Bay Lane SRF

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Waste licence application

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1 RECEIVING ENVIRONMENT - NOISE

1.1 RECEIVING ENVIRONMENT

The site is in the town land of Bay St. Margaret's, County Dublin to the north of Blanchardstown, about 3km south west of the small village of St. Margaret's, 3km north east of Mulhuddart, and 2.8km west of the closest boundary of Dublin Airport. It is situated on the north side of a local road, known as Bay Lane, which connects the N2 at Kilshane Bridge with the N3 at Hollystown.

The area is generally rural in character. Much of the land immediately surrounding the site is undeveloped and is utilised for various agricultural practices. There are several commercial and industrial developments in the local area of the Bay Lane Quarry. Some share the same access road as the site including a cement company (Halton Concrete) located 200m to the west of the site and a commercial bus yard (Butlers Bus Tours) located approximately 250m to the east of the site. A food (Pallas Foods) wholesale supplier's foodservice centre is located approximately 350m north northwest of the site. Several business parks are located to the south of the site including Northwest Business Park, which is located approximately 600m to the south east of the quarry site.

There is a small amount of low-density residential housing in the local area. The immediate area is rural, and housing consists mainly of one-off detached residential properties located along Bay Lane.

There are approximately four occupied residential properties near the site boundary. A vacant bungalow, which is owned by the applicant, is located at the south east corner of the site boundary. Other residential properties located along, or just off Bay Lane are at least 500m away from the quarry's eastern boundary.

The road network around the site is comprised of Bay Lane, the N2-R121 dual carriageway link road and the associated roundabout. As mentioned above, Halton Concrete and Butlers Bus Tours share the same access road as the site.

1.1.1 Baseline Noise Survey

The survey was conducted in general accordance with ISO 1996-1: 2003: 'Acoustics - Description, measurement and assessment of environmental noise - Part 1: Basic quantities and assessment procedures' sets out requirements for conducting a baseline survey to establish prevailing noise levels. A noise survey was conducted on the 14th and 15th of February 2019 to meet with these requirements. During the survey, 3 attended monitoring locations were monitored simultaneously.

<u>Procedure</u>

Measurements were conducted over 30-minute periods on a cyclical basis during the daytime between 13:00 to 19:00 hours. Evening and night-time measurements were conducted over 15-minute periods between the hours of 19:00 and 01:00 hours.

The measurement equipment used was a Bruel and Kjaer 2250 Type 1 Sound Level Meter with outdoor microphone protection. All measurements were free field, measured >2m from reflecting facades and the microphone was positioned at a height of 1.5m above ground level.

Weather conditions during the surveys were in line with the conditions described within ISO 1996, Acoustics 'Description and Measurements of Environmental Noise'. All measurement equipment complies with the relevant Type 1 requirements of: IEC651 Specification for Sound Level Meters and IEC804 Specification for Integrating – Averaging Sound Level Meters and were checked and calibrated before and after the survey using a Brüel and Kjaer 4231 piston phone calibrator to an accuracy of +/-0.3dB.

The measurement results were noted onto survey record sheets immediately following each measurement and stored in the instrument's internal memory for subsequent analysis. Notes were taken in relation to the primary contributors to noise build-up at each location.

Measurement Parameters

The noise parameters recorded during the baseline noise assessment were:

L_{Aeq} is the A-weighted equivalent continuous steady sound level during the measurement period and effectively represents an average ambient noise value. This is the equivalent continuous sound level.

L_{A10} refers to those A-weighted noise levels in the top 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period. It is used to determine the intermittent high noise level features of locally generated noise and usually gives an indicator of the level of road traffic.

L_{A90} refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to describe a background level.

Measurement Locations

Measurements were carried out at the nearest noise sensitive locations to the proposed soil and stone recovery facility. The EPA defines a noise sensitive location as "any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels".

Monitoring locations were comprised of 3 attended measurements locations, which are detailed in Table 1.1 and outlined in Figure 1.1.

Table 1.1: Noise Monitoring Locations

Position	Description
N1	Roundabout north of site
N2	Site entrance (south west)
N3	Farm & residence to the south east of site

The main noise sources in the study area comprise of road traffic noise from the N2-R121 dual carriageway link road and local passing traffic along Bay Lane, aircraft noise from Dublin Airport and agricultural practices within the vicinity of the area.

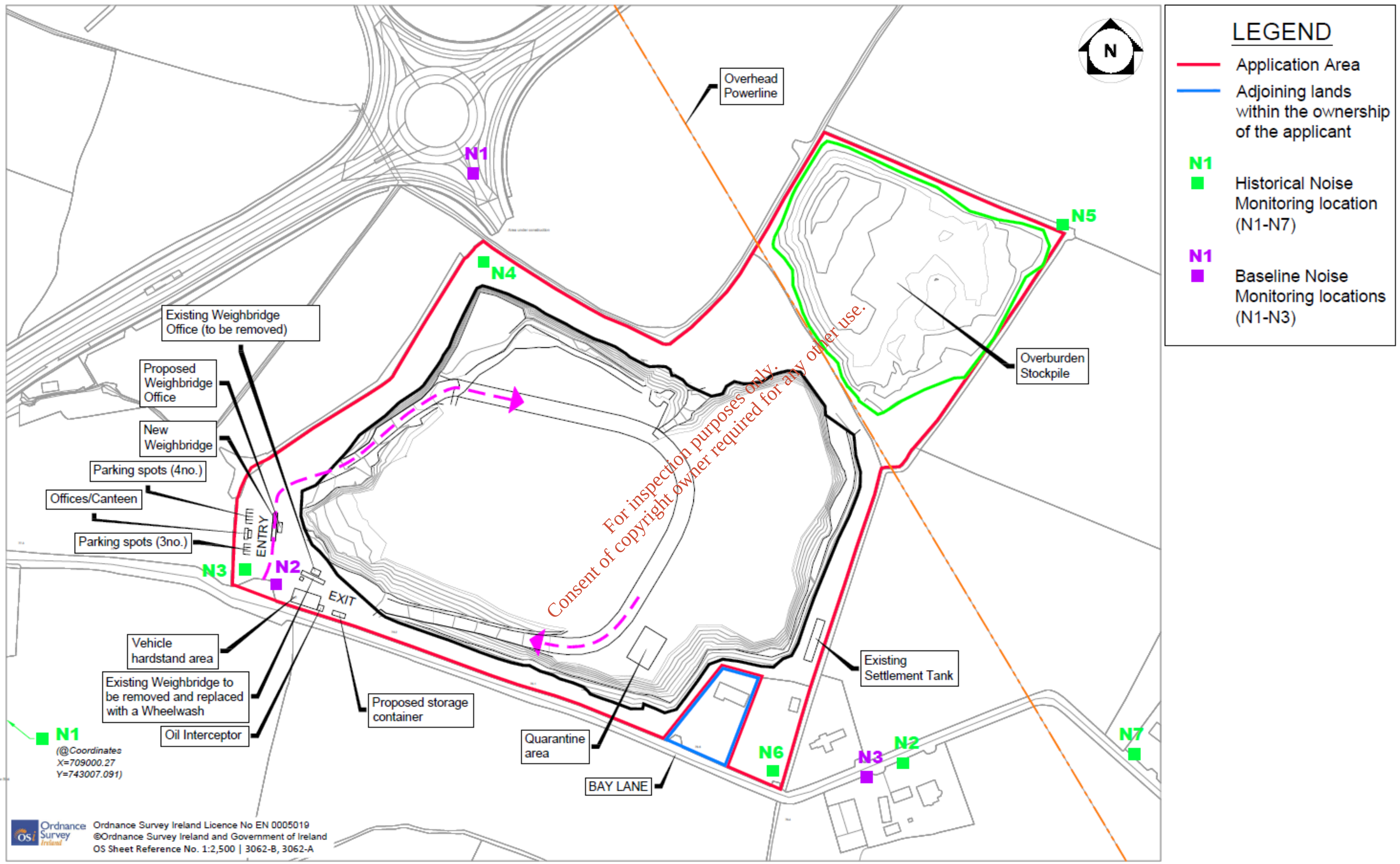

Figure 1.1: Noise Monitoring Locations – baseline and historic

1.1.2 Baseline Noise Survey Results

The results of the baseline noise survey carried out are shown below in **Table 1.2, Table 1.3** and **Table 1.4.** Daytime measurements were 30 minutes in duration while evening and night-time measurements were 15 minutes in duration. All noise monitoring results are presented rounded to the nearest whole integer, with 0.5 being rounded up.

Table 1.2: Baseline Noise Survey Results for N1

Position Number	Period	Measurement Period	Measured Noise Levels (dB re. 2x10-5 Pa)		
			L_{Aeq}	L_{A10}	L_{A90}
N1	Daytime	13:01 – 13:31	68	71	55
		15:17 – 15:47	66	69	55
		16:57 – 17:27	67	70	59
		Arithmetic Average of LAF90 (dB)			56
		Daytime Criterion, dB LAr,T			**55**
	Evening	19:40 – 19:55	61	64	52
		Arithmetic Average of LAF90 (dB)			52
		Evening Criterion, dB LAr,T			**50**
	Night-time	23:37 – 23:52	53	56	42
		00:32 – 00:47	54	55	40
		Arithmetic Average of LAF90 (dB)			41
		Night-time Criterion, dB LAr,T			**45**

A minimum of three sampling periods were carried out for daytime measurements. Noise levels recorded were in the range of 66 to 68dB $L_{Aeq,\ 30\ minutes}$ with an arithmetic average of 67dB L_{Aeq}. During the daytime, dominant noise source was passing local traffic with some aircraft passing overhead contributing to the noise environment. This is confirmed by analysis of the L_{A10} statistical noise parameter which had an arithmetic average of 70dB. Background noise levels in the range of 55 to 59dB $L_{AF90,\ 30\ minutes}$. The arithmetic average of the $L_{AF90,\ 30\ minutes}$ was 56dB, which excludes the contribution from any intermittent noise sources such as road traffic noise and as such is more representative of the noise at this location.

