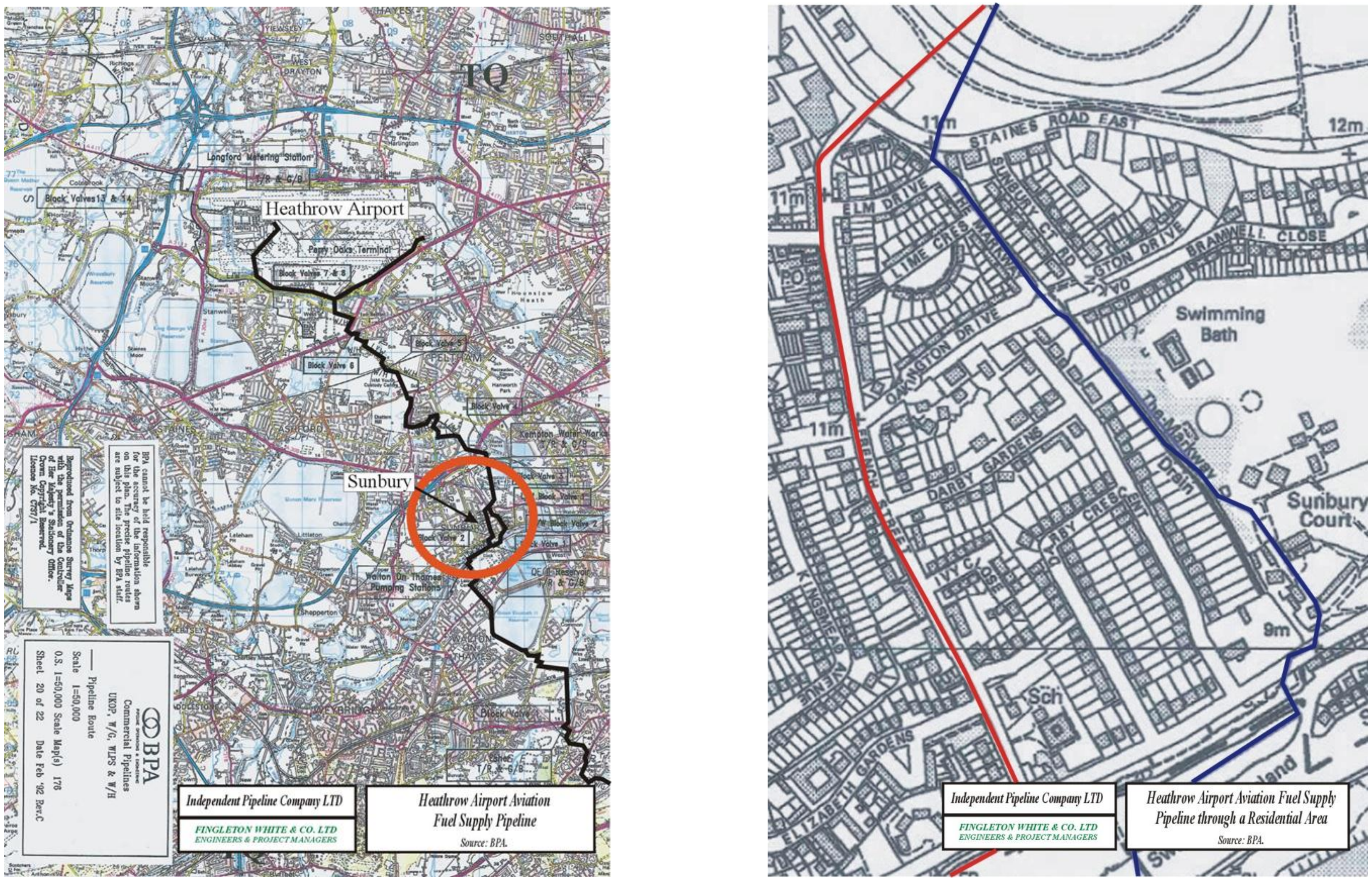


Figure 3 – Fuel Pipeline Supply to Heathrow

11. Further to the requests above the applicant is requested to clarify and or update the EIS as follows:

a) To note that a small portion of open space lands are traversed near the Tolka Bridge.

Response: The pipeline traverses a passive open space at the junction of Alfie Byrne Road and East Wall, Road, south west of the Tolka River for a distance of 15m. It also traverses a triangular passive open space, part of the Alfie Byrne Open Space, north west of the Tolka River for 6m. Both these open spaces are shown on Strip Map 08, drawing no 0362/D/02/G/008.

b) To reflect latest published airport travel figures and any related projections for Dublin Airport.

Response: The DAA Annual Report 2014 states that there were 21.7 million passengers in 2014. The DAA do not publish projected passenger figures.

The Commission for Aviation Regulation publishes projected passenger figures.

The following information is available in the CAR Maximum Level of Airport Charges at Dublin Airport, 2014 Determination:

4. Passenger Forecasts.

Table 4.1:

	2013	2014	2015	2016	2017	2018	2019
Passengers (m)	20.2	21.5	22.1	22.7	23.4	24.1	24.8
Annual Change (%)		6.6	2.8	2.9	2.9	2.9	2.9

Source: 2013 DAA outturns, 2014-2019 CAR forecasts.

We forecast that passenger numbers will grow steadily from 21.5m in 2014 to 24.8m in 2019, a compound annual growth of 2.9%

In the Design Basis 0362-RT-0002-R1 submitted with the application the annual growth rate for fuel demand is 3.5%. As stated this pipeline will meet the fuel demand in Dublin Airport well beyond 2035.

c) To indicate any net jobs benefit between jobs created by the proposal and potential loss of jobs from reduced road tanker transportation of aviation fuel etc.

Response:There will be no jobs losbs.t. There are approximately 20 tanker drivers employed to deliver fuel from Dublin Port to Dublin Airport. There is currently a shortage of driipeline will result in increased efficienvers in Ireland so there is scope to redeploy these drivers.There will be 100 construction jobs.The operation of the pipeline will result in increased efficiencies for Dublin Airport which will contribute to more business and more airport related jobs.

d) Details and profile of current road tanker transportation in relation to traffic flows across the day i.e. does the majority of movements take place after the evening rush hour etc.

Response: The current operational demands for fuel at Dublin Airport requires 24hr deliveries. Tanker deliveries take place throughout the day and night.

e) To clarify the level of any operational emissions from pumping activity.

Response: There will be no emissions on site from the pumping activity.

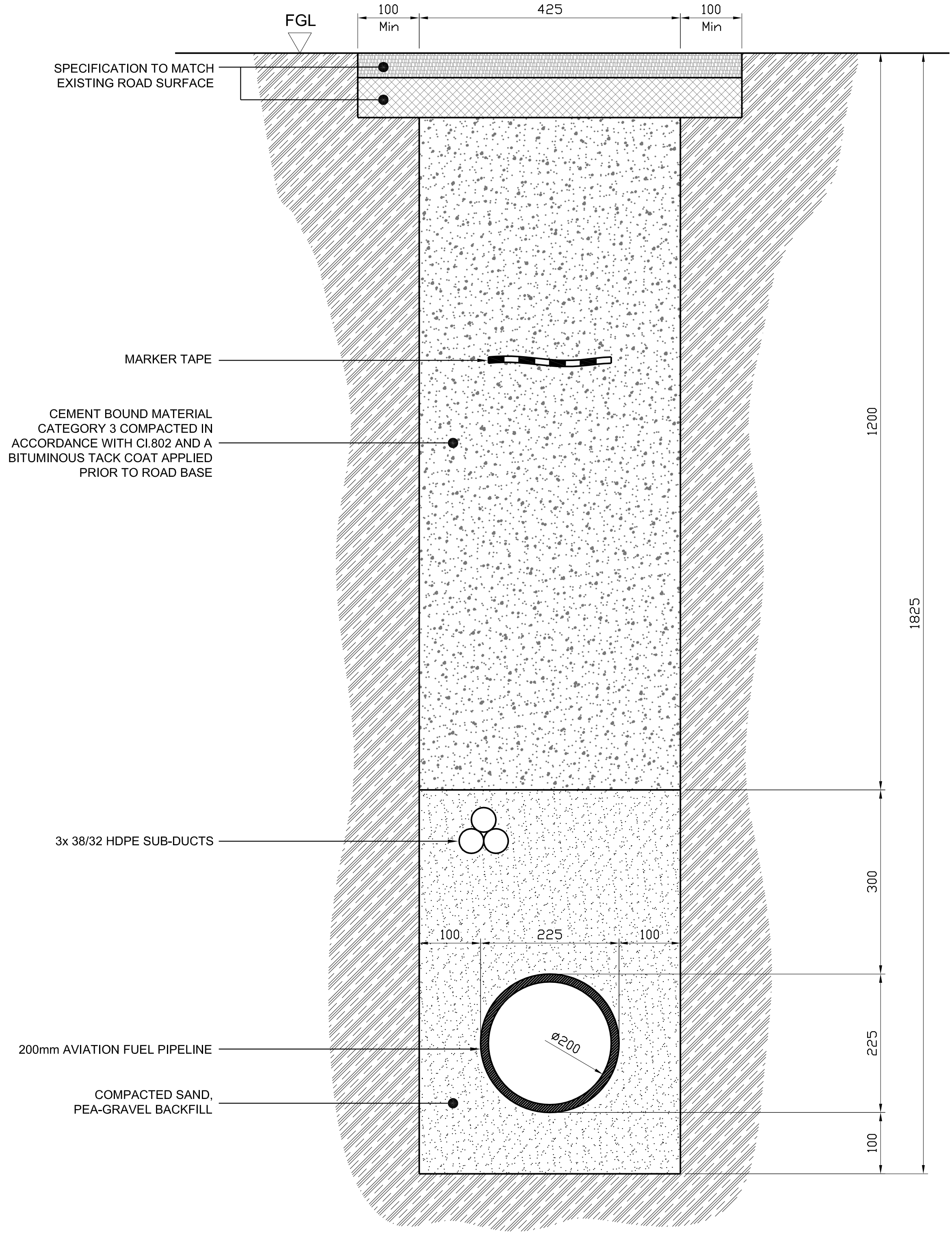
f) Correct Section 9 chapter of the main EIS Volume in terms of the header misreference to 'Section 8'.

Response: The header is incorrect. However it could not be considered to have had a material impact on the understanding of the EIS.

g) Reprint page 36 of the main EIS volume

Response: Included in Appendix E

Appendix A



TYPICAL CROSS SECTION OF PIPELINE TRENCH

NOTES:

1. All Clause References are to the N.R.A. Specifications for Roadworks.

REV	REVISION	REV.BY	A	B	C
0	PLANNING ISSUE	RMD 10/07/15	NM 10/07/15	MW 10/07/15	ML 10/07/15

APPROVED

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T:(00353)(0)57 866 5400
www.fingleton.ie

On Behalf of: INDEPENDENT PIPELINE Co. Ltd.

Project: AVIATION FUEL PIPELINE

APPROVALS
A ENGINEER
B PROJECT MANAGER
C PROJECT DIRECTOR

TYPICAL CROSS SECTION OF PIPELINE TRENCH; ADDITIONAL COVER ALONG MALAHIDE RD (R107)

Scale	Status	Drawing Number	Sheet
1:10/A4	DRAFT	0362/D/14/C/0006	1 Of 1

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Mr Hugh Creegan,
Director of Transport Investment and Taxi Regulation,
National Transport Authority,
Harcourt Lane,
Dublin, 2

17 June 2015

Dear Mr Creegan,

Re: Aviation Fuel Pipeline – PA 2552/15 - Further Information

The Dublin City Council request for Further Information for the above project includes the following item,

"1. The Planning Authority notes that National Transport Authority (NTA) have concerns regarding the potential impacts of the proposal on a number of transport objectives in the NTA's Integrated Implementation Plan 2013-2018, including a proposed Bus Rapid Transit (BRT) line – Clongriffin to Tallaght which is proposed to run along the Malahide Road. The Malahide Road is also a potential route for future Light Rail Transport (LRT). In this regard the NTA request that the accommodation of the pipeline on the Malahide Road would need to demonstrate that the proposal does not conflict with, or compromise, the BRT scheme and other public transport planned for this route. The NTA request that 1.2 m cover to top of concrete casing be provided to allow for the BRT scheme and potential future LRT along the route.