The evening background noise level was measured as 52dB $L_{A90,\ 15\ minutes}$. Similarly, to the daytime noise measured, the dominant noise source was noted to be continuous local road traffic noise with some passing aircraft overhead.

A minimum of two sampling periods were carried out for night-time measurements. During the night-time period it was observed that road traffic noise was the dominant source with some noise from Pallas Foods associated with truck movements audible in the distance. Measured noise levels were 53 and 54dB $L_{Aeq,\ 15\ minutes}$ with background noise levels measured at 42 and 40dB $L_{AF90,\ 15\ minutes}$. The arithmetic average of the $L_{AF90,\ 15\ minutes}$ was 41dB.

Table 1.3: Baseline Noise Survey Results for N2

Position Number	Period	Measurement Period	Measured Noise Levels (dB re. 2x10-5 Pa)		
			L_{Aeq}	L_{A10}	L_{A90}
N2	Daytime	13:37 – 14:11	64	67	51
		15:49 – 16:19	64	68	52
		17:31 – 18:01	64	66	51
		Arithmetic Average of LAF90 (dB)			51
		Daytime Criterion, dB LAr,T			**55**
	Evening	19:00 – 19:15	62	63	49
		Arithmetic Average of LAF90 (dB)			49
		Evening Criterion, dB LAr,T			**50**
	Night-time	23:18 - 23:33	55	52	43
		00:13 – 00:28	45	46	40
		Arithmetic Average of LAF90 (dB)			42
		Night-time Criterion, dB LAr,T			**45**

Three sampling periods were carried out for daytime measurements. Noise levels recorded were 64dB $L_{Aeq,\ 30\ minutes}$. During the daytime, dominant noise source was distant traffic from the N2-R121 dual carriageway link road with intermittent noise from aircraft passing overhead and local passing traffic along Bay Lane. This is confirmed by analysis of the L_{A10} statistical noise parameter which had an arithmetic average of 67dB. Background noise levels in the range of 51 to 52dB $L_{AF90,\ 30\ minutes}$. The arithmetic average of the $L_{AF90,\ 30\ minutes}$ was 51dB, which excludes the contribution from any intermittent noise sources such as road traffic noise and as such is more representative of the noise at this location. There was also some audible faint plant noise from Halton Concrete at this location.

The evening background noise level was measured as 49dB $L_{A90,\ 15\ minutes}$. Similarly, to the daytime noise measured, the dominant noise source was noted to be continuous distant road traffic noise from the N2-R121 dual carriageway link road.

Two sampling periods were carried out for night-time measurements. During the night-time period it was observed that distant road traffic noise was the dominant source. Measured noise levels were 55 and 45dB $L_{Aeq,\ 15\ minutes}$ respectively with background noise levels measured at 43 and 40dB $L_{AF90,\ 15\ minutes}$. The arithmetic average of the $L_{AF90,\ 15\ minutes}$ was 42dB.

Table 1.4: Baseline Noise Survey Results for N3

Position Number	Period	Measurement Period	Measured Noise Levels (dB re. 2x10-5 Pa)		
			L_{Aeq}	L_{A10}	L_{A90}
N3	Daytime	14:26 – 14:59	64	63	46
		16:22 – 16:52	66	69	50
		18:06 – 18:36	64	68	46
		Arithmetic Average of LAF90 (dB)			47
		Daytime Criterion, dB LAr,T			**55**
	Evening	19:20 – 19:35	63	64	44

Position Number	Period	Measurement Period	Measured Noise Levels (dB re. 2x10-5 Pa)		
			L_{Aeq}	L_{A10}	L_{A90}
		Arithmetic Average of LAF90 (dB)			44
		Evening Criterion, dB LAr,T			**50**
	Night-time	23:01 – 23:16	48	51	41
		23:56 – 00:11	45	49	37
		Arithmetic Average of LAF90 (dB)			39
		Night-time Criterion, dB LAr,T			**45**

Three sampling periods were carried out for daytime measurements. Noise levels recorded were in the range of 64 to 66dB $L_{Aeq,\ 30\ minutes}$ with an arithmetic average of 65dB L_{Aeq}. During the daytime, dominant noise source was distant road traffic noise from the N2-R121 dual carriageway link road and passing local traffic with intermittent aircraft passing overhead contributing to the noise environment. This is confirmed by analysis of the L_{A10} statistical noise parameter which had an arithmetic average of 67dB. Background noise levels in the range of 46 to 50dB $L_{AF90,\ 30\ minutes}$. The arithmetic average of the $L_{AF90,\ 30\ minutes}$ was 47dB, which excludes the contribution from any intermittent noise sources such as road traffic noise and as such is more representative of the noise at this location.

The evening background noise level was measured as 44dB $L_{A90,\ 15\ minutes}$. Similarly, to the daytime noise measured, the dominant noise source was noted to be road traffic noise.

Two sampling periods were carried out for night-time measurements. During the night-time period it was observed that road traffic noise was the dominant source. Measured noise levels were 48 and 45dB $L_{Aeq,\ 15\ minutes}$ with background noise levels measured at 41 and 37dB $L_{AF90,\ 15\ minutes}$. The arithmetic average of the $L_{AF90,\ 15\ minutes}$ was 39dB.

1.1.3 Historic Noise Surveys

As noted previously, a review of historic noise monitoring results associated with the 2000 EIS prepared for the proposed limestone quarry and associated development at Bay Lane (Ref: F00A/0862) was also undertaken. As part of this application a baseline noise survey was carried out in 2000 at 7 locations, 3 of which were noise sensitive locations (residential properties).

The results of the most recent of these surveys are outlined below in Table 1.5. Please note the locations referred to as N1 – N7 are different locations to where the baseline noise survey was undertaken. Please refer to Table 1.5 for details of these locations.

Table 1.5: Historic Noise Survey Results

Position Number	Date	Measurement Period	Measured Noise Levels (dB re. 2x10-5 Pa)			Comments
			$L_{Aeq,\ 60\ min}$	$L_{A10,\ 60\ min}$	$L_{A90,\ 60\ min}$	
N1	14/02/2000	13:00 – 17:00	62	50	30	Aircraft passing overhead, occasional road traffic on Bay Lane
N2	17/02/2000	09:45 – 15:25	66	60	40	
N3		11:50 – 12:50	67	61	42	

Position Number	Date	Measurement Period	Measured Noise Levels (dB re. 2x10-5 Pa)			Comments
			$L_{Aeq, 60 min}$	$L_{A10, 60 min}$	$L_{A90, 60 min}$	
N4	21/02/2000	11:30 – 12:30	71	71	38	Aircraft passing overhead
N5		12:35 – 13:35	70	69	35	
N6		14:00 – 15:00	64	46	34	
N7		15:05 – 16:05	68	60	43	Aircraft passing overhead, occasional road traffic on Bay Lane

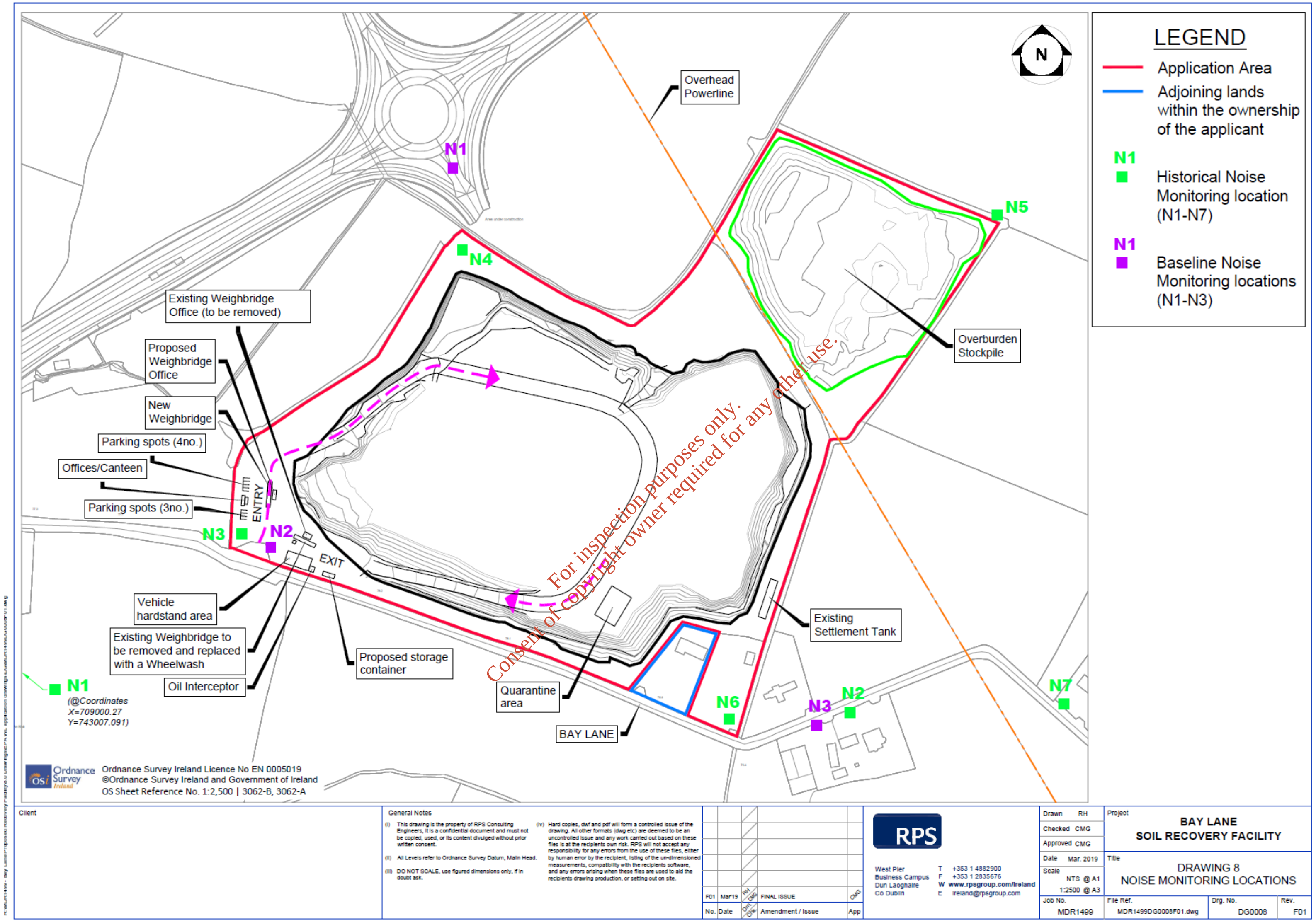

Figure 1.2: Historic and baseline Noise Monitoring Locations (Drawing 8)

1.1.4 Baseline Vibration

It has not been considered necessary to undertake baseline vibration monitoring as there is no evidence to suggest that existing receptors are currently affected by appreciable environmental vibration.