In this regard the applicant is requested to submit revised drawings and details regarding how this requirement shall be achieved. The applicant shall liaise with the NTA prior to any formal response."

I have had discussions with Owen Shinkwin, NTA and he has clarified the following two points,

- Prior to construction the detailed Traffic Management Plan, which will take account of pedestrians and all transport modes, including the BRT, will be submitted to Dublin City Council by the developer. Following agreement the Plan will then be submitted by DCC to the NTA.

Response: Fingleton White understands that there will be no requirement for the Developer to liaise directly with the NTA.

Status: Confirmation of the above from the NTA.

- The NTA request that 1.2m cover to the top of the pipe be increased to 1.5m along the Malahide Road.

Fingleton White & Co. Ltd., Bridge Street Centre, Portlaoise, Co. Laois, Ireland, Registered No: 86002
Directors: J.Fingleton, M. White, M. Lennon, F.O'Mahony

Response: The minimum cover requirement for a pipeline designed, constructed and operated according to ISEN 14161; 2011 petroleum and natural gas industries-Pipeline transportation systems (ISO 13623:2009 modified) is 1.2 m for roads and railways. Refer to Section 6.8.2 Table 5.

The Pipeline Design Factor determines the maximum allowable operating stress in the pipeline. This is normally specified as a percentage of Specified Minimum Yield Strength (SMYS) of the pipe. In accordance with Section 6.4.2.2 Table 2 of ISEN 14161 the design factor for this pipeline should not exceed 0.67 (i.e. 67% of SMYS) i.e. major roads and railways. The actual design factor which this pipeline will experience under maximum operating conditions is 0.18 or 18% of pipe SMYS.

The increased wall thickness of 12.7mm provides impact protection from external sources. This pipeline does not need any additional protection.

Status: Confirmation from the NTA that, given the design details set out above, 1.5m cover would not be required in this instance.

I trust that the above is satisfactory and I look forward to hearing from you.

Yours sincerely,

Mary White

Údarás
Náisiúnta Iompair
National Transport Authority

Dún Scéine, Cúirt Uíbh Eachach,
Lána Fhearchair, Baile Átha Cliath 2

Dún Scéine, Iveagh Court,
Harcourt Lane, Dublin 2

t 01 879 8300
f 01 879 8333

info@nationaltransport.ie
www.nationaltransport.ie

Mary White,
Fingleton White,
Bridge Street Centre,
Portlaoise,
Co. Laois.

RECEIVED 10 JUL 2015

6th July 2015

Re: Aviation Fuel Pipeline – PA 2552/15 - Further Information

Dear Ms. White,

I refer to your letter of 17th June 2015 in relation to the further information request issued by the planning authority and specifically the item regarding the depth of the pipeline under the road carriageway of Malahide Road.

I note the confirmation in your letter that the pipeline has been designed not to require any additional protection in terms of additional depth. However, the rationale for the request that the top of the pipe itself be placed at a depth of 1.5 metres is to remove the pipeline from the construction zone of any possible future light rail provision along the Malahide Road corridor.

The construction zone under the tracks of a light rail system extends to 1.2metres in depth. Accordingly, it is desirable that the fuel aviation pipeline be located such that the top of the specified granular surround to the pipeline be located at the base of the 1.2 metre light rail construction zone, or that the actual pipeline is located 300mm below the light rail construction zone.

Accordingly, it is requested that the current 1.2m cover to the top of the pipe be increased to 1.5m along the Malahide Road, to cater for the potential of a light rail scheme being routed along Malahide Road in the future. It should be noted that this additional depth does not preclude the aviation pipeline, if constructed, from being relocated in the event of a future light rail scheme along this corridor, but it does provide the possibility that it may be retained without modification if constructed at the suggested revised depth.

I trust that the above clarifies the position.

Yours sincerely,

Hugh Creegan,
Director of Transport Investment and Taxi Regulation.

Pauline O'Brien

From: Owen Shinkwin <owen.shinkwin@nationaltransport.ie>
Sent: 24 July 2015 17:44
To: Mary White
Subject: RE: 0362 Aviation Fuel Pipeline - Additional Information

Dear Ms. White,

Further to Hugh Creegan's letter to you, dated 6th July, I can confirm that the Authority is satisfied that, as detailed in your letter dated 17th June, there will be no requirement for the developer to liaise directly with the NTA, in regards to the traffic management plan to be submitted to Dublin City Council prior to construction.

Regards,

Owen Shinkwin

From: Mary White [mailto:Mary.White@fingleton.ie]
Sent: 17 June 2015 16:06
To: Hugh Creegan
Cc: Owen Shinkwin
Subject: 0362 Aviation Fuel Pipeline - Additional Information

Good afternoon Mr. Creegan,

I have attached a letter for your attention.

Regards,

Mary White.

Fingleton White

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Portlaoise	Mobile +353 87 6750424
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Ireland	Web: www.fingleton.ie

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Tá eolas sa teachtaireacht leictreonach seo a d'fhéadfadh bheith príobháideach nó faoi rún agus b'fhéidir go mbeadh ábhar rúnda nó pribhléideach ann. Is le h-aghaidh an duine/na ndaoine nó le h-aghaidh an aonáin atá ainmnithe thuas agus le haghaidh an duine/na ndaoine sin amháin atá an t-eolas. Tá cosc ar rochtain don teachtaireacht leictreonach seo do aon duine eile. Murab ionann tusa agus an té a bhfuil an teachtaireacht ceaptha dó bíodh a fhios agat nach gceadaítear nochtadh, cóipeáil, scaipeadh nó úsáid an eolais agus/nó an chomhaid seo agus b'fhéidir d'fhéadfadh bheith mídhleathach.
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Appendix B

OCUMENT FACEPLATE

CLIENT:	Independent Pipeline Company
PROJECT:	Aviation Fuel Pipeline
CLIENT PROJECT NO.:	0362
TITLE:	Assessment of Impact on Dublin Tunnel
DOCUMENT NO.:	0362-RG-0018

APPROVALS FOR THIS ISSUE

REVISION NO.: 0	**PURPOSE: PLANNING ISSUE**		
Name	**Position**	**Signature**	**Date**
Noel Maher **Author**	**Design Engineer**	Noel Maher	***13/07/2015***
Mary White **Approver**	**Project Engineer**	Mary White	***13/07/2015***

CONTENTS

1.0 OBJECTIVE

Assess the impact of the Aviation Fuel Pipeline on the Dublin Tunnel both during and post construction.

2.0 SITE LOCATION

The proposed Aviation Fuel Pipeline route is on the western side of the Alfie Byrne Road crossing the Dublin Tunnel at tunnel at chainages 4988m and 4993m as shown on Drawing No. 0362-D-07-C-002. The length of the pipeline crossing is 72m through Area C, Zones 1 and 2.

3.0 REFERENCE DOCUMENTS

The following Documents were referenced,

Guidance Notes for Developers; The assessment of surface and sub-surface developments in the vicinity of the Dublin Port Tunnel" published March 2009.
Dublin Port Tunnel As Built Drawing no. DR/CB/PRO/C1/70045/09/X.
Dublin Port Tunnel As Built Drawing no. DR/CB/SCT/C12/74037/11/X
Dublin Port Tunnel As Built Drawing no. DR/CB/SCT/C12/74070/07/X
Environmental Impact Statement, Main Report, Sections 12 & 13
Environmental Impact Statement, Appendices, Flood Risk Analysis
Construction Plan M29/09/TMPlan

4.0 CONSTRUCTION METHODOLOGY:

The pipeline will be constructed using the open cut trench and backfill technique. The trench will be 0.425m wide x 1.525m deep. The imported material will consist of pea-gravel surround to the pipe to a depth of 625mm-700mm maximum depth of cement bound material, reinstatement of the flexible pavement to match existing.

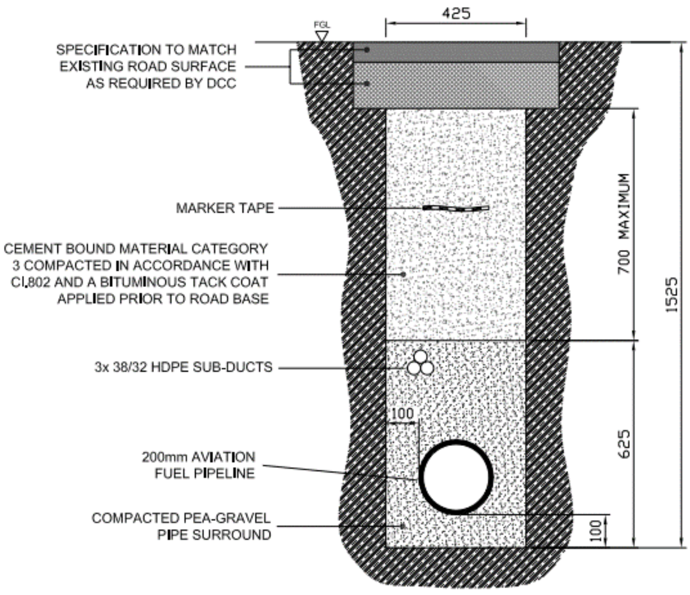


Fig 1: Typical Cross Section of Pipeline Trench

5.0 SURCHARGE LOADING

The maximum construction surcharge load will be 3.34 + 2.60 = 5.94kN/m2
The maximum permanent surcharge load will be 3.66 kN/m2 calculated as follows.

Calculation of Surcharge Loading:

Pipe details:	200mm Extra Stong carbon steel pipe	
	219 mm OD	Reference: IS ISO 3183-1:1996 Petroleum and natural gas industries - Steel pipe for pipelines
	193.7 mm ID	
	12.7 mm Wall thickness	
	64.64 kg/m weight	
	0.0295 m^2 internal cross sectional area of pipe	
	0.0376 m^2 external cross sectional area of pipe	
Fuel Details:	JET A1 Aviation kerosene	
	840 kg/m^3 density	

Fill materials:	Existing compacted fill =	1800	kg/m^3	(Typical)
	Pipe surround Pea Gravel density =	1800	kg/m^3	(Maximum)
	Compacted leanmix density =	2200	kg/m^3	(Maximum)

The flexible road construction has been assumed to be 200mm thick. This will be reinstated as per existing and will be ignored for the purpose of this calculation.
The load exerted from the existing column of stone fill can be calculated:

Depth x width x density of material =

(1.525m - 0.2m) x 0.425m x 1800kg/m^3 x 9.81 / 1000 = 9.94kN/m run

The exising load per m run per 100mm width of trench =

(1.525m - 0.2m) x 0.1m x 1800kg/m^3 x 9.81 / 1000 = 2.34kN/m run

The proposed pipeline will have zones of slight differential loading. This is due to the weight of the pipe filled with liquid versus the backfill material.
Refer to figure 2.

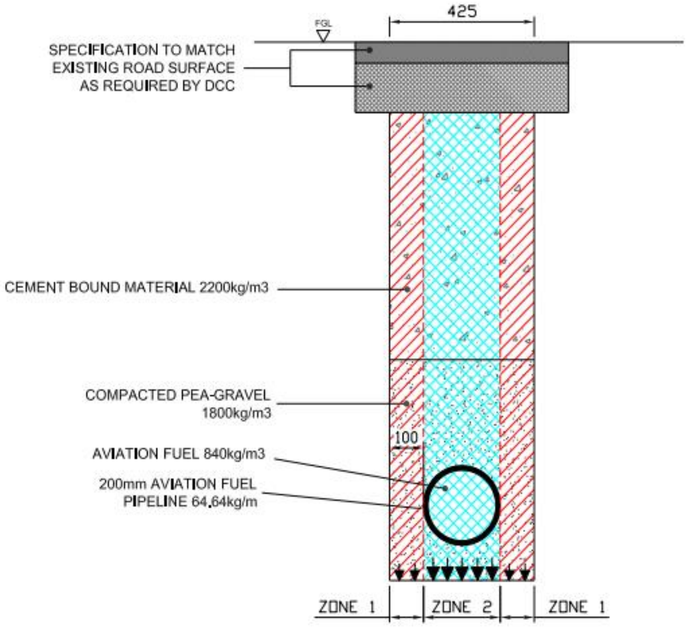


Fig 2: Loading Diagram

Construction Load

During the construction phase of the pipeline the loading from the excavator and trucks will be similar to the current loads that are being applied during normal day to day use of this carriageway. Alfie Byrne Road has been assigned Traffic Impact Number (TIN)of 3. TIN 3 to 5 are heavily trafficked routes.
The only additional machinery load in the trench will be as a result of using a 75kg wacker plate to compact the backfill material. This wacker has a distribution plate with typical dimensions 0.4m wide x 0.55m long. This will result in an intermittent surcharge of $3.34kN/m^2$.

Zone 1:		kN/m run
Pea gravel =	(0.625m x 0.1m) x $1800kg/m^3$ x 9.81 / 1000 =	1.10
Leanmix backfill=	(0.7m x 0.1m) x $2200kg/m^3$ x 9.81 / 1000 =	1.51
Wacker plate=	$3.34kN/m^2$ x 0.1m =	0.33
		2.94

Zone 2:		kN/m run
Pea gravel =	(0.625m x 0.225m) – $0.0376m^2$ x $1800kg/m^3$ x 9.81 / 1000 =	1.82
Pipe =	64.64kg/m x 9.81 / 1000 =	0.63
Leanmix backfill=	(0.7m x 0.225m) x $2200kg/m^3$ x 9.81 / 1000 =	3.40
Wacker plate=	$3.34kN/m^2$ x 0.225m =	0.75
		6.60

The additional surcharge load due to construction of the pipeline:

Zone 1: 2.94kN/m - 2.34kN/m = 0.6kN/m run
Zone 2: 6.60kN/m – (2.34 x 2.25 width factor) = 1.34kN/m run

These equate to equivalent applied loads of:

Zone 1: 0.6kN/m / 0.1m = $6kN/m^2$
Zone 2: 1.34kN/m / 0.225m = $5.93kN/m^2$

Permanent Load

Zone 1:		kN/m run
Pea gravel =	(0.625m x 0.1m) x $1800kg/m^3$ x 9.81 / 1000 =	1.10
Leanmix backfill=	(0.7m x 0.1m) x $2200kg/m^3$ x 9.81 / 1000 =	1.51
		2.61

Zone 2:		
Pea gravel =	(0.625m x 0.225m) – $0.0376m^2$ x $1800kg/m^3$ x 9.81 / 1000 =	1.82
Pipe =	64.64kg/m x 9.81 / 1000 =	0.63
Fuel =	$0.0295m^2$ x $840kg/m^3$ x 9.81 / 1000 =	0.24
Leanmix backfill=	(0.7m x 0.225m) x $2200kg/m^3$ x 9.81 / 1000 =	3.40
		6.09

The additional surcharge load post installation of the pipeline will be:

Zone 1: 2.61kN/m - 2.34kN/m = 0.27kN/m run
Zone 2: 6.09kN/m – (2.34 x 2.25 width factor) = 0.825kN/m run

These equate to equivalent applied loads of:

Zone 1: 0.27kN/m / 0.1m = 2.7kN/m^2
Zone 2: 0.825kN/m / 0.225m = 3.66kN/m^2

Surcharge loading conclusion

The maximum construction surcharge load will be 6kN/m^2
The maximum permanent surcharge load will be 3.66kN/m^2

6.0 SEQUENCING OF WORKS

The following details are based on an average of 24m (2 x 12m pipe lengths) being laid each day. The pipes will be installed using open cut trenching. The work site will measure 72m x 4m.

- The excavators will be 18t, Rubber Tyred
- The volume of material excavated each day will be 26m^3.
- There will be two trucks, capacity 8m^3, to draw away this material. This will require four trips to a registered landfill
- Bedding and lean mix material will be delivered to site as required. This will require three deliveries from the supplier to the site.
- Plant on site will include a generator, welding equipment, radiograph equipment, compaction plate.

The works to install 72m of pipeline over the Dublin Tunnel will take three days.

The sequence of works will be as follows:

Route Proving
The precise position of the route within the pipeline corridor will be confirmed using a combination of slit trenching, trial holes and radar to confirm top of the tunnel and other services. The route proving will be carried out within the work site ahead of the pipe laying.

Line of Route

- Set up agreed Traffic Management Plan.
- Establish a safe working zone with barriers which will only be accessible to authorized personnel.
- Saw cut the carriageway.
- Break out surface with an excavator with breaker attachment.
- Excavate to the required depth to accommodate the pipeline at 1.2m of cover.
- Excavate slit trenches as required.
- Remove excavated material to a registered spoil disposal facility.

Pipe Installation and Associated Works

- Lay Pipe bedding material
- Install pipe at 1.2 metres of cover
- Weld pipe to previous section
- Radiograph weld
- Acceptance test
- Wrap pipe
- Surround pipe with compacted bedding material
- Install sub-duct for management system optical fibre cable
- Backfill with compacted lean concrete and install marker tape
- Re-instate road
- Remove debris and sweep clean
- Remove route markers, safety fencing etc.
- Re-open to traffic
- Close down traffic management

7.0 ASSESSMENT VARIABLES

Depth and lateral location of the tunnel relative to the surface development

The proposed pipeline will cross over the tunnel at an angle of 113^0 to the direction of the tunnel. The clearance between the tunnel crown and the bottom of the pipe will range from 0.67m to 0.97m.

Depth and breadth of the building excavation

The pipeline trench will be 0.425 x 1.525m

Geological model of the site

The section of the pipeline along Alfie Byrne Road is underlain by Carboniferous limestone and shale of the Lucan (Calp) Formation. The aquifer in this area has been classified as "locally important – bedrock is moderately productive only in local zones". The overburden in this area has been mapped by the GSI as being made ground and encountered during trial pit excavations conducted as part of the EIS.

Groundwater levels and any changes that may arise in the short or long term

This section of the Tunnel is routed through made ground. The drawings received from the NRA indicate that the water table level is considerably lower than the pipeline. In addition a trail hole investigations, to a depth of 2m, carried out in Alfie Byrne Open Space close to the Tunnel crossing indicated no evidence of a water table.

Hydrology

The Flood Risk Assessment included in the EIS states the following,

- A risk of flooding from groundwater sources is not anticipated.
- There is no significant pluvial flood risk to the development
- The fluvial flood risk is temporary and can be managed through mitigation during construction
- The floodplain storage will not be reduced by the scheme

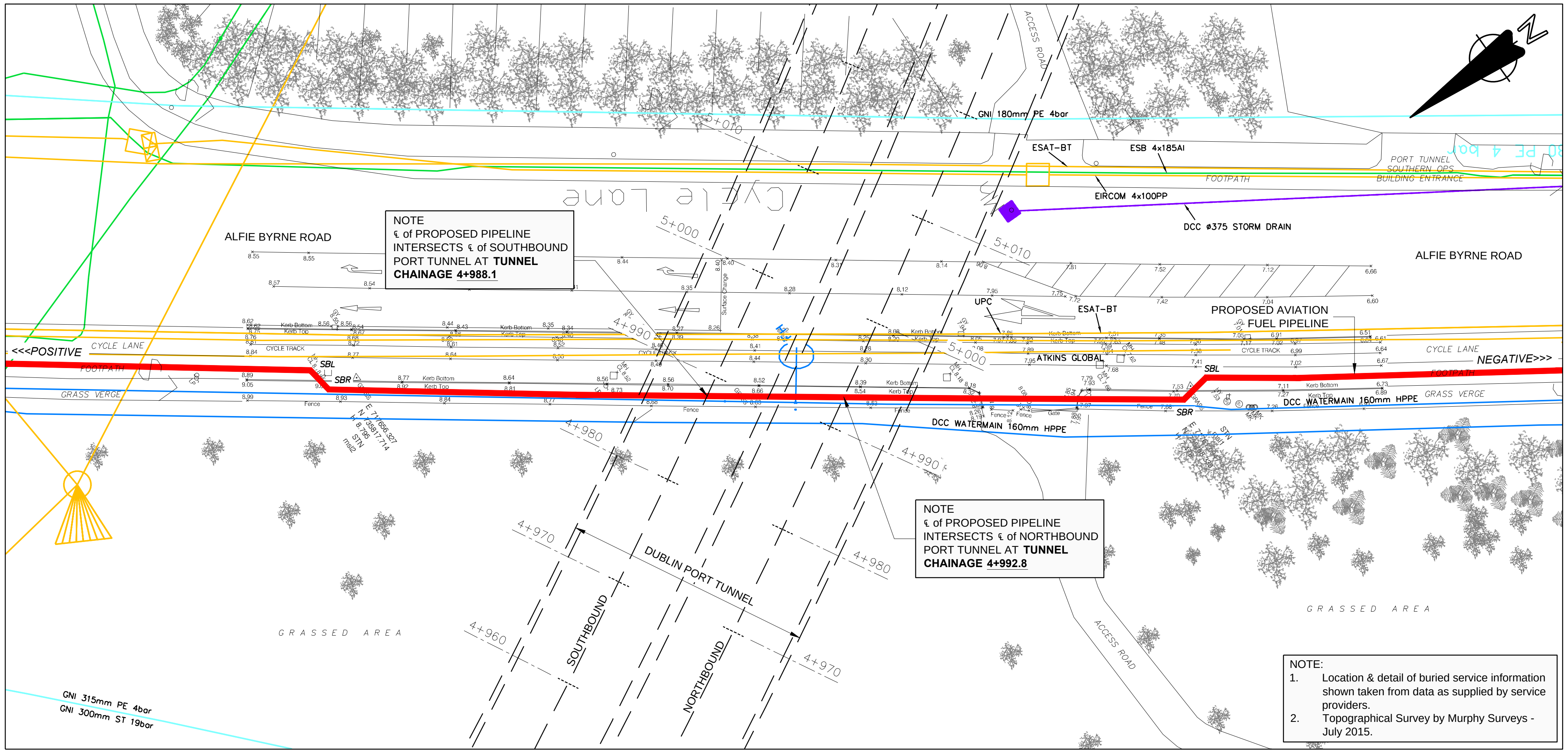
- The proposed development will not increase the flood risk in the catchments through which it traverses

Tunnel lining type and profile
The tunnel lining for the open section comprises cast in-situ horse-shoe tunnel complete with full perimeter tanking. The tanking is overlain by a cast insitu concrete slab to protect the tunnel lining. The clearance between the bottom of the trench will range from 0.67m to 0.96m. The pipeline construction will not come in contact with the tunnel lining.

Geotechnical properties of the ground.
The subsurface is imported stone fill.