2 RECEIVING ENVIRONMENT – AIR

2.1 EXISTING ENVIRONMENT

2.1.1 Receiving Environment

The site of the proposed development a disused quarry, is located at Bay Lane, St. Margaret's, County Dublin[1], approximately 1km southwest of Exit 2 on the M2 motorway, approximately 4km NNW of Exit 5 (N2) on the M50 motorway and is approximately 7km west of Dublin Airport.

The south-eastern perimeter of the site is bounded by road frontage. The north-western, northern and western perimeter of the site is bounded by lands in active agricultural use.

There are various sensitive receptors (houses, commercial operations) located in the area and these receptors vary in distance from the proposed development. These receptors may experience a change in air quality and the extent of these changes in air quality is identified in this assessment. The nearest sensitive residential receptors to the proposed development are the residential dwellings on Bay Lane.

A small number of commercial operations are within the proposed developments vicinity. The nearest commercial receptors include various operations along the Cherryhound-Tyrellstown (N2-R121) Link Road and Bay Lane.

The nearest Natura 2000 sites to the proposed development are all located over 10km away from the site. The nearest sites of note are:

- Malahide Estuary SAC (site code 000205) and SPA (site code 004025) are located circa 14km to the north east of the site;
- Baldoyle Bay SAC (site code 000199) and SPA (site code 004016) are located circa 15km to the east of the site;
- North Bull Island SAC (site code 000206) and SPA (site code 004006) are located circa 15km to the south east in Dublin Bay; and
- Rye Water Valley/Carton SAC (site code 001398) located circa 13km south west of the site.

There are no other habitats or species located within the vicinity of the proposed development that may be adversely impacted by air quality emissions from the proposed development. As such, this interaction is not addressed further within this assessment.

2.1.2 Existing Sources in the Area

The main existing sources of pollution near the site are from road traffic, air traffic and general dusts. The road network around the proposed development is predominantly composed of national and local roads including Bay Lane to the south that connects to Kilshane Road (L3120) to the east and the

[1] Address per FCC planning decision 1694 reference F00A/0862 of 20 April 2001

Cherryhound-Tyrellstown (N2-R121) Link Road to the west and subsequently the N2 and M50 motorways that link to Dublin city.

The local and regional roads serve HGVs and vehicles entering and leaving the N2 for the operations in in the area including Northwest Business Park, Pallas Foods, Halton Concrete and local housing construction sites in the vicinity.

The on-going soil and stone transport and backfilling operations will give rise to dust dispersion and deposition around the proposed development. The dust dispersion in the area is dependent on the amount of road traffic and the HGVs used at the proposed development and the surrounding operations.

Dublin Airport is located approximately 7km from the site at Bay Lane, with the western end of the existing Runway 10/28 located approximately 3.5km from the site's eastern boundary. The site is also located beneath an existing flight path, with aircraft passing overhead on a regular basis.

Waste operations in the area can give rise to odour and dust nuisances to the receptors in the area. There are two waste facilities in the surrounding area that are licenced by the EPA:

- W0277 - Huntstown Inert Waste Recovery Facility (Roadstone Limited): Operating as a Soil Recovery Facility and circa 1.5km south east of the site.
- W0183 - Starrus Eco Holdings Limited, Cappagh Road – Materials Recovery Facility and circa 2km south of the site.

In addition, there are a further set of industrial licensed facilities in the area as follows:

- P0474 - Patrick Kelly Timber Limited (wood processing) circa 2km east of the site.
- P0993 - Huntstown Bioenergy Limited (powergen) circa 2km south east of the site.
- P0483 - Huntstown Power Company Limited (powergen) circa 2km south east of the site.
- P0777 - Viridian Power Limited (powergen) circa 1.5km south east of the site.
- P0552 - Swords Laboratories (pharmachem) circa 3km south west of the site.

Each of the above operations have potential emissions of both scheduled emissions (through stacks, at powergen) and fugitive emissions of dusts (the waste operators) as well as road traffic serving each operation.

2.1.3 Baseline Air Quality

Air quality legislation in Ireland deals with air quality by the means of "zones" based on population. For Ireland, four zones are defined, and the main areas defined in each zone are:

- Zone A: Dublin Conurbation
- Zone B: Cork Conurbation
- Zone C: Other cities and large towns comprising Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee, Dundalk, Navan, Letterkenny, Celbridge, Newbridge, Mullingar, Balbriggan, Greystones, Leixlip and Portlaoise.
- Zone D: Rural Ireland, i.e. the remainder of the State excluding Zones A, B and C.

The proposed development is located on Bay Lane, St. Margaret's, North Co. Dublin in the jurisdiction of Fingal County Council. As such, the site lies within EPA Air Quality Zone A (Dublin Conurbation). The

EPA air quality monitoring network for Zone A and the Dublin Airport Authority (daa) air quality monitoring network have been reviewed and suitable representative data is presented to identify the background air quality around the proposed development.

A summary of the EPA monitoring carried out in Zone A (Dublin Conurbation) is presented in the following sections. The EPA monitoring networks in Zone A includes several monitoring locations in North Dublin. Of these Blanchardstown, Finglas and Swords monitoring stations would be most representative of the site location at Bay Lane. However, each of these monitoring locations do not record all ambient air quality parameters outlined in the Directive on ambient air quality and cleaner air for Europe (2008/50/EC). Therefore, air quality in the receiving environment is described using the average annual mean value concentrations from all measured monitoring stations in Zone A.

Table 2.6 shows the aggregated annual mean value concentrations measured for SO_2, PM_{10}, $PM_{2.5}$, NO_2, NO_X, CO and benzene in Zone A for 2016 and 2017. The table compares the annual mean measured levels with the limit values defined in the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011). The averages are considered representative of the north Co. Dublin area and the site of the proposed development.

Table 2.1: Extract of summary data from EPA Ambient Air Monitoring for Zone A in 2016 and 2017

Pollutant	Unit	Annual Mean Concentration in 2016	Annual Mean Concentration in 2017	Annual Limit for Protection of Human Health
Nitrogen Dioxide (NO_2)	µg/m^3	23.7	20.8	40
Nitrogen Oxide (NOx)	µg/m^3	42.8	37.6	30
Sulphur Dioxide (SO_2)	µg/m^3	1.2	1.66	20
Particulate Matter (PM_{10})	µg/m^3	13.5	12.4	40
Particulate Matter ($PM_{2.5}$)	µg/m^3	8.6	7.5	25
Carbon Monoxide (CO)	mg/m^3	0.3	0.285	10
Benzene	µg/m^3	1.01	0.92	5

The existing baseline levels of SO_2, PM_{10}, $PM_{2.5}$, NO_2, CO and Benzene based on data from the EPA monitoring network are currently below annual ambient air quality limit values in Zone A. The annual mean for Nitrogen Oxide (NO_x) is above the annual limit in Zone A, however, NO_x exceedances are more concerning in areas of sensitive ecosystems due to potential effects on vegetation and hence these elevated levels in the Dublin area are not considered a significant compliance issue.

Dublin Airport is located approximately 7km east of the site at Bay Lane, with the western end of the existing Runway 10/28 located approximately 3.5km from the site's eastern boundary. The site is also located beneath an existing flight path, with aircraft passing overhead on a regular basis.

A summary of the Air Quality monitoring carried out by daa is presented in the following sections. The daa monitoring network includes an on-site monitoring location which monitors NO_2 and PM_{10} and ten off-site monitoring locations which monitor NO_2 and Benzene.

Table 2.2: Dublin Airport Air Quality Monitoring Figures (on-site monitoring - continuous analyser)

Pollutant	Unit	Annual Mean Concentration in 2016	Annual Mean Concentration in 2017	Annual Mean Concentration in 2018	Annual Limit for Protection of Human Health
Nitrogen Dioxide (NO_2)	µg/m^3	23	20	28	40
Particulate Matter (PM_{10})	µg/m^3	23	21	20	40

The existing baseline levels of PM_{10}, and NO_2 based on data from the daa on-site monitoring location are currently below annual limits of protection for ambient air quality limit values. The daa off-site air quality monitoring figures for NO_2 and Benzene (annual limit of 5 µg/m^3) for 2016, 2017, and 2018 were all below annual limit values.

In summary, existing baseline levels of pollutants based on the data from both the EPA Zone A and daa monitoring networks are currently below ambient air quality limit values and by extension the levels near the proposed facility are also considered to be below the limit values.

2.1.4 Baseline Climate

The weather in Ireland is influenced by the Atlantic Ocean, resulting in mild, moist weather dominated by maritime air masses. The prevailing wind direction is from a quadrant centred on west-southwest. These are relatively warm winds from the Atlantic and frequently bring rain. Easterly winds are weaker and less frequent and tend to bring cooler weather from the northeast in spring and warmer weather from the southeast in summer. The site of the proposed soil recovery facility is approximately 15km west of the east coast would experience a higher frequency of easterly winds than more inland locations or those on the west coast.

The nearest meteorological station to the area is the Met Éireann Station in Dublin Airport which lies approximately 7km (terminal buildings) east of the subject site. The 30-year averages from the station at Dublin Airport are presented in **Table 2.9**.

Table 2.9 The 30-Year Average Meteorological Data from Dublin Airport (Annual Values from 1981-2010, source: www.met.ie)

Parameter	30-Year Average
Mean Temperature (°C)	9.8
Mean Relative Humidity at 0900UTC (%)	83.0
Mean Daily Sunshine Duration (Hours)	3.9
Mean Annual Total Rainfall	758.0
Mean Wind Speed (knots)	10.3

2.1.4.1 Temperature

At Dublin Airport the 30-year record for temperature (**Table 2.10**) shows that the average daily temperature across a calendar year is 9.8°C with an average maximum of 13.3°C and an average minimum of 6.4°C. Across the calendar year the average number of days with air frost is 29.4.

Table 2.10 The 30-Year average data for rainfall at Dublin Airport (Annual Values from 1981-2010, source: www.met.ie)

Temperature (°C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Daily Max	8.1	8.3	10.2	12.1	14.8	17.6	19.5	19.2	17	13.6	10.3	8.3	13.3
Mean Daily Min	2.4	2.3	3.4	4.6	6.9	9.6	11.7	11.5	9.8	7.3	4.5	2.8	6.4
Mean Temperature	5.3	5.3	6.8	7.3	10.9	13.6	15.6	15.3	13.4	10.5	7.4	5.6	9.8
Mean num. of Days with Air Frost	6.4	6.5	3.8	2.4	0.3	0	0	0	0	0.5	3.0	6.4	29.4

2.1.4.2 Wind

The prevailing wind direction for the area is between west and southwest (10-20%) as presented in the wind-rose for Dublin Airport Meteorological Station for 1981-2010 in **Figure 2.1**. Northerly and north-easterly winds tend to be very infrequent (less than 5%) with easterly and south-easterly winds marginally more frequently (5-10%).

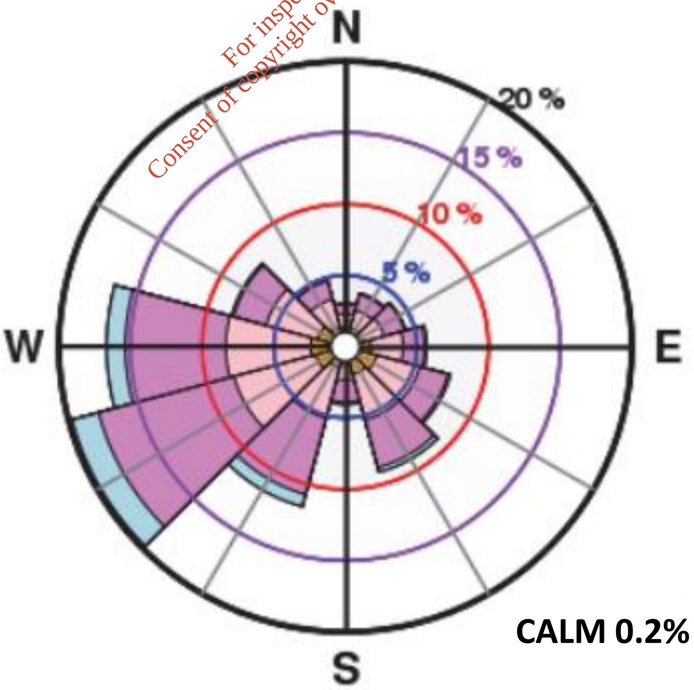

Figure 2.1 Wind-rose for the Dublin Airport Meteorological Station 1981 – 2010 (Source: www.met.ie)

Wind characteristics are typically moderate with relatively infrequent gales with an average of 8.2 days with gales per annum with an average maximum wind gust of 80 knots during the year (January) (**Table 2.11**).

Table 2.11 30-Year average data for wind at Dublin Airport (Annual Values from 1981-2010, source: www.met.ie)

Wind (knots)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Monthly Speed	12.5	12.0	11.6	9.9	9.2	8.6	8.7	8.7	9.2	10.4	11.0	11.3	10.3
Max. Gust	80	73	66	59	58	53	54	56	59	69	66	76	80
Mean num. of Days with Gales	2.3	1.5	1.1	0.1	0.1	0.1	0.1	0.1	0.2	0.5	0.8	1.3	8.2

2.1.4.3 Rainfall

The average yearly rainfall in the 30-year average is 758.0mm, this is broken down into monthly averages in **Table 2.12**. The greatest daily total of rain is recorded in May (73.9mm) with moderately frequent days with ≥5.0mm per annum (42 days).

Table 2.12 30-Year average data for rainfall at Dublin Airport (Annual Values from 1981-2010, source: www.met.ie)

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Monthly Total	62.6	48.8	52.7	54.1	59.5	66.7	56.2	73.3	59.5	79.0	72.9	72.7	758.0
Greatest Daily Total	27.1	28.1	35.8	30.4	42.1	73.9	39.2	72.2	40.6	53.2	62.8	42.4	73.9
Mean num. Days with ≥5.0mm	4	3	3	3	3	3	3	4	4	4	4	4	42

2.1.4.4 Weather Events

The proposed development must consider weather events relating to cold weather, wind, rain and events (storms, snow etc.) that may disrupt operations.

Table 2.13 displays the mean number of days per annum on average across the 30-year average a weather event occurs. Snow lying at 0900UTC is infrequent occurring on average 3.4 days per annum, posing a low risk to operations. Fog is the most frequent weather event observed at Dublin Airport during the 30-year average records, occurring on average 41.5 days per annum.

Table 2.13 30-Year average data for weather events at Dublin Airport (Annual Values from 1981-2010, source www.met.ie)

Weather (mean num. of days with…)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Snow or Sleet	4.6	4.2	2.8	1.2	0.2	0	0	0	0	0	0.8	2.9	16.6
Snow lying at 0900UTC	1.6	0.6	0.1	0	0	0	0	0	0	0	0.1	0.9	3.4
Hail	1.2	1.5	2.0	1.9	1.3	0.1	0.2	0.1	0.1	0.3	0.3	0.7	9.7
Thunder	0.3	0.2	0.3	0.2	0.9	0.8	0.8	0.9	0.3	0.3	0.2	0.2	5.5
Fog	3.3	3.1	3.6	3.6	3.4	2.8	3.3	3.8	4.2	3.2	3.1	4.1	41.5

3 RECEIVING ENVIRONMENT – WATER

3.1 BASELINE CONDITIONS

3.1.1 Rainfall and Climate

The 30-year average annual rainfall measured at Dublin Airport is 757.9mm for the period 1981 to 2010. The annual average values for the period 2010 to 2018 are shown in **Table 3.1** where data is available. The data shows that since 2016 the average rainfall has been lower than the 30-year average. Annual potential evapotranspiration has not changed significantly since 2015 and has a peak value of 584mm/year in 2018. Effective rainfall which is the amount of rainfall available to infiltrate the ground (and not evaporated or taken up by plants) has been notably low in 2017 and 2018. In 2018, dry summer months were counteracted by wet winter months.

Table 3.1: Annual Rainfall and Potential Evapotranspiration measured at Dublin Airport

Year	Rainfall (mm/yr)	Potential Evapotranspiration (mm/yr)	Effective Rainfall (mm/yr)
2018	709.4	584.1	125.3
2017	660.7	552.7	108
2016	713.6	571.0	142.6
2015	878.4	551.3	327.1
2014	927.2	-	-
2013	763.9	-	-
2012	849.5	-	-
2011	671.8	-	-
2010	671.4	-	-

3.1.2 Site Area Description

The site area is approximately 13.67ha in total and the regional topography surrounding the site is generally flat. The topographic contours of the site are displayed in **Figure 9.6 in the Soils, Geology and Hydrogeology Section**, the natural ground level at the site boundary range between 74mAOD and 76mAOD. The pit slopes surrounding the quarry open cut that represent the land awaiting backfill are near-vertical and extend from the top of the rock to approximately 59mAOD. A berm extends around the pit within the site boundary, the top of the berm varies around the site between 76mAOD (north and east) and 80mAOD (south).

The proposed backfilling of the existing Bay Lane Quarry pit will restore the ground surface to the pre-quarrying levels, making the site more consistent with the surrounding landscape. The backfilling and restoration will be slightly domed to allow surface flow and compacted to allow for future built development if this were permitted. The final proposed restoration is shown in **Drawing 7 - Landscaping Restoration Plan** and referenced in the Landscape Chapter. Landscaping is discussed in more detail in **Chapter 16** of the EIAR.

3.1.3 Existing Site Drainage

Regionally, the bedrock is likely being recharged from topographic highs where the groundwater level in superficial is high and downward vertical flow can occur. Discharge of groundwater is into surface water drainage systems in low-lying areas. The groundwater levels on site vary between near-surface approximately 75mAOD and 59mAOD. The site contains a sump in the north-north-west of the site and a settlement tank in the south-east.

Since the quarry has ceased activity in 2008/2009 it would appear that it has drained only through evaporation and/or surface water runoff. The surface water run-off that fell within the open pit remained with no direct discharge to the nearby streams hence contributing to the pooling of standing water. The ground level areas of the site either drain into the open pit or via percolation to the existing groundwater and discharge into the local drainage ditches. There was no surface water run-off discharging to the settlement tank.