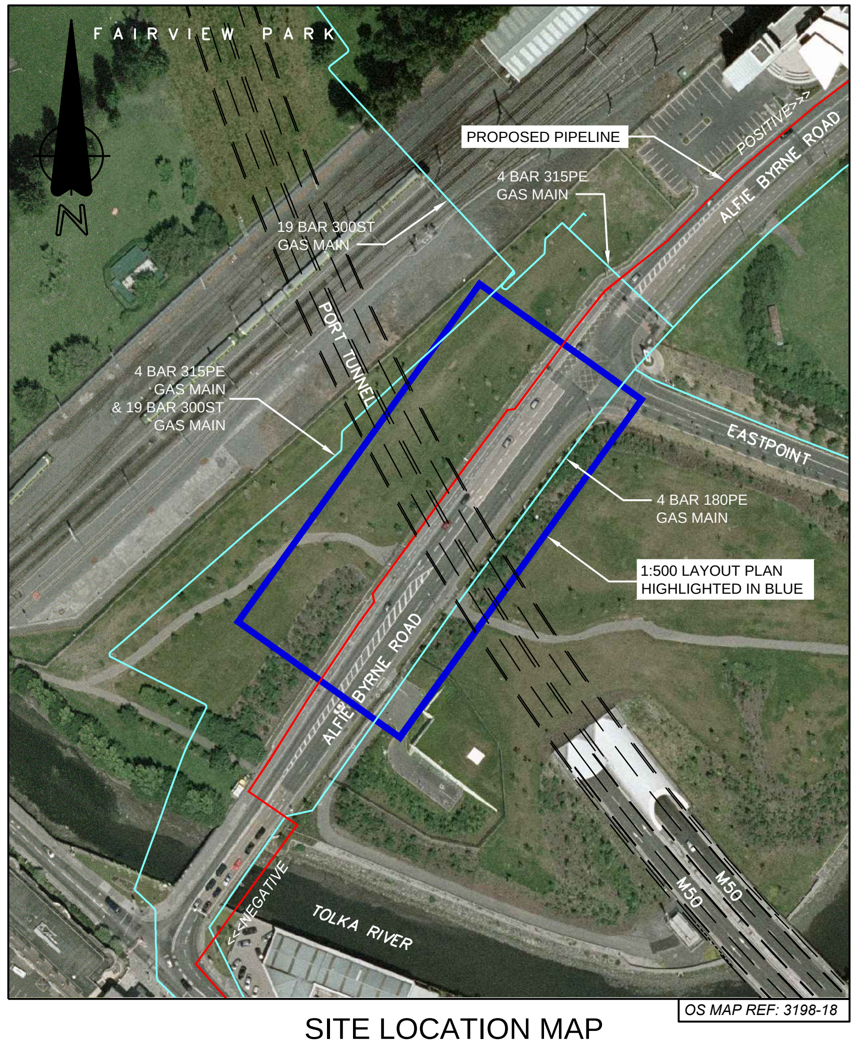
Positioning of any ground reinforcement or piles relative to the tunnel
The pipeline will not require any ground stabilisation or anchoring works

Direction of all stressing loads at all stages of the works
The surcharge loads will be axial loads.



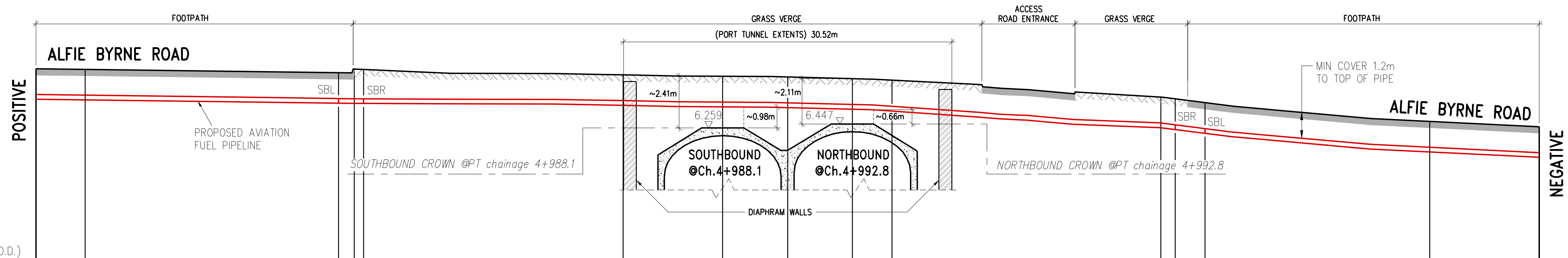
LAYOUT PLAN

Scale 1:500



SITE LOCATION MAP

Scale 1:2500



DATUM LEVEL (0.0m A.O.D.)																		
GROUND LEVEL (m A.O.D.)	9.02	8.99	8.83	9.00	8.98	8.74	8.67	8.63	8.56	8.49	7.70	7.62	7.44	6.57	6.32
TOP OF PIPE LEVEL (m)	7.82	7.79	7.63	7.62	7.62	7.54	7.47	7.43	7.36	7.27	6.49	6.41	6.23	5.37	5.12
COVER (m)	1.20	1.20	1.20	1.38	1.36	1.20	1.20	1.20	1.20	1.22	1.21	1.21	1.21	1.20	1.20
CHAINAGE (m)	1979.6	1975.0	1951.5	1950.0	1949.1	1925.0	1915.7	1909.7	1903.7	1900.0	1875.0	1873.7	1870.9	1850.0	1839.8

PROFILE ALONG CENTRE LINE OF PIPE

Scales Horizontal 1:500 Vertical 1:250

Legend:

BURIED SERVICES

- GAS
- ELECTRICITY
- WATERMAIN
- DRAINAGE
- TELECOMS

Map Index:

APPROVALS	
A	ENGINEER
B	PROJECT MANAGER
C	PROJECT DIRECTOR

Revision 2

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REV	REVISION	A	B	C	
2	PLANNING ISSUE – FURTHER INFORMATION	RMD 10/07/15	NM 10/07/15	MW 10/07/15	ML 10/07/15
1	PLANNING ISSUE	RMD 08/01/15	KM 08/01/15	MW 08/01/15	ML 08/01/15
0	PRELIMINARY ISSUE	RMD 16/06/14	KM 16/06/14	MW 16/06/14	ML 16/06/14
		REV.BY		APPROVED	

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On Behalf of: INDEPENDENT PIPELINE Co. Ltd.

Project: AVIATION FUEL PIPELINE

DUBLIN PORT TUNNEL CROSSING

Scale: 1:500/A3

Drawing Number: 0362-D-07-C-0002

Status: DRAFT

Sheet 1 of 1

RPS

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6th August 2015

Our Ref: MGT0281
File Ref: MGT0281LT0001

To Whom It May Concern

We have reviewed the report titled Assessment of Impact on Dublin Tunnel; document number 0362-RG-0018 Rev 0, issued by Fingleton White.

The findings of our review are as follows:-

Documents referred to are as follows:

- Guidance notes for Developers dated March 2009. "The assessment of surface and sub-surface developments in the vicinity of the Dublin Port Tunnel".
- Aviation Fuel Pipeline Impact Assessment of Impact on Dublin Tunnel Dated 13/07/2015
- Drg No DR/CB/PRO/C1/70037/11/X.
- Drg No DR/CB/PRO/C1/70045/09/X
- Drg No DR/CB/SCT/C12/74070/07/X

Documentation Review.

(i) The guidance notes for Developers indicate that the Dublin Tunnel has been designed to sustain a surcharge load of 22.5 kN/m².

(ii) The objective of the Pipeline Impact Assessment Report is to assess the impact of the proposed aviation fuel pipeline on the Dublin Tunnel both during and post construction. The report details the proposed methodology and sequencing of the proposed works. The report also indicates that the proposed pipeline will not come in contact with the Tunnel lining.

(iii) Surcharge Loading: The approach is appropriate and that the loadings used in the surcharge calculations are reasonable. The predicted surcharge loadings are significantly below the permitted surcharge loading stated in the guidance notes.

Christy O'Sullivan
Chartered Engineer
Director
For and on behalf of RPS

COS/OK

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Appendix C

RESPONSE TO DUBLIN CITY COUNCIL FURTHER INFORMATION REQUEST (ITEM 4 – CONSTRUCTION NOISE) IN RESPECT OF THE PROPOSED AVIATION FUEL PIPELINE (PLANNING REF. 2552/15)

JULY 2015

FEHILY TIMONEY & COMPANY

RESPONSE TO DUBLIN CITY COUNCIL FURTHER INFORMATION REQUEST (ITEM 4 – CONSTRUCTION NOISE) IN RESPECT OF THE PROPOSED AVIATION FUEL PIPELINE (PLANNING REF. 2552/15)

User is Responsible for Checking the Revision Status of this Document

Rev. Nr.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
2	Issue for Approval	SMcA/MG	COD	COD	14.07.2015

Client: Fingleton White

Keywords: Aviation fuel pipeline, further information request, construction noise

Abstract: This document is prepared by Fehily Timoney & Company (FTC) in response to a further information request from Dublin City Council relating to planning application reference 2552/15 for a proposed 14.4 km pipeline which will transport aviation fuel from a pumping station at Dublin Port to a receiving station at Dublin Airport. This document specifically responds to Item 4 of the RFI relating to construction noise.

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APPENDICES

1 RESPONSE TO FI SECTION 4

1.1 Planning Application and Further Information Request – Dublin City Council

Following the planning application for the proposed aviation fuel pipeline in April 2015 to Dublin City Council (planning application reference 2552/15), a request for further information (FI) was received on 04 June 2015. Section 4 of the FI requires the following:

4. The Planning Authority notes that further detail on the criteria that will be used to assess whether noise monitoring is required and what exactly is meant by the phrase "ensure the site is operating without undue noise impact" (section 10.6) is required. The applicant's assessment already shows that the site will be causing significant noise impacts when operational. It is recommended that further detail on the proposed absorbent screening to be used at the site boundary be provided. The applicant is requested to address the above.

From our interpretation of this information request, it would appear that there are three distinct elements which need to be addressed:

- Criteria to determine if noise monitoring is required
- Clarification on wording used in the EIS and
- Further detail on acoustic screening

The response to each is provided below following a brief on the EIS noise impact assessment.

1.2 EIS Noise Appraisal

A noise assessment was provided in Chapter 10 of the EIS for the proposed pipeline development. An EIS noise assessment must consider both construction and operational noise.

The operational noise assessment was scoped out of the appraisal since there are no significant noise sources associated with the operation of a buried pipeline. The inlet and reception stations will be sources of operational noise but the impacts will be imperceptible given their location within the industrial areas of Dublin Port and Dublin Airport.

The focus of the assessment was therefore on the approximate 10-month construction period with respect to residential and other noise sensitive locations along the roadway sections of the pipeline. The construction of the proposed pipeline will introduce additional noise sources to the ambient noise environment. Each phase of construction will entail the use of machinery and plant which will be deployed at various locations along the proposed pipeline corridor.

The construction noise impact assessment was carried out in accordance with British Standard 5228 Part 1:2009 Code of practice for noise and vibration control on construction and open sites Part 1 Noise (British Standards Organisation, 2009) applying the prediction methods and the recommended construction noise limits.

Daytime, evening-time and night-time monitoring was carried out at ten locations applying ISO 1996-1 Acoustics - Description and Measurement of Environmental Noise Parts 1 and 2 (International Standards Organisation, 2003 and 2007) in May and June 2014 to determine existing background noise levels. These background noise levels allowed for derivation of appropriate BS 5228 Part 1 construction noise limits.

The construction noise levels were then modelled applying the prediction methods described in BS 5228 Part 1 and compared with the construction noise limits. It was determined that without mitigation, the limits would be exceeded for most of the sensitive locations at distances up to 10m from the construction works.

With the EIS assumption of 15dB attenuation provided through use of acoustics screens (more data on barrier attenuation is provided in Section 1.2.3 below), a significant impact was still noted at some 28 residential locations. Mitigation measures were proposed to allow quantification of the resultant construction noise through monitoring during the initial works in order to determine the most appropriate form of noise mitigation design, initially through mitigation at source (i.e. appropriately sized plant, suitable scheduling of works and appropriate on-site behaviour) followed by the selection and installation of acoustic screens. These mitigation measures would be compulsory at each of the construction sites. Monitoring was also included for the duration of the construction works for compliance assessment.

1.2.1 Response on Noise Monitoring Criteria

"The Planning Authority notes that further detail on the criteria that will be used to assess whether noise monitoring is required…"

FTC would like to clarify the detail included in the EIS, in respect of the mitigation measures described in Section 10.6.1 'Mitigation Measures – Noise Construction Phase'. In respect of this, the EIS does not propose that criteria will be used to determine if noise monitoring is required, but instead states that noise monitoring will be undertaken:

a) at the start of the construction works for initial quantification of noise levels resulting from construction activities in order to determine the mitigation required and
b) on a regular basis throughout the construction period (frequency to be agreed with the local authorities) to ascertain compliance with the British Standard 5228 Part 1:2009 construction noise limits

This is evidenced in the following excerpts from Section 10.6.1 of the EIS.