When the site was an active quarry, the sump in the north-north-west section of the site was used in conjunction with a pump to control the groundwater level within the open pit. Water from the sump was pumped to a settlement tank located on south-east of the site, where water was collected, settled and discharged into a near-by stream, which is tributary of the River Ward (River Shallon on EPA mapping), on the eastern boundary of the site.

The settlement tank is constructed from reinforced concrete with 6m x 31m dimensions and a height to top water level of 5m. Accumulated settled solids are periodically removed by draining down the tank and pumping out the solids using the sludge pump. After settlement, clarified water drains by gravity to an adjacent separator tank, the discharge from the separator is piped directly to a nearby ditch.

The site was previously controlled by Irish Asphalt Ltd. Irish Asphalt undertook monitoring of surface water / surface water discharge on an annual basis and released annual analysis of the surface water quality of discharge. Grab samples were obtained from the discharge point at the site in accordance with the requirements of the Trade Effluent Licence. Irish Asphalt was licenced from Fingal County Council (FCC) (Registration number WPW/F/047) to discharge this water into the stream until 2008 which has since been inactive.

An application, by GLV Bay Lane Limited, has been made to FCC to reactivate the discharge licence in to empty the pit of standing water using the same proposed site drainage for Phase 1 of the pit backfilling. The first phase will consist of constructed surface water channels to direct the flow path of standing water and surface water runoff within the open pit to discharge to the existing sump located on the north-north west section, where it will be pumped to the settlement and separator tank at the south-east corner of the site. The flow from the pond is to be pumped to the settlement and separator tank for treatment. The final effluent from the tank is to discharge to nearby stream through an outfall pipe with peak flow restricted to greenfield run-off rate (45.74 l/s). This arrangement is to be maintained until the standing water level is reduced to sufficiently low level to allow machinery operate within the open pit.

3.1.4 Proposed Site Drainage

GLV Bay Lane Limited will have applied for a licence from FCC to pump standing water from the quarry floor into a settlement tank, and then to discharge the water into the stream with peak flow restricted to greenfield run-off rate prior to backfilling of the pit. This proposed drainage will also be utilised during Phase 1 of the filling of the pit. The drainage layout is displayed in **Figure 3.1.**

Following the emptying of the pit of standing water, approval will be sought from the EPA via the waste licence to maintain surface water drainage from the pit during the operational period of the quarry restoration. The proposed drainage arrangement for the open pit during operation will consist of varying drainage arrangements for three phases of the backfill operation. All discharges from the site will be sent to the settlement and separator tank, prior to discharge to adjacent unnamed stream with peak flow restricted to greenfield run-off rate (45.74 l/s).

The first phase of the operational period will consist of contouring the backfill in the south west area of the pit towards surface water channels adjacent to the proposed access directing the flow of standing water and surface water runoff to discharge to the existing sump located in the north west of the pit, where it will be pumped (rate - 0.05 m^3/s) to the settlement and separator tank at the south-east corner of the site. Other surface water channels will be contoured around the edge of the pit to direct flow towards the sump. The flow from the pond is to be pumped to the settlement and separator tank for treatment. The final effluent from the tank is to discharge to nearby stream through an outfall pipe with peak flow restricted to greenfield run-off rate.

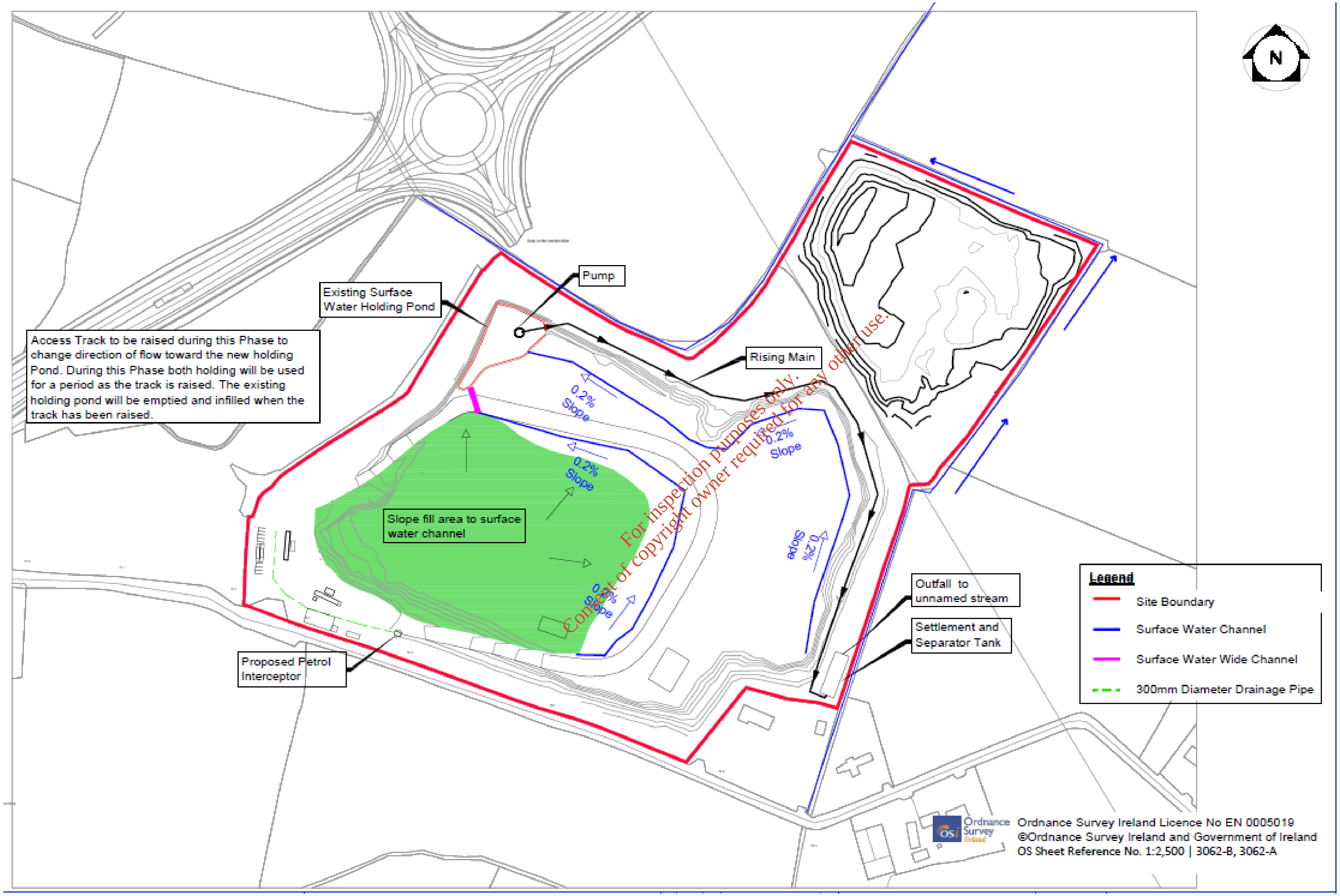

Figure 3.1 Proposed Drainage Layout Phase 1

The second phase**, Figure 3.2**, consists of additional surface water channel constructed along the access track to convey surface water run-off and groundwater discharge to a sump at the south-east corner of the open pit. The backfilling will take place in the north east of the pit and backfill the existing sump (which will be emptied prior to being backfilled) The access track will need to be partially backfilled to slope towards to secondary sump in the south east corner. During this phase both sumps may need to be used during the transition period of the access track to slope to the south eastern sump. The flow from the second sump is to be pumped to the settlement and separator tank for treatment prior to discharge to nearby stream. The final effluent from the tank is to discharge to nearby stream (mean flow rate 48 l/s) through an outfall pipe with peak flow restricted to greenfield run-off rate (45.74 l/s).

The final phase, **Figure 3.3**, will consist of backfilling the access road and the second sump. As the land is raised it will be sloped towards the existing drainage ditches along the boundary of the site. This also allow surface water and groundwater to begin to discharge back into the existing ditches to replicate the drainage of the site prior to the excavation of the quarry.

As the pit is backed filled it will be compacted during all phases to limit the infiltration of the surface water to allow the groundwater to rebound to its natural state. The pit will not be lined and dewatering of the pit will continue during the backfill period to ensure slope stability and prevent ponding of surface water.

The surface water run-off for the site compound will discharge to a proposed plastic pipe which will be treated by a petrol interceptor prior to discharge to the sumps via a surface water channel.

Upon final restoration, as referenced in the Landscape Chapter 16, of the entire site the surface water channels will be buried. The petrol interceptor, drainage pipes and settlement tank to be removed from site. The proposed ground surface at final restoration will be domed to allow surface water run-off and groundwater to discharge to existing ditches located to the north, south, east and west of the site boundary.