"*It is recommended that noise monitoring is carried out during the first stage of construction to determine the actual noise emissions generated by the construction activities."*

"*A noise management plan will also be developed for the construction phase to ensure that best practice in the reduction of noise is implemented during the construction phase by the contractor and will include the following:*

- *A noise monitoring programme which will set out the duration and frequency at which monitoring will occur. This will be agreed with the local authorities. Results of this monitoring will be submitted to both DCC and FCC…."*

The construction noise levels detailed in Section 10.5.1 of the EIS 'Summary of Key Possible Impacts – Noise' were predicted using the methods described in BS 5228 Part 1 using the following assumptions:

- All construction activities (based on modelled plant) occur for 50% of the 10-hour calculated period except for pavement cutting and surface pulverising which are assumed to occur for 10% of the time
- Full surface reflection (i.e. assumes no noise attenuation from soft ground absorption)
- No screening attenuation
- Separation distances of 3 m to 10 m from receivers

These assumptions and the plant modelled (described in Table 10.9 of the EIS) are based on the available information for schemes of this nature and reflective of the actual construction activities anticipated at the site. The EIS mitigation measures therefore include for initial noise monitoring to be carried out during the first 2-day construction period, covering the setup-trenching-installation-reinstatement-commissioning sequence. This monitoring will be an attended time-logging survey so that noise can be correlated to each activity. The time history data will be interrogated to determine which (if any) activities exceed the construction noise limit and analysis undertaken to determine at what distances to sensitive receivers the limit is exceeded.

The noise levels from these activities at the affected distances will be firstly attenuated at source, where mitigation measures such as the use of quieter plant, improved scheduling so noisier activities do not coincide and good on-site behaviour (i.e. no revving of engines, reduced load dropping heights, etc.) will be considered. Only where these measures do not sufficiently reduce the level to below the construction noise limit at the closest receivers, will noise barriers be installed.

Again, this is evidenced in the EIS, which states:

"*It is recommended that noise monitoring is carried out during the first stage of construction to determine the actual noise emissions generated by the construction activities. As there are several construction steps at each section, an attended logging survey should be carried out which will correlate construction steps with noise levels. This data can be interrogated to determine which (and if any) steps do result in a significant noise impact (i.e. exceedance of the BS 5228 Part 1 noise threshold values).* "

Ongoing compliance monitoring will be carried out as part of an overall noise management plan to validate that the mitigation measures recommended during the first phase of construction works are functioning and are providing the necessary attenuation. As per the EIS, the duration and frequency of compliance noise monitoring will be agreed with the local authorities.

Recent linear projects in Dublin have been conditioned to include weekly compliance monitoring at points of construction. It is proposed that, as a minimum, weekly monitoring will be carried out at each active pipeline construction site. Attended monitoring will be carried out at the nearest accessible noise sensitive location. The measured L_{Aeq} value can be reported to either the relevant local authority in whose functional area the construction works are being carried out or to both Dublin City Council (DCC) and Fingal County Council (FCC). Monitoring will be undertaken in accordance with ISO 1996.

This detail can be finalised on issue of the construction noise compliance limits and preparation of the Noise Management Plan, outlined in Section 10.6.1 of the EIS.

1.2.2 Response on Undue Noise Impact Description

"..and what exactly is meant by the phrase "ensure the site is operating without undue noise impact" (section 10.6) is required. The applicant's assessment already shows that the site will be causing significant noise impacts when operational."

The FI specifically references Section 10.6.1 of the EIS with the phrase of note underlined;

"*During the construction phase of the development, the noise generated on the site will be managed so as to minimise potential impacts on any local noise sensitive location. All plant and equipment used during the construction phase will comply with noise regulations for outdoor plant and machinery. Particularly noisy activities will be carefully planned and timed to cause the least impact. Noise monitoring will be carried out, as necessary, during the construction phase to ensure the site is operating <u>without undue noise impact.</u>* "

As described in Section 2.2.1, construction noise predictions can only be estimated at EIS stage, due to assumptions on plant type, the sequencing of plant and variations in operating times. The EIS determined that significant noise impacts would occur based on the predicted levels from a typical construction site using plant and activities reflective of a pipeline construction over a 10-hour working period. As described in part 2.2.1 of this response, the actual construction noise levels during the first construction phase will be quantified using an attended time-logged survey and once quantified, suitable mitigation will be designed to reduce the levels to below the construction noise limit permitted by DCC.

Once appropriate mitigation is in place, compliance monitoring will also be carried out (duration and frequency to be agreed with local authorities) to "*ensure the site is operating without undue noise impact*" or for clarification purposes, to ensure that the site is not generating noise levels above the permitted construction noise limits.

The monitoring will be carried out to establish the following:

1. The mitigation measures designed during the first construction sequence are carried through to each team's sequence of works and are sufficiently attenuating the noise levels
2. The construction activities are compliant with the granted construction noise limit to prevent a noise impact
3. Where construction noise level is not compliant with the limit, modifications to the mitigation design will be recommended such as a greater barrier mass in the acoustic screens and varying the use of plant preventing noisier plant from operating concurrently, to ensure compliance with the construction noise limit

1.2.3 Response on Proposed Absorbent Screening

"*It is recommended that further detail on the proposed absorbent screening to be used at the site boundary be provided."*

Section 10.6.1 of the EIS states that *"The most suitable form of mitigation for this type of construction work is absorbent screening, to be erected around sections of construction. Typical attenuation of 10 to 20 dBA can be attained."*

For clarification purposes and as described in section 2.1.1 above, mitigation will be initially investigated and proposed at source (i.e. replacement of plant with quieter types, positioning of stationary plant away from residential sides of work areas, best practice behaviours on-site, etc.) and acoustic screening will only thereafter be employed if required to reduce noise levels to within the construction noise limits.

The monitoring results and analysis will indicate the level of attenuation needed from the screening to bring the noise level within the permitted noise limit. However, acoustic screens are provided in brand specific sizes and sound absorption specifications. Therefore once the height/ length of works requiring screening and the attenuation needed (in terms of noise level and noise frequencies) are determined, the correct number of barriers and thickness of absorbent material can be specified.

To prevent noise impact from the first construction sites, prior to the results of the initial monitoring and the implementation of initial mitigation, acoustics screens can be installed to surround the works area. The specifications for screen numbers and absorption to be used at the remaining work sites for the 10-month period can be agreed once the mitigation design is finalised.

Acoustic screens have and are being employed on recent linear construction projects in Dublin. BlokNMesh branded barriers are in use on the Luas Cross City (Luas Bloombridge) project for the last six months. These barriers come in 3.5m by 2.0m panels providing a 20dB decrease in noise level. A supplier specification for these screens is provided in Appendix 1.

Echo Barrier who produce a similar type of barrier suitable for construction noise attenuation are also commonly used. Literature produced by Echo Barrier (provided in Appendix 1) on their H-Series barriers state that noise reductions of between 9 and 14dB can be achieved at a distance of 10m from the construction noise source. Unpublished field test results of Echo Barriers demonstrated a 17.4dB noise reduction from noise generated by a Kango Hammer and a Stihl saw, typical construction equipment. This attenuation was noted at distances of both 2m and 8m from the barrier. The noise assessment for the aviation fuel pipeline assumed a typical attenuation of 15dB, in line with the supplier's field test results.

These barriers are an effective form of construction noise attenuation when installed correctly and correct installation and maintenance will form part of the construction team's toolbox talks.

Appendix 1

Supplier Noise Barrier Details




BLOK N MESH

ACOUSTIC SHIELD

BLOK N MESH

- BS ENISO 354:2003
  BS ENISO 140-3:1995
  BS1793 PT 1&2
- ADSORBS 75% OF THE NOISE (20dB)
- NON FLAMMABLE TO BS 5867 PART 2

FOR MORE DETAILS OR TO ARRANGE A SITE VISIT CALL

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ECHO BARRIER®
Environmentally Sound

Field Performance of Noise Barriers

Why **30dB** attenuation on paper can become **10dB** in practice...

1. Noise Mythology

There is a considerable volume(!) of mis-information published concerning the attenuation provided by acoustic barriers. For example, claims of "up to 32dB attenuation" remind me of shampoo adverts - "up to 100% effective at eliminating the signs of dandruff". This covers everything from 0% upwards - unless you are a footballer, when, apparently, up to 110% is available…
Whilst we also put this data in our technical notes, we try to make it very clear that the field performance of noise barriers is very different. The specification battle means that people quote the highest attenuation possible at any frequency from lab test data (so you can refer to BS EN numbers etc). However, this is taking advantage of the technical nature of sound to obscure, rather than to inform potential customers who are not noise experts.

This technical note provides you with an honest appraisal of the technical and practical factors that affect the real world performance of any acoustic barrier. It also provides you with the results of a field test on a range of noise barriers from various suppliers. You can use this data to get a realistic feel for the benefits that you can get in practice from acoustic barriers in real applications - and to inoculate yourself against the hyperbole commonly associated with product literature.

2. Real World Barrier Attenuation Results

Field noise reductions from acoustic barriers - all figures in dB(A)

Barrier Type	1m	10m	
Rstandard	9.5	12	Conventional, 12kg each, 3 per Heras panel, acoustic absorbent lined barriers
Rsingle	14.5	9	15kg single sheet per Heras panel - with just a hint of acoustic absorbent…
LMsheet	13.5	9	low mass single sheet Heras panel, no acoustic absorbent barrier
Echo H series	12.5	12	< 6kg lightweight, 3 per Heras panel, hi-tech acoustic absorbent lined barriers
Echo H series x2	14.5	14	local double layer of H series barrier as recommended for high performance
Echo H series x2		19	* diamond drill high frequency noise source - 31dB lab data reduction

The figures show the overall noise reduction in dB(A) for the various barriers at distances of 1m and 10m from the barrier. Data for the highest performing barrier is also provided for a different application where the noise source is predominantly high frequency. The test setup shown here is a 3 sided barrier round a large loudspeaker used as the noise source. This setup means that the only noise paths are through the barrier material, through leaks and over the top of the screen. No sound will pass round the ends (technically equivalent to a barrier of infinite length). The source was pink noise ("pink" is a technical term in acoustics. It is a standard test sound that theoretically has equal energy in each octave band - like white noise, but with more energy at low frequencies).

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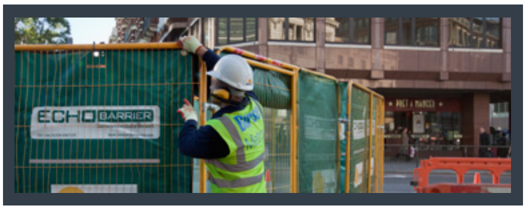
3. How to Select your Barriers - the Practical Considerations

The difference between the attenuations of the worst and best barriers was 5dB(A). The two single layer, 3 part barriers (12kg each for the Rstandard versus 6kg each for the Echo H series) had exactly the same performance in this test. Consequently, the key considerations in choosing between these two types of barrier are not acoustic. They are the practicalities of fitting/removing, transportation, water retention and the way they look.



The Echo H series design means that they are:-

- half the weight and can be fitted two or three times faster (by one person), saving time and money on site
- do not retain water (so no mess and remain at a weight of 6kg…)
- are easier to transport and are designed to be doubled-up locally if necessary to increase the attenuation
- they are also very good looking. Unlike the other factors, however, that is a subjective judgment……

Field Noise Attenuation Data

Noise Jargon

- **Frequency Range;** Human hearing is c 20Hz to 20kHz. 100Hz (low frequency) is mains hum; 1kHz (1000Hz - mid/high frequency) is used as the time pips. Acoustic testing for attenuation and absorption usually covers the 63Hz to 4kHz range.
- **Loudspeaker - pink noise source**; A standard test sound that, in theory, has equal energy in each octave band. We played this through a large speaker.
- **Octave bands;** These are like graphic equalisers on hi-fi - they tell you how much noise there is in each standard frequency range.
- **"A" weighting - dB(A) v dB (or dBLin);** The "A" filter in sound level meters progressively attenuates low frequencies in a similar way to the ear. It is designed to tell you how damaging the sound would be to your hearing.

Factors affecting Real-World Barrier Performance

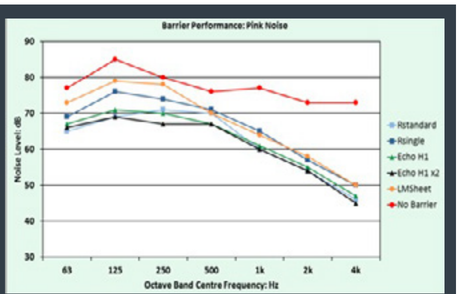
For this test geometry, there are 3 paths for the noise from the source to the receiver. Through the barrier material (governed by mass), through leaks (governed by gaps between panels and between the panels and the ground) and over the top of the screen. The transmitted sound is the total of the sound from all 3 paths. There is also a secondary effect due to reflections between the barriers - particularly at lower frequencies. The LMSheet and Rstandard barriers are low mass with no panel leaks - but ultimately have lower performance as too much sound passes through them.

The first plot shows the unweighted octave band noise levels with a dominant component in the 125Hz band. The performance of the barriers increases with frequency, due both to geometric factors and to the affect of mass (both reduce barrier attenuation at low frequencies). The second plot shows the same information, but with the data "A" weighted (the lower frequencies contributing progressively less to the overall level). In the latter case, the dominant component now is the 1kHz band. Once the barrier attenuation is taken into account, the dominant contributions to the overall level are now the 250Hz - 500Hz bands.

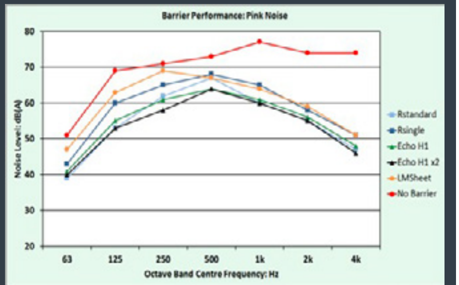
The third "A" weighted plot shows the performance of the best barrier for a predominantly high frequency noise source, a diamond drill. As all the sound is at higher frequencies, the barrier performs better, giving 19dB overall attenuation. Despite this type of source being ideal to demonstrate maximum barrier attenuation, you could quote "up to 31dB" from the lab data. This is 12dB higher than the field results - a factor of x16 in terms of noise energy! Clearly misleading…. Echo Barriers have been very carefully designed to provide a uniquely high level of performance in practice, on site. This has been achieved by designing for the perfect balance between mass, leakage paths and typical geometries. This explains how they can provide the same performance as barriers that are twice the weight.

On site, this means low noise levels, a 70% or more reduction in fitting time plus easy transport, mechanical handling and storage plus no water retention.

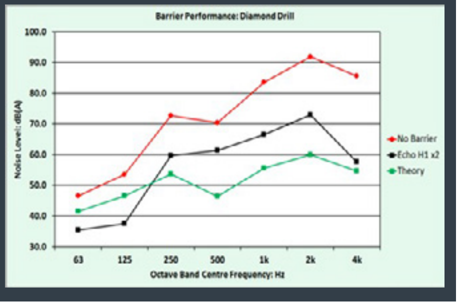
- *Attenuation at 10m - - unweighted noise levels*



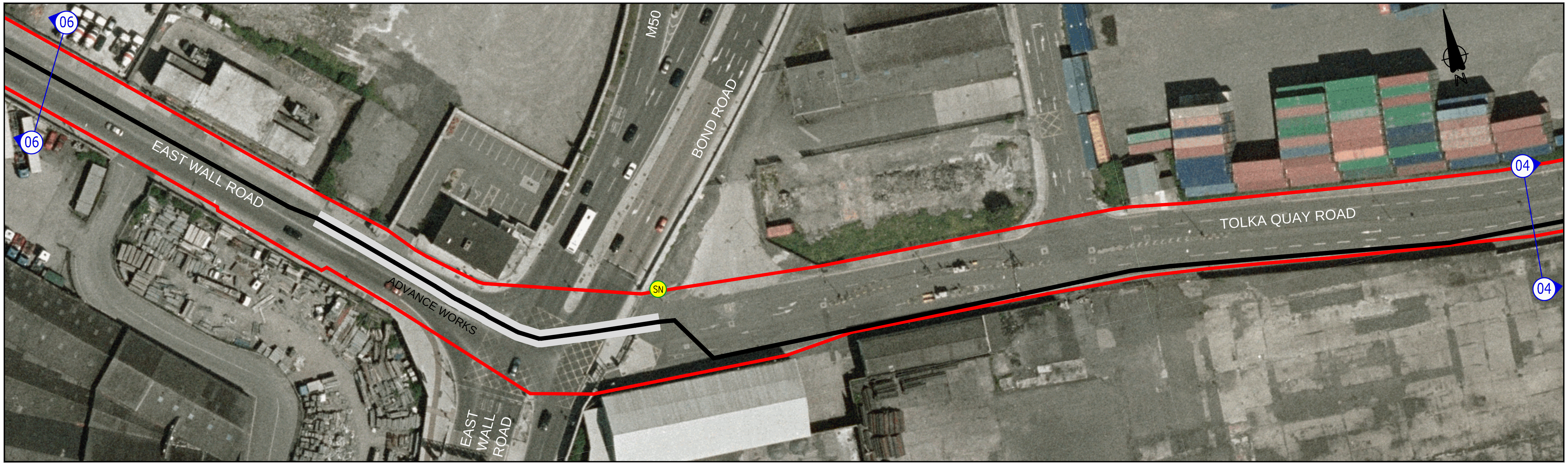
- *Attenuation at 10m - - "A" weighted noise levels*

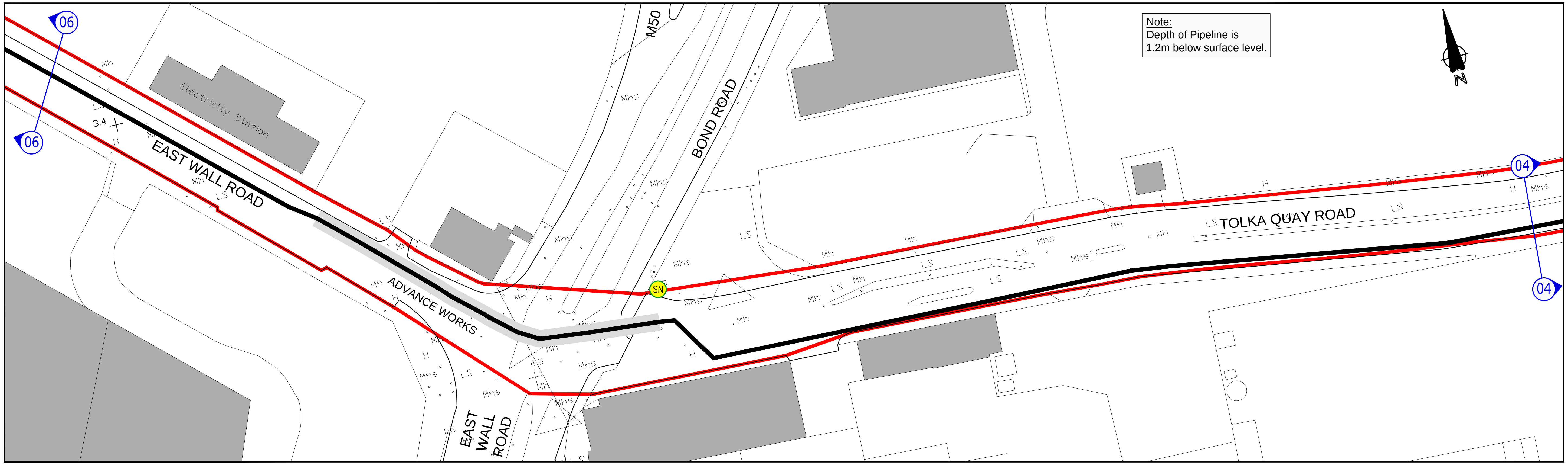


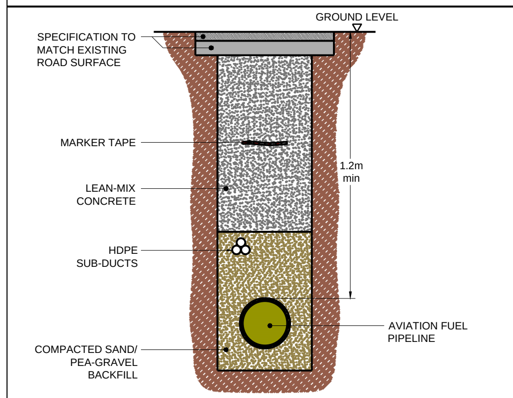
- *Attenuation at 10m - - "A" weighted noise levels - High frequency diamond drill noise source*



Appendix D







TYPICAL SECTION THROUGH PIPELINE

PIPELINE SPECIFICATIONS

DIAMETER OF PIPE	200mm
DESIGN PRESSURE	40 BAR
PIPELINE WALL THICKNESS	12.7mm

O.S. MAP Ref. 3198-23, 3198-24, 3264-03, 3264-04

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KEY

- 200mm INDICATIVE PIPELINE ROUTE
- SITE BOUNDARY
- SN SITE NOTICE LOCATION
- XX MATCHLINE TO ADJOINING STRIP MAP No. XX

REV	REVISION	REV.BY	A	B	C
2	PLANNING ISSUE	RMD 17/12/14	KM 17/12/14	MW 17/12/14	ML 17/12/14
1	CONSULTATION	RMD 01/09/14	KM 01/09/14	MW 01/09/14	ML 01/09/14
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On Behalf of: INDEPENDENT PIPELINE Co. Ltd.