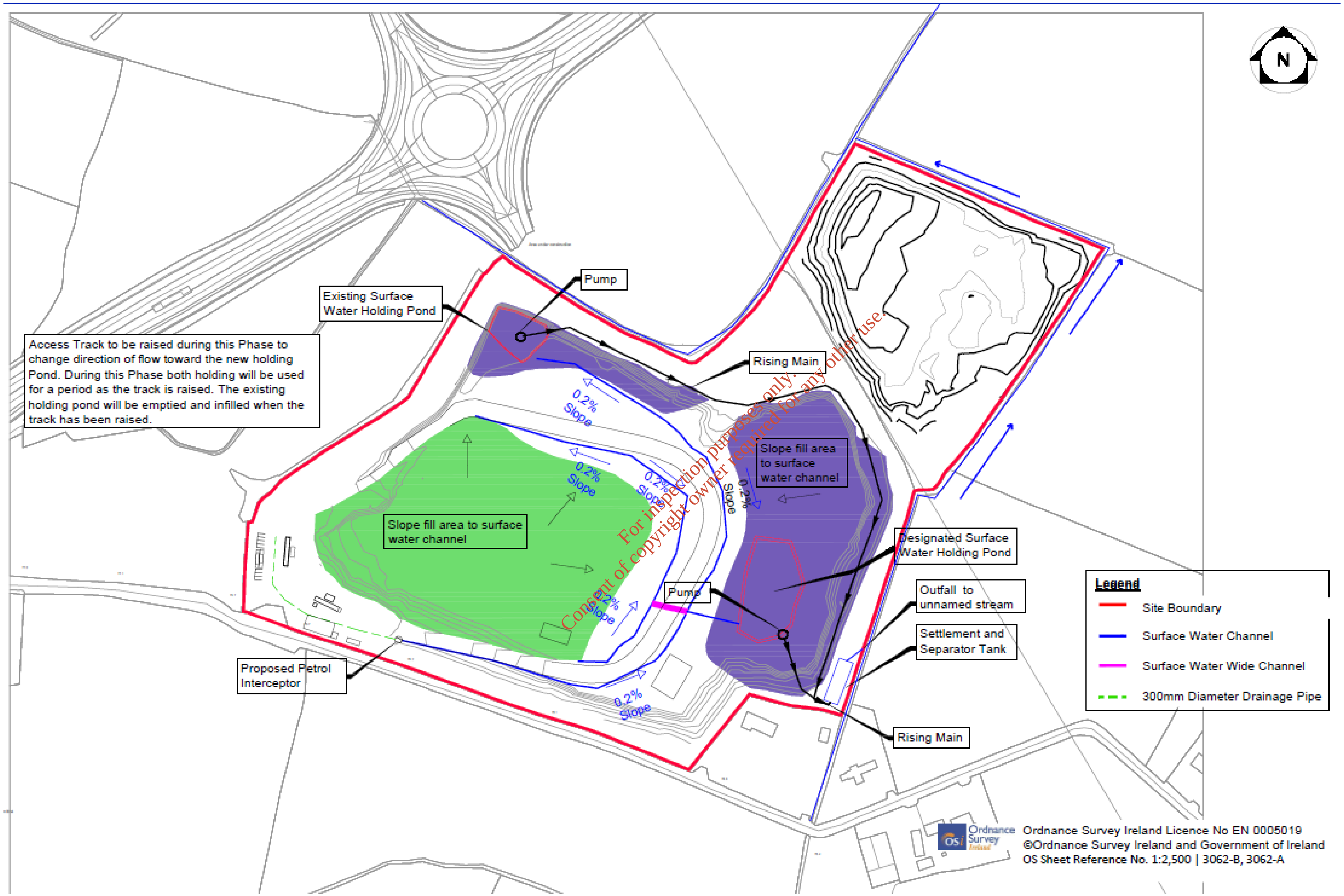

Figure 3.2 Proposed Drainage Layout Phases 1 and 2

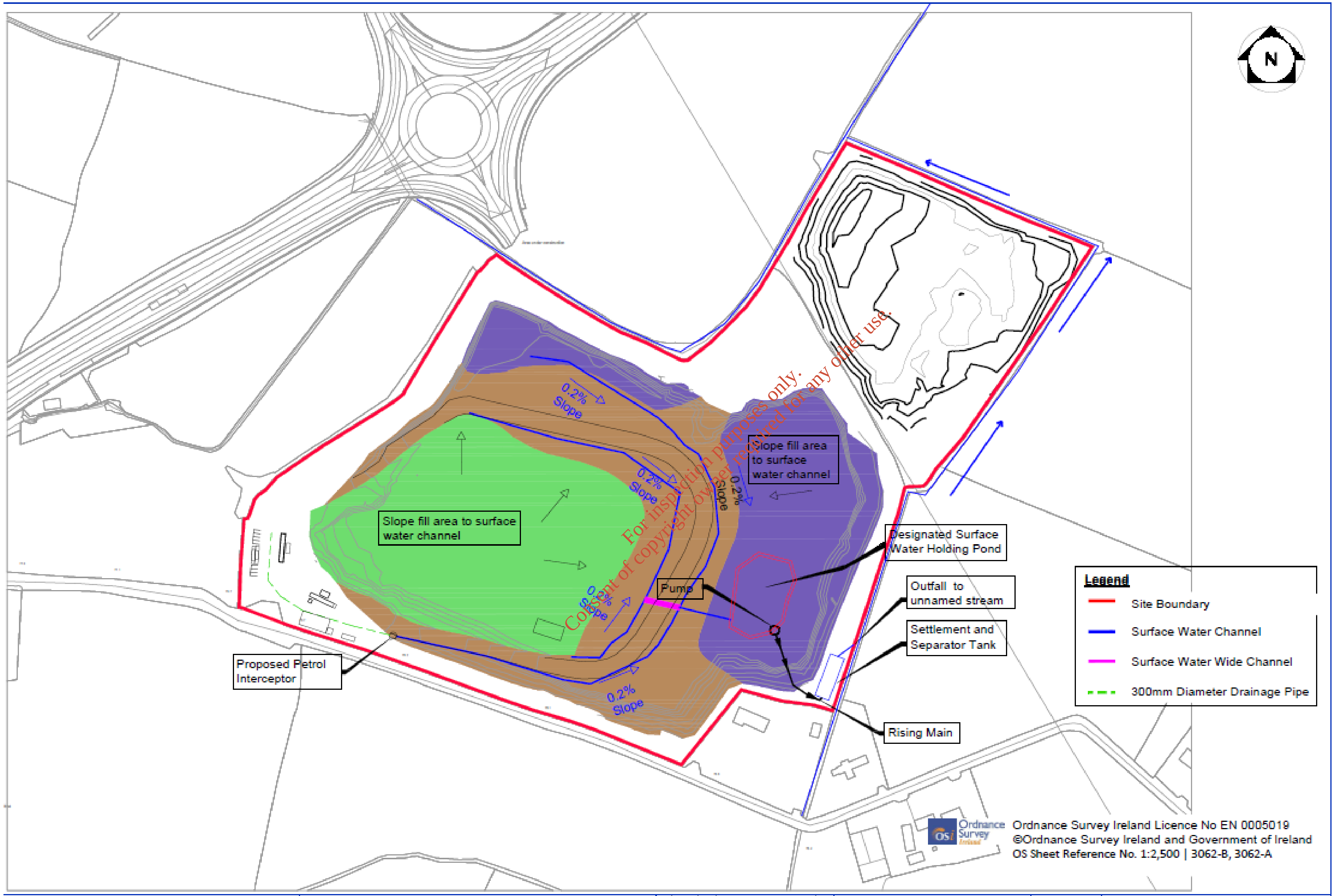

Figure 3.3 Proposed Drainage Layout Phase 3

Open Channels

The open channel proposed for the site will consist of a trapezoid shape and sized to convey the peak surface water run-off rate for the 5-year return period and groundwater discharge during the backfilling operations. The sizing for the proposed channel was designed based on a longitudinal slope (fall) of 1 in 500. The proposed dimensions for the open channel are indicated in **Figure 3.4** below.

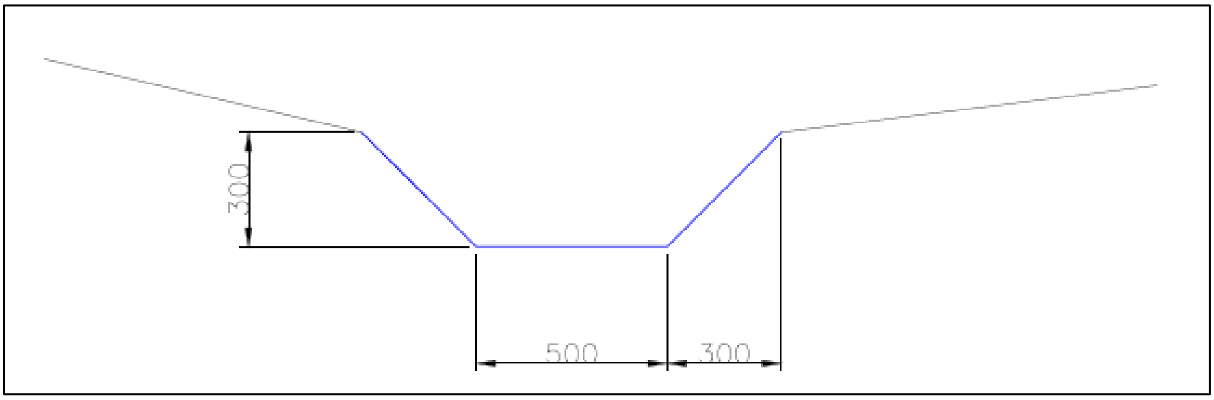

Figure 3.4 Open Channel Dimensions

Further modification was made with the open channel design just for a section of the channel for a wider channel to allow Heavy Goods Vehicles (HGVs) to cross the channel onto the access ramp from the open pit. The side slopes for the channel was reduced to 1 in 3 slope to allow for HGV access. The proposed dimensions for the wide channel are indicated in **Figure 3.5** below.

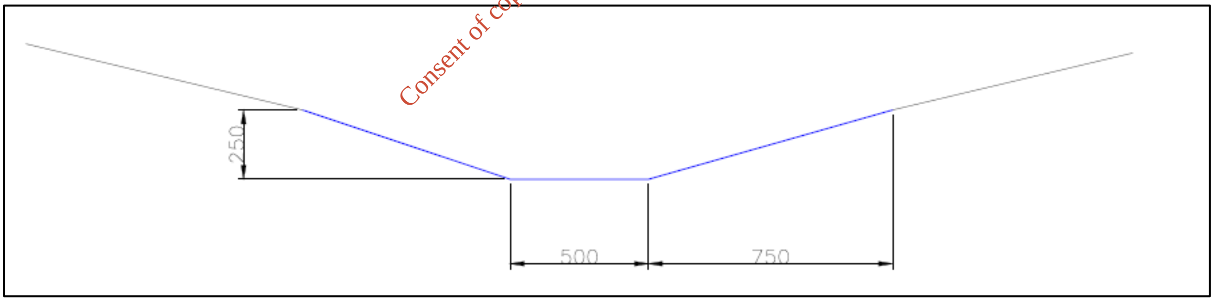

Figure 3.5 Wide Channel Dimensions

Sizing attenuation storage

The Frequency Duration Depth (FDD) table supplied by Met Eireann for the site location was used to predict surface water run-off within the open pit during storm events. The design return period has been taken at 1 in 50 years. For the purpose of estimating design storm run-off, the site has been divided into two areas, the open pit itself and the surrounding non-excavated ground to account for the variation with infiltration from the site.

The infiltration rates have been attributed for the two areas based on the results of the rising head tests undertaken on site previously and the resulting run-off calculated for different duration storms.

The peak total run-off occurs after 4 hours, although run-off rates are greater for smaller duration events. The maximum total run-off for the site has been estimated to be 3,098 m^3 for a 4-hour event.

The settlement and separator tank provide 500m^3 storage hence the storage requirement for the site and the sumps temporary is 2598 m^3. This storage volume can be distributed between both sumps during the phasing of the backfill. During the final phases of the backfilling operation as the fill material itself will be able to retain some storage volume. However, as the material will be compacted to raise the water table the estimated 30-year storage volume (2103 m^3) will be maintained during the backfilling duration as a conservative mitigation measure. The invert level of the sump will be raised as the backfilling takes place during Phase 2 and Phase 3.

3.1.5 Surface Water Catchment

According to the EPA database, the river that flows along the west and north of the site is the Ward River (part of the Shallon River Network – IE_EA_08W010300). The EPA mapping locates the Shallon River within the Broadmeadow river catchment (Broadmeadow_SC_010). The flow direction of this Ward River from the site is generally to the north east and flows towards Swords where it discharges into the Broadmeadow River. There is an unnamed stream to the east of the site which is a tributary of the Ward River.

The Shallon River Network (**Figure 3.6**) is known as the Water Framework Directive (WFD) Broadmeadow[river]_SC_010 sub-catchment and forms part of the wider EPA Hydrometric Area no. 08 (HA08). A review of OSi Historic maps between 1837 and 1913 show that the river and stream courses have not changed significantly in the interim.

Potential dependent Groundwater Bodies (GWBs) which spatially intersect the Broadmeadow WFD sub-catchment include:

- Swords GWB (IE_EA_G_011)
- Lusk-Bog of the Ring GWB (IE_EA_G_014)

Groundwater bodies are discussed further detail in **Chapter 9** (Soil and Geology and Hydrogeology).

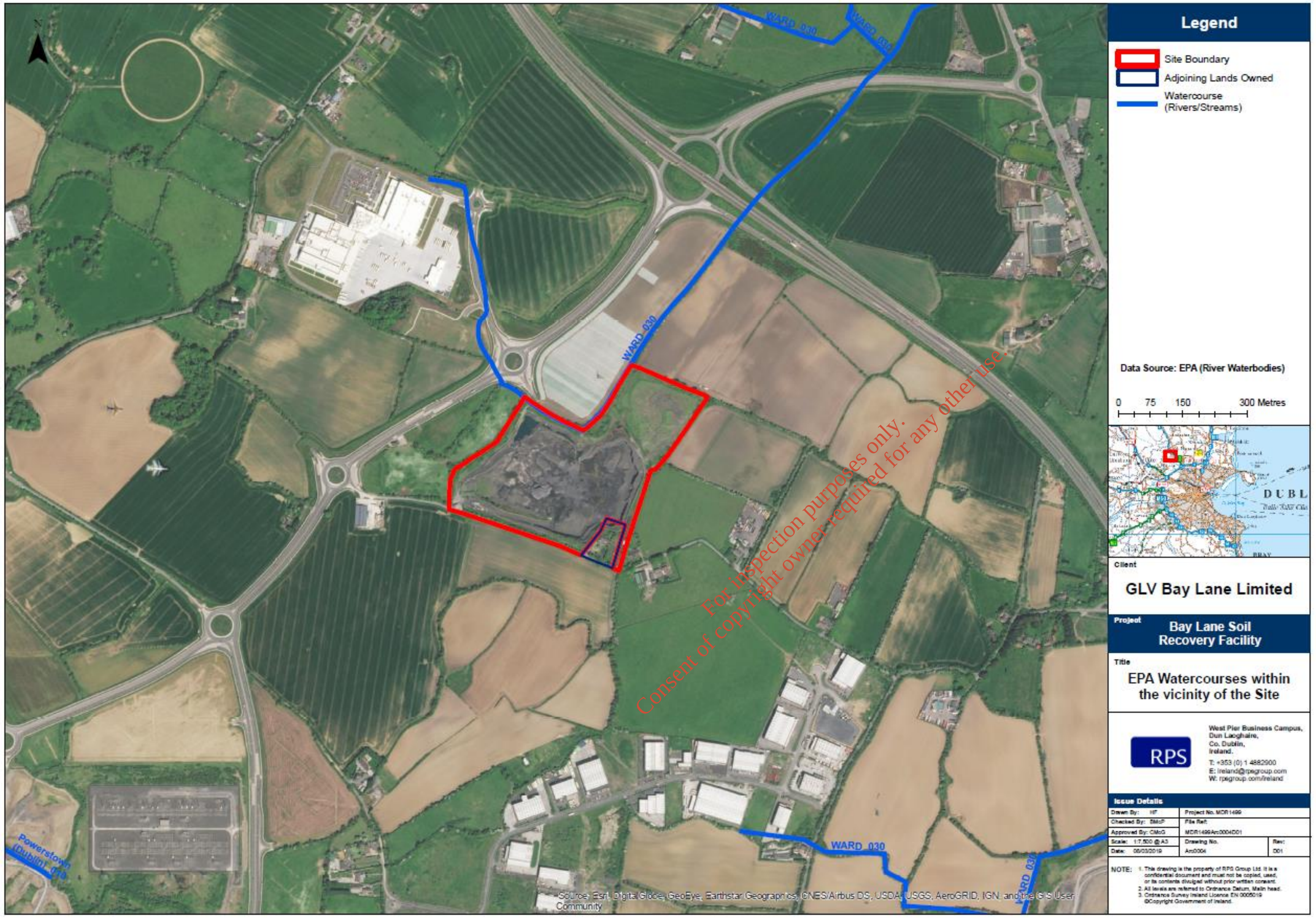

Figure 3.6 Surface Water Environment

3.1.6 Surface Water Quality

3.1.6.1 Regional

The WFD requires 'Good Water Status' for all European waters by 2015 or at the latest by 2027, to be achieved through a system of river basin management planning and extensive monitoring. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'. The overall objective of the river basin management plans is to restore the status to 'Good' by 2021.

The WFD status 2010 to 2015 for the Ward River adjacent to the site (IEEA_08W0103000) is 'Good', however, as the river approaches Swords, the status becomes 'Poor' and projected 'At Risk'.

The WFD status 2010 to 2015 for Broadmeadow Transitional Waterbody (IE_EA_060_0100) is assigned as 'Moderate'.

The biological quality of the Ward River is assessed by the EPA at Ward – Chapelmidway Bridge monitoring station (RS08W010100), located approximately 6km north east (down gradient) of the site and at Bridge North of Killeek monitoring station (RS08W010300) located approximately 8km north east of the site (down gradient).

Q-Values are used by the EPA to express biological water quality, based on changes in the macro invertebrate communities of riffle areas brought about by organic pollution. The higher the pollution level in a watercourse, the lower the Q-value as summarised in **Table 3.2**.

Table 3.2: EPA Biological Q – Value Ratings

Quality Ratings (Q)	Status	Water Quality
Q5, Q4-5	High	Unpolluted
Q4	Good	Unpolluted
Q3-4	Moderate	Slightly polluted
Q3, Q2-3	Poor	Moderately polluted
Q2, Q1-2, Q1	Bad	Seriously polluted

Table 3.3: EPA Q Values for Ward River

Station Code	1988	1991	1994	1996	1998	2001	2005	2008	2010	2014
Ward – Chapelmidway Bridge monitoring station (RS08W010100)	2-3	2	3	-	-	-	-	-	-	-
Bridge North of Killeek monitoring station (RS08W010300)	3	2	-	3	3	3	2-3	3	3	4

The EPA Q values for the Ward River between 1988 and 2017 are displayed in **Table 3.3**, the results indicate predominantly moderate pollution within this surface waterbody.

3.1.6.2 Locally

Samples (4 No.) were obtained from the standing water within the open pit and also from the unnamed stream (2 No.) to confirm the water quality within the site and potential impact of the discharging effluent on water quality of the adjacent stream. The sample location points are shown in **Figure 3.7** and were:

1. P1 - from the standing water within the open pit
2. P2 - from the standing water within the open pit
3. P3 - from the standing water within the open pit
4. P4 as a replicate of p2 - from the standing water within the open pit
5. P5 a blank
6. In the Shallon Ward river upstream with reference to the proposed discharge point.
7. In the Shallon Ward river downstream with reference to the proposed discharge point.

The results are presented in Appendix 9.

Surface water results have been compared to guideline values within the following legislation:

- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (SI No. 272 of 2009) and (Amendment) Regulations 2015 (SI No. 386 of 2015)

Reported inorganic concentrations were all below the relevant surface water guidelines with the exception of:

- Ammoniacal Nitrogen as N which exceeded the guideline of 0.065mg/l within samples; P1 (0.11mg/l), upstream (0.37mg/l) and downstream (0.5mg/l).
- BOD which exceeded the guideline of 1.5mg/l within samples; upstream (2mg/l) and downstream (2mg/l).
- Dissolved Copper which exceeded the guideline of 30mg/l within the sample; P5 (122mg/l).
- Dissolved Nickel which exceeded the guideline of 4mg/l within the samples; P1 (15mg/l), P2 (15mg/l), P3 (15mg/l) and P4 (14mg/l).