Project: AVIATION FUEL PIPELINE

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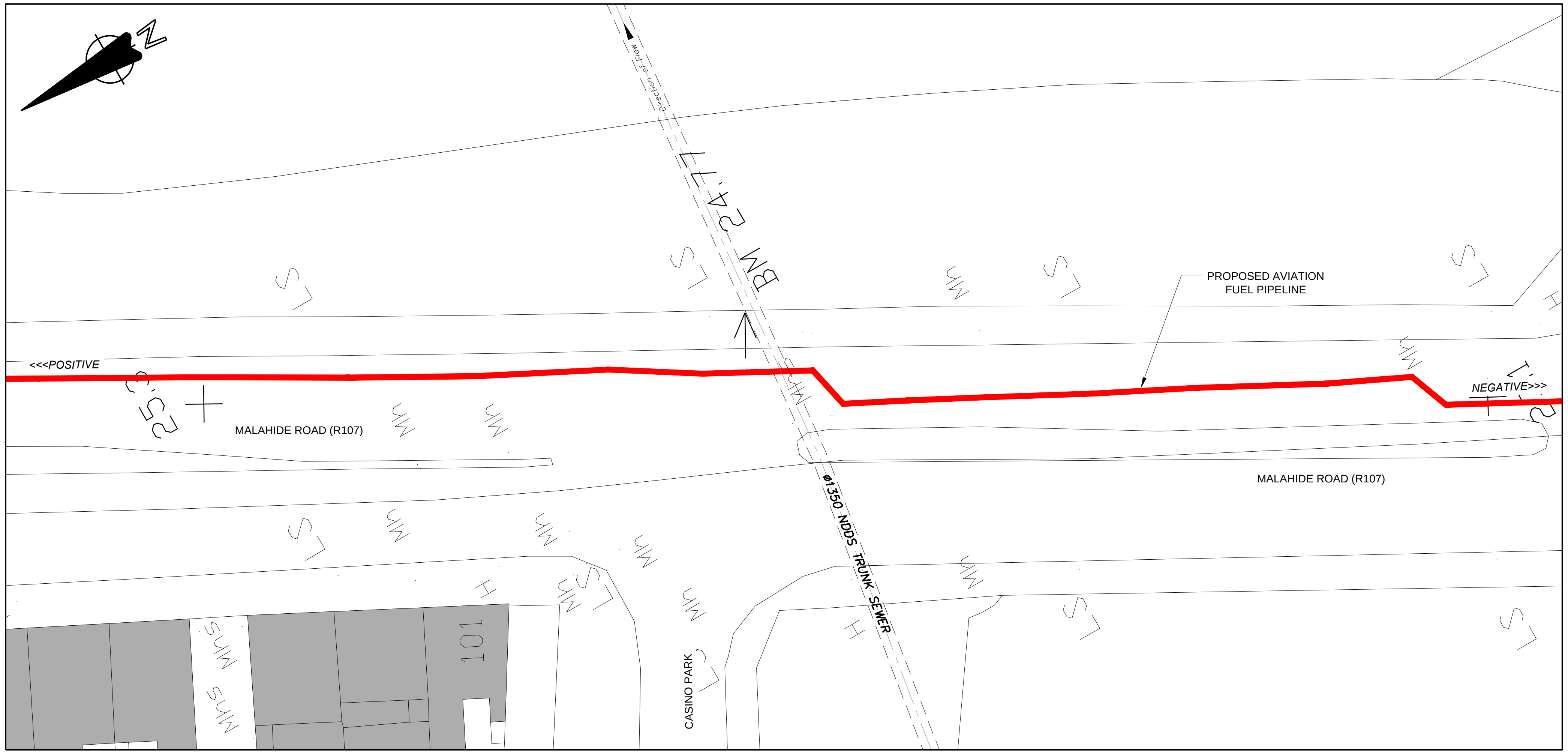
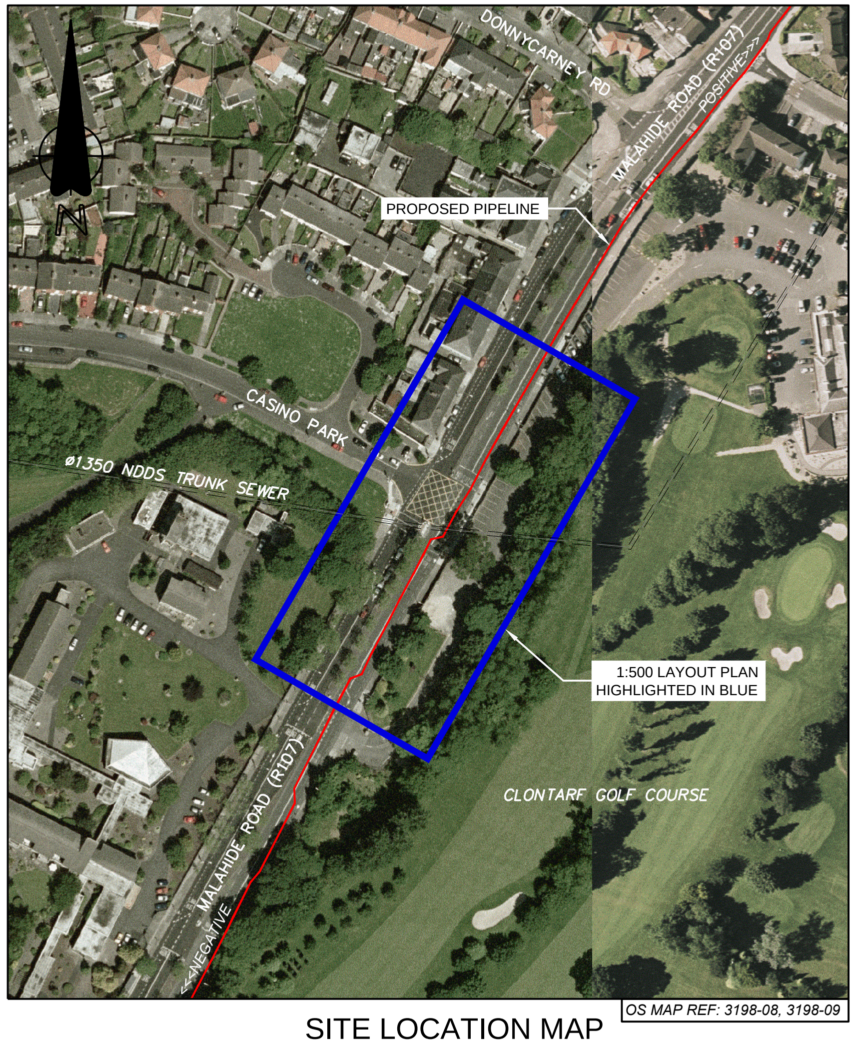
ROUTE CORRIDOR; STRIP MAP No.5

Scale	Status	Drawing Number	Sheet
1:1000/A3	ISSUED	0362/D/02/G/0005	1 Of 1



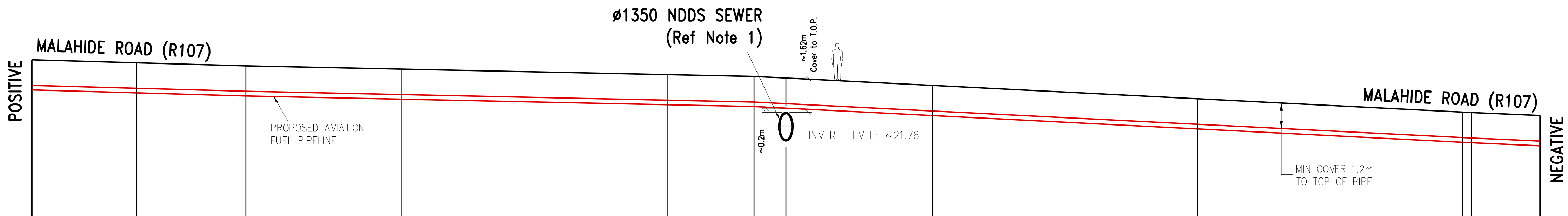
LAYOUT PLAN

Scale 1:500



SITE LOCATION MAP
REFER STRIP MAP 0362-D-02-G-0015

Scale 1:2500



DATUM LEVEL (17.0m A.O.D.)

GROUND LEVEL (m A.O.D.)	25.59	25.45	25.30	25.15	24.89	24.80	24.73	24.38	23.75	23.12	23.10	22.96
TOP OF PIPE LEVEL (m)	24.39	24.25	24.10	23.95	23.69	23.60	23.53	23.18	22.55	21.92	21.90	21.76
COVER (m)	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CHAINAGE (m)	4409.9	4400.0	4389.7	4375.0	4350.0	4341.8	4338.8	4325.0	4300.0	4275.0	4274.2	4267.7

PROFILE ALONG CENTRE LINE OF PIPE

Scales Horizontal 1:500 Vertical 1:250

NOTES:
1. I.L. of Sewer Pipe at this location interpolated using data map "3198-08" dated 25th Aug 2010 & "3198-09" dated 6th April 2011, as supplied by DCC. Indicated level is indicative only.

Legend:

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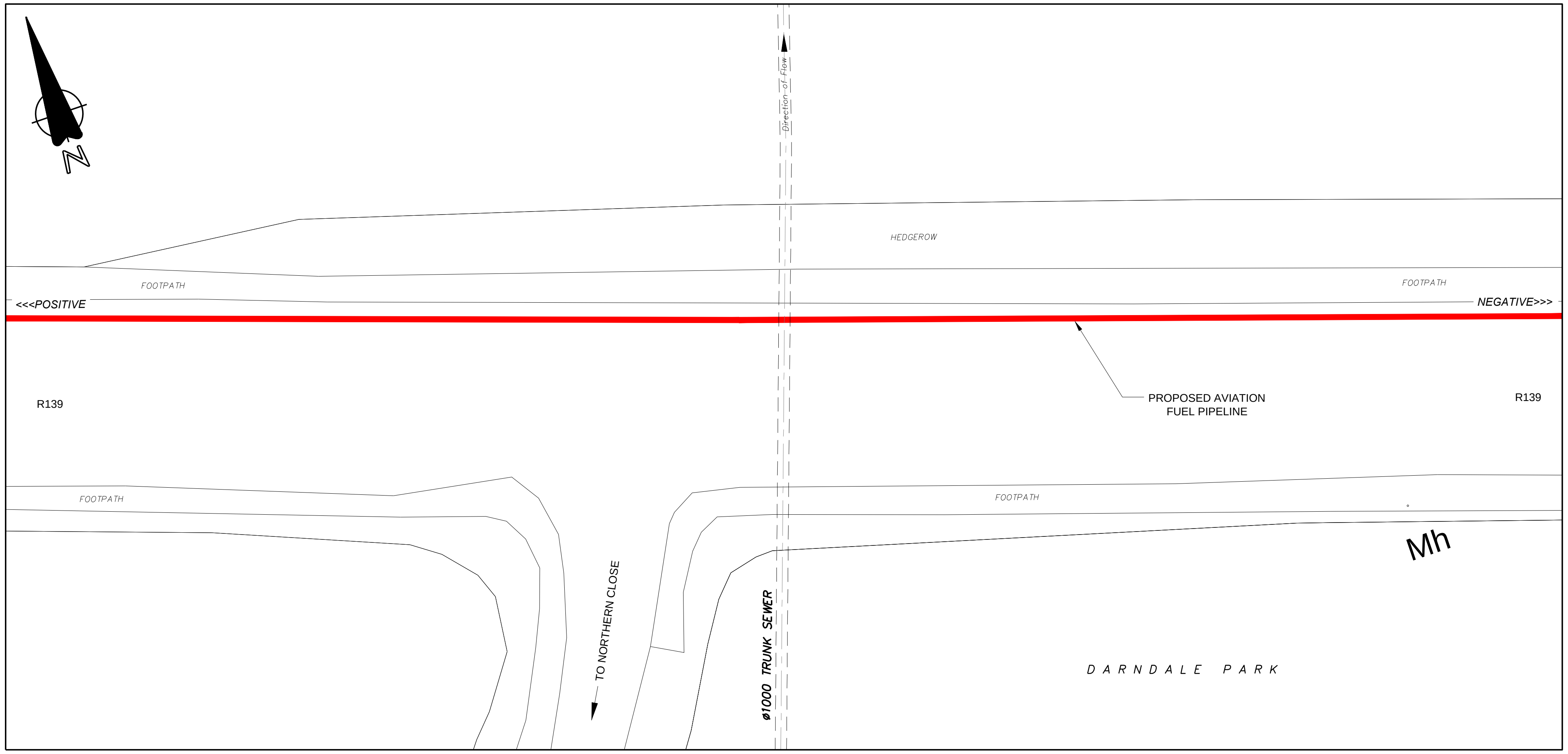
NORTH DUBLIN DRAINAGE SCHEME
TRUNK SEWER CROSSING

Scale: 1:500/A3
Drawing Number: 0362-D-07-C-0011
Status: ISSUED
Sheet 1 of 1



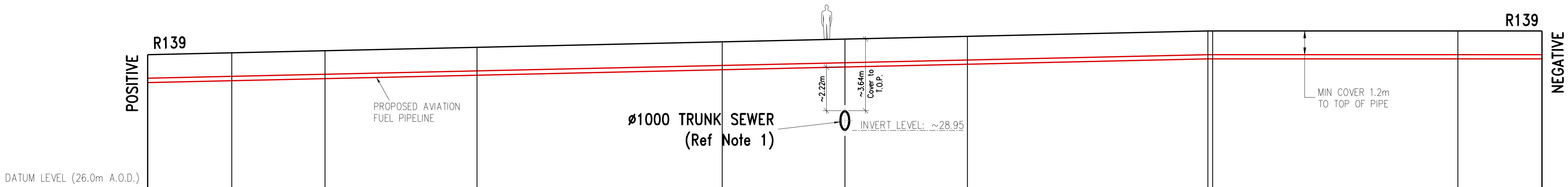
LAYOUT PLAN

Scale 1:500

OS MAP REF: 3064-D, 3065-C, 3132-05, 3133-01

SITE LOCATION MAP
REFER STRIP MAP 0362-D-02-G-0031

Scale 1:2500



GROUND LEVEL (m A.O.D.)	32.80	32.90	33.00	33.17	33.45	33.59	33.73	34.00	34.00	34.00	34.00
TOP OF PIPE LEVEL (m)	31.60	31.70	31.80	31.97	32.25	32.39	32.53	32.80	32.80	32.80	32.80
COVER (m)	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CHAINAGE (m)	10158.6	10150.0	10140.5	10125.0	10100.0	10087.5	10075.0	10050.5	10050.0	10025.0	10016.4

PROFILE ALONG CENTRE LINE OF PIPE

Scales Horizontal 1:500 Vertical 1:250

NOTES:
1. I.L. of Sewer Pipe at this location interpolated using data map dated 25th Jun 2015, as supplied by DCC. Indicated level is indicative only.

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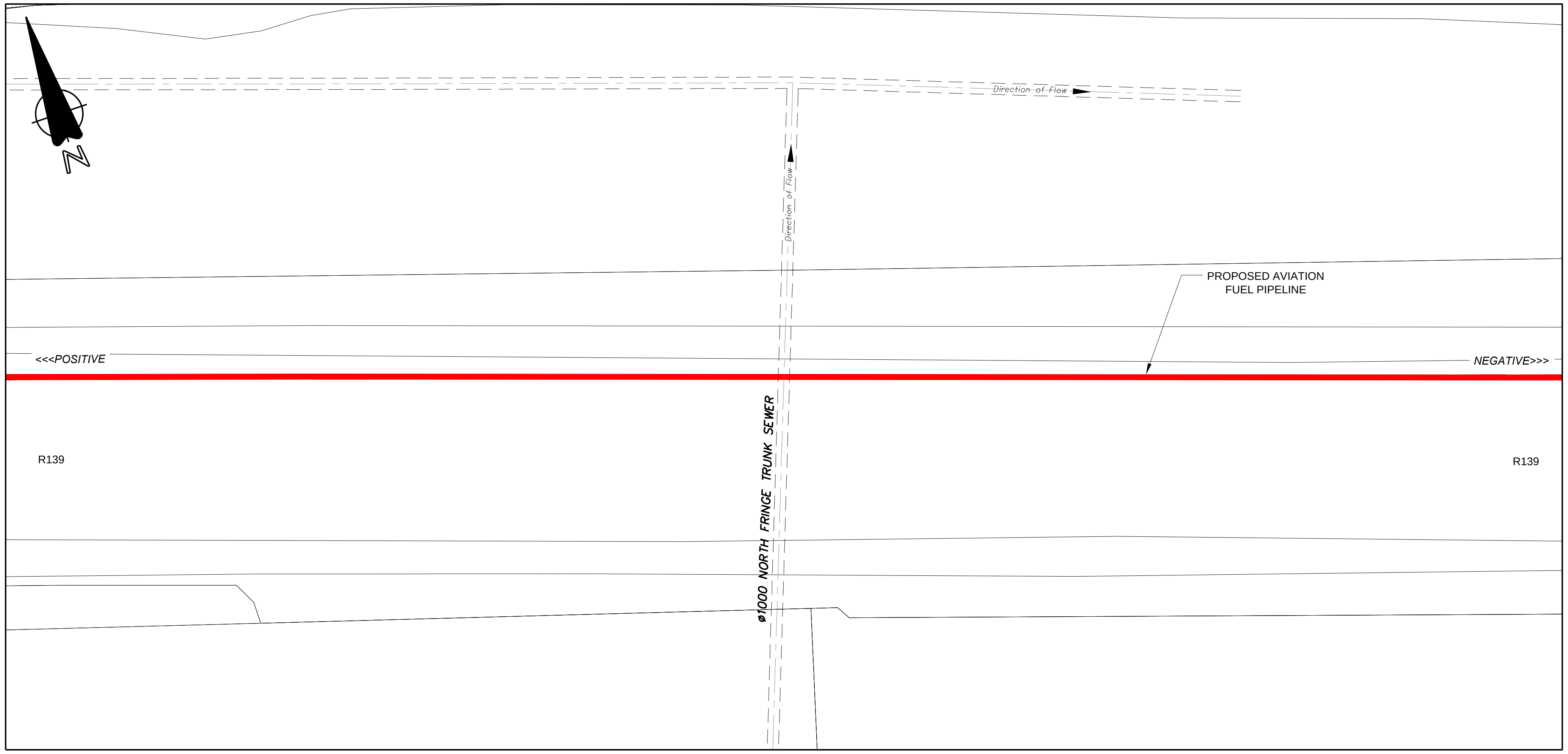
TRUNK SEWER R139 CROSSING

Scale: 1:500/A3

Drawing Number: 0362-D-07-C-0013

Status: ISSUED

Sheet 1 Of 1



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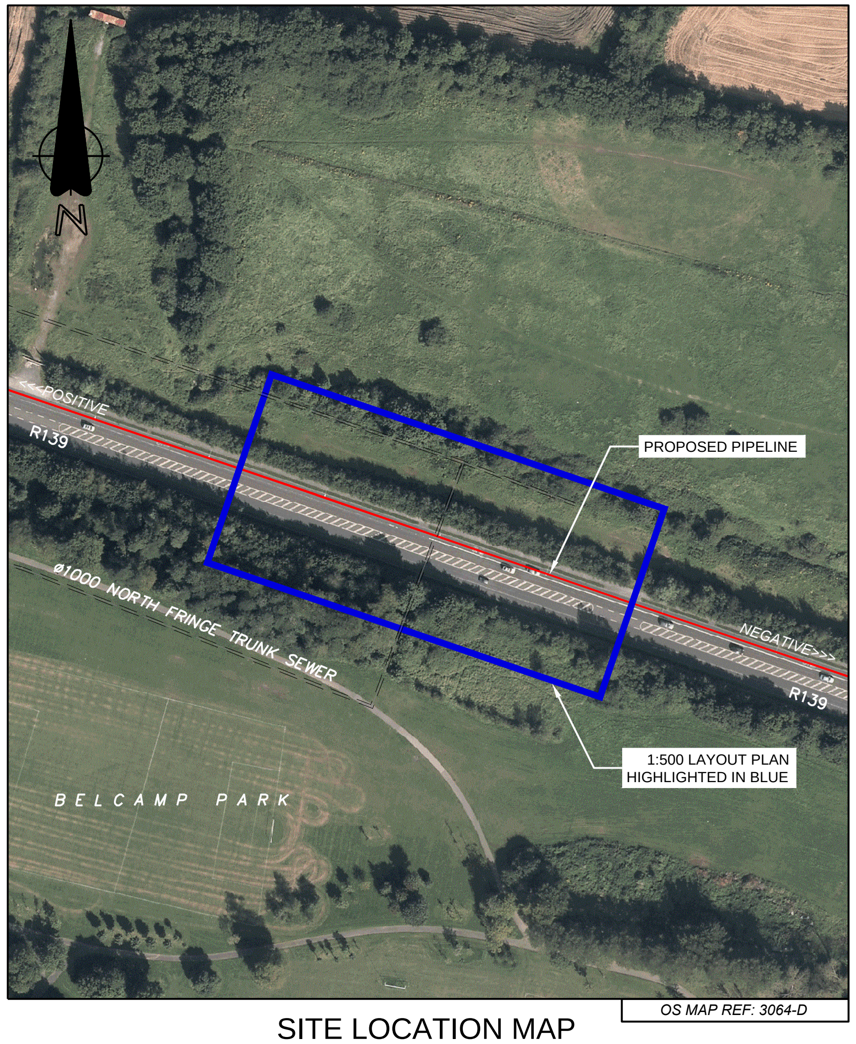
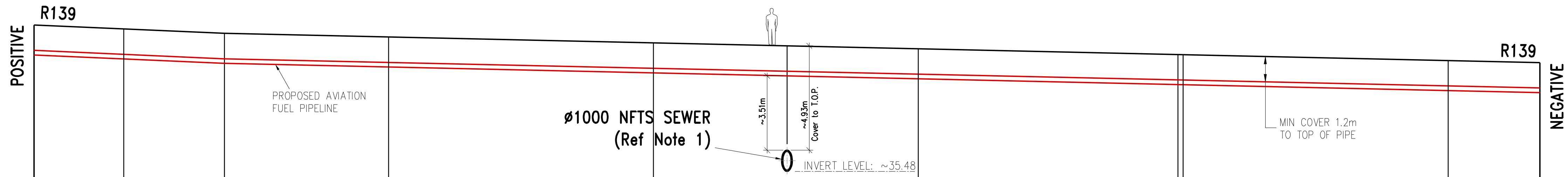


SITE LOCATION MAP
REFER STRIP MAP 0362-D-02-G-0033

Scale 1:2500



GROUND LEVEL (m A.O.D.)	42.40	42.21	42.00	41.83	41.55	41.41	41.27	41.00	40.99	40.72	40.62
TOP OF PIPE LEVEL (m)	41.20	41.01	40.80	40.63	40.35	40.21	40.07	39.80	39.79	39.52	39.42
COVER (m)	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CHAINAGE (m)	11058.5	11050.0	11040.5	11025.0	11000.0	10987.4	10975.0	10950.5	10950.0	10925.0	10916.3

PROFILE ALONG CENTRE LINE OF PIPE

Scales Horizontal 1:500 Vertical 1:250

NOTES:
1. I.L. of Sewer Pipe at this location interpolated using data map dated 12th Aug 2011, as supplied by FCC. Indicated level is indicative only.

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NORTH FRINGE TRUNK SEWER CROSSING

Scale: 1:500/A3

Drawing Number: 0362-D-07-C-0012

Status: ISSUED

Sheet 1 Of 1

Appendix E

The Air Transport Sub-Programme main objective, under this Plan, is to ensure that there is sufficient infrastructure capacity to meet the growing air traffic demand and to ensure that infrastructural capacity increases in line with the growth in air services, particularly for Dublin Airport because of its international gateway status for a capital city. The proposed pipeline project will provide a secure and sustainable supply of fuel to meet increasing demands.

4.1.3 *Green Paper on Energy Policy in Ireland - 2014*

This consultation paper was published by the Department of Communications, Energy and Natural Resources in May 2014. The Green Paper sets out six policy priority areas in respect of which views are sought:

- Priority 1: Empowering Energy Citizens
- Priority 2: Markets and Regulation Priority 3: Planning and Implementing Essential Energy Infrastructure
- Priority 4: Ensuring a Balanced and Secure Energy Mix
- Priority 5: Putting the Energy System on a Sustainable Pathway
- Priority 6: Driving Economic Opportunity

It highlights the importance of providing reliable energy supply, while minimising costs and protecting against supply disruptions for Irish enterprise and consumers. With transport accounting for almost 19% of greenhouse-gas emissions in 2012 in Ireland it outlines the importance of reducing energy consumption in the transport sector.

4.1.4 White Paper - Delivering a Sustainable Energy Future for Ireland 2007 -2020

The White Paper '*Delivering a Sustainable Energy Future for Ireland*'[i] sets out the Government's Energy Policy Framework for 2007 – 2020, to deliver a sustainable energy future for Ireland. It is set firmly in the global and European context of concern in relation to energy security and climate change. Section 3.1 of the plan - *Actions to Ensure Energy Supply* states that:

> "*Security of energy supply is crucial for the economy and society. Security of supply requires that we have reliable access to oil and gas supplies and the infrastructure in place to import, distribute and to store gas and oil.*"

This paper aims to ensure that the Irish energy sector continues to make a substantial contribution to reducing CO_2 emissions through actions like ensuring energy policy and climate change policy goals are closely aligned and that strategies for reducing energy demand and energy related emissions contribute to national climate change targets.

Section 3.11.2 - Promoting the Sustainable Use of Energy in Transport outlines that it is essential that growth in energy consumption in the transport sector is decoupled from economic growth in order for the transport sector to become more sustainable. The objective is to:

> "*develop a transport system, which will allow for the maintenance of economic competitiveness by removing infrastructural bottlenecks and achieving security of supply through a diverse fuel mix, whilst increasing social cohesion and access for communities in peripheral rural areas and reducing environmental impacts*".

The paper also realises that the provision of supply-side infrastructure through capital investment is required to achieve this.

In section 3.13.12, the paper sets a target of 20% savings in energy across the electricity, transport and heating sectors by 2020. The proposed pipeline will assist in meeting the transport target through the removal of HGVs from the road network.