Reported organic concentrations (volatiles or semi-volatiles) were all below relevant surface water guidelines with the exception of Fluoranthene which exceeded the guideline of 0.0063µg/l in the downstream sample (0.068 µg/l).

Reported pesticide concentrations were all below laboratory detection limit.

3.1.7 Flood Risk

The lands and the surrounding area fall within the Fingal East Meath Flood Risk Assessment and Management (FEMFRAM) Study (2011). The outputs of the study included flood extent mapping, flood risk management proposals and flood risk management plans. However the OPW flood mapping website does not show that the site falls within any modelled flooding. The closet recorded and predicted flood risk to the site as per the OPW flood risk mapping tool are available on the flood info website (http://www.floodinfo.ie/map/floodmaps/). The Preliminary Flood Risk Assessment (PFRA) extents for the proposed development, **Figure 3.8**, shows that the site is not in an area of fluvial, or groundwater or coastal flood risk (Flood Zone C, probability of flooding less than 0.1%). The figure does show a large pluvial extent for the site which however this can be attributed the quarry pit being open and potential rainwater gathering there. As the pit will be restored to the existing ground levels the risk of pluvial flooding will reduced to standard greenfield runoff.

The flood mapping website also contains records of historical flooding incidents in the surrounding area. The nearest single flood event listed is approximately 1.5km south east of the site occurring at the N2 in November 2002. The flooding at the N2 contributed from runoff from adjacent grasslands. Drainage works was carried out at this location in 2005. There are currently no OPW flow gauges present within the Broadmeadow sub-catchment or within the Broadmeadow River Catchment. The review of all available data concluded that site is an appropriate development within this area, and there any flooding or surface water management issues related to the site are extremely low.

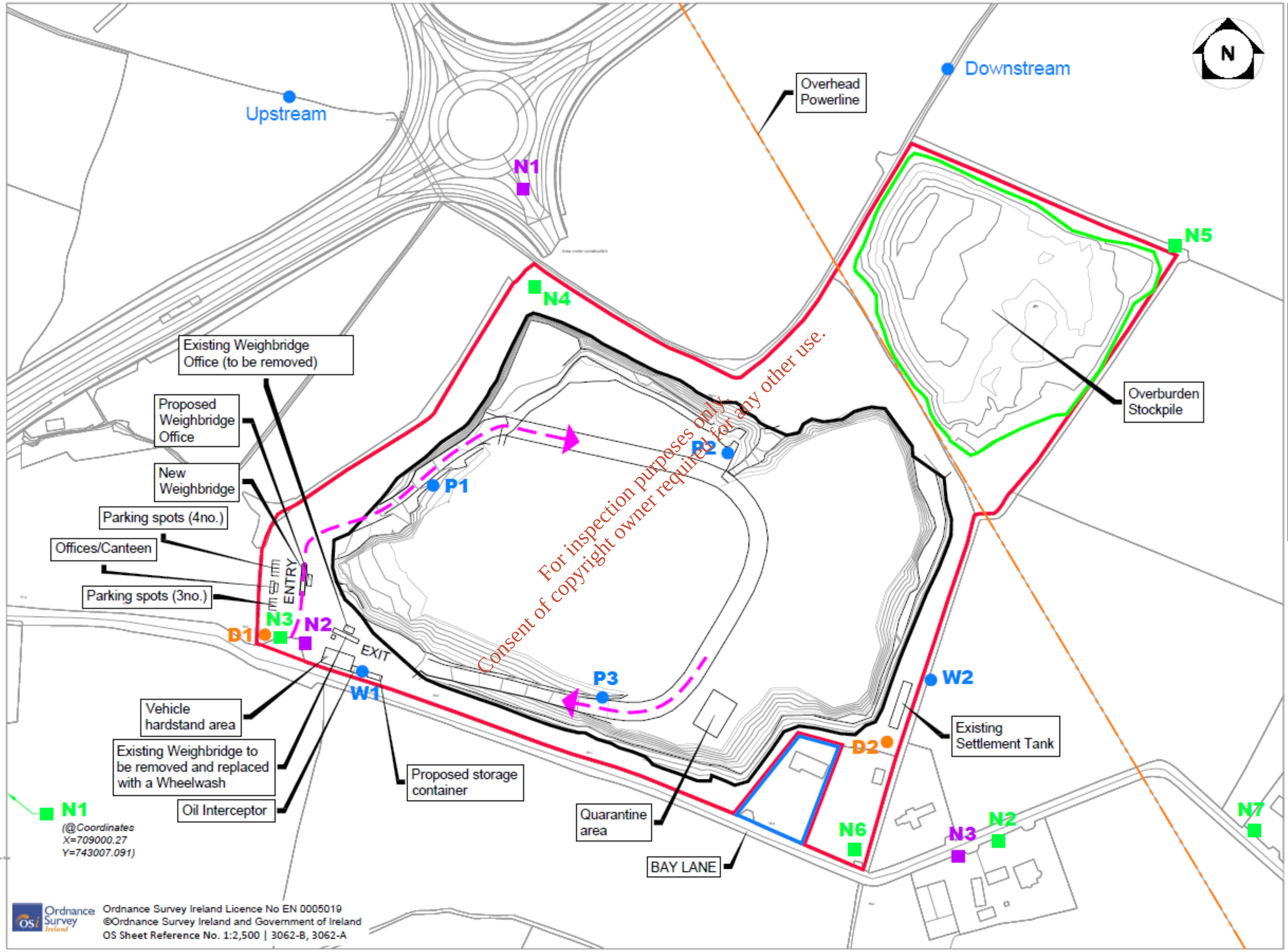

Figure 3.7 Surface Water Monitoring Locations denoted as p1, p2, p3, and upstream and downstream

Figure 3.8 PFRA Pluvial Flood Extents (myplan.ie)

3.1.8 Areas of Conservation

The NPWS database lists no areas of conservation in the immediate vicinity of the site. The sites designated for nature conservation within a 20km radius are as follows:

- Special Areas of Conservation (SAC)
  - Rogerstown Estuary SAC (000208)
  - Malahide Estuary SAC (000205)
  - Ireland's Eye SAC (002193)
  - Rockabill to Dalkey Island SAC (003000)
  - Baldoyle Bay SAC (000199)
  - North Dublin Bay SAC (000206)
  - Rye Water Valley/Carton SAC (001398)
- Special Protected Areas (SPA)
  - Rogerstown Estuary SPA (004015)
  - Malahide Estuary SPA (004025)
  - Ireland's Eye SPA (004117)
  - Baldoyle Bay SPA (004016)
  - North Bull Island SPA (004006)
- Proposed National Heritage Areas (pNHA)

- Rogerstown Estuary (000208)
- Malahide Estuary (000205)
- Ireland's Eye (000203)
- Baldoyle Bay (000199)
- North Dublin Bay (000206)
- Rye Water Valley/Carton (001398)

Further details on the above designated sites and their respective distance from the site are presented in EIAR **Chapter 8 (Biodiversity)**.

3.1.9 Other Projects and Facilities

Huntstown Landfill (W0277-03) lies approximately 2km south east of the site and is accessed along various unnamed roads. The Huntstown Landfill has the largest capacity of annual intake in the Greater Dublin Area (GDA) accepting 750,000 tonnes per annum and is forecasted to remain the largest following the closure of the Murphy Concrete facility in 2018.

The IMS Hollywood, Murphy Concrete, Kiernan Sand and Gravel, Milverton and Knockharley waste facilities are within a 40km radius of the Bay Lane Proposed Recovery facility, accepting between 167,400tpa to 750,000tpa.

The immediate area surrounding Bay Lane Quarry is not highly populated. The local area surrounding the site primarily consists of a mix of commercial, industrial, agricultural and undeveloped lands and one-off residential properties. The lands surrounding the site, while much of it is still being actively farmed, are subject to a number of commercial developments. The airport is situated to the east and the site is in line with a flight path.

The south-eastern perimeter of the site is bounded by road frontage. The north-western, northern and western perimeter of the site is bounded by lands in active agricultural use. At the south-eastern perimeter, across the perimeter from the disused and boarded up house and farm building is an occupied dwelling house.

There are a number of commercial and industrial developments in the local area of the Bay Lane Quarry. Some share the same access road as the site including a cement company (Halton Concrete) located 200m to the west of the site and a commercial bus yard (Butlers Bus Tours) located approximately 250m to the east of the site.

3.1.10 Water Supply and Waste Water

A water mains connection point will be required for the proposed site offices and facilities, the connection point needs to be identified and agreed with the utility provider. The activities on site that require water include the wheel washing facility, canteen, shower, toilet facilities and dust management systems.

No sewer main is located at the site and so no connection is available. The nearest sewer main is located to the west of the site along the unnamed road stretching between the N2 and the junction for Bay Lane.

Construction and operational activities onsite will not result in a significant impact on the local water infrastructure and supply as intense water use on site is not expected. There will be reuse of rainwater collected on site for controlling dust and mud nuisance.

Sanitary effluent water will be generated from the canteen, toilet and wash facilities within the administration building. All effluent will be collected in a sealed underground pipe network and discharged to a packaged treatment plant with treated effluent percolated to ground. The proposed system will effectively treat effluent from the staff and visitors and will be sized to allow for additional loading. Location of this unit will be near office area, exact location will be determined by percolation testing.

The system will be appropriately sized and will operate in compliance with appropriate code of practice for a facility, e.g. EPA Code of Practice: Wastewater Treatment Systems for Single Houses.