A13.0 Air quality

A13.1 Methodology

During the environmental scoping process, F.I.G. Planning and Building Services (in commenting on the proposed approach in the draft environmental scoping report) advised that "*any in-depth air quality study / monitoring should be scoped out and downgraded to the best practice employed in reducing dust generation, mud on roads etc.*" This advice has been adopted in the methodology for the air quality assessment, presented in the following sub-sections.

A13.1.1 Construction phase dust and plant emissions

The assessment of potential impacts associated with construction of the proposed scheme has been undertaken in accordance with the UK Institute of Air Quality Management (IAQM) *'Guidance on the Assessment of Dust from Demolition and Construction'* (IAQM, 2016). This guidance has been adopted in the absence of specific guidance applicable to the Falkland Islands. A summary of the construction phase assessment process is as follows:

1. Screen the need for a more detailed assessment.
2. Separately for demolition, earthworks, construction and trackout[9]
    a) Determine potential dust emission magnitude.
    b) Determine sensitivity of the area.
    c) Establish the risk of dust impacts.
3. Determine site-specific mitigation.
4. Examine the residual effects to determine whether or not additional mitigation is required.

Full details of the assessment methodology are provided in **Appendix 11**.

The UK's Defra technical guidance (TG16) (Defra, 2018) states that emissions from Non-Road Mobile Machinery (NRMM)[10] used on construction sites are unlikely to have a significant impact on local air quality where relevant control and management measures are employed. As such, emissions from NRMM were considered qualitatively in this assessment, with reference to the proposed schedule of construction plant usage, the distance from such activities to sensitive receptor locations and the prevailing meteorological conditions. Relevant recommendations for control measures to be employed during the construction phase are included.

A13.1.2 Construction and operational phase road traffic emissions

The proposed scheme will generate additional vehicle movements during the construction and operational phase. The potential impact on local air quality of traffic movements generated by the proposed scheme has been screened using the methodology detailed in the latest IAQM and Environmental Protection UK (EPUK) guidance (IAQM and EPUK, 2017). This guidance sets out criteria for increases in Light Duty Vehicle (LDV) and Heavy Duty Vehicle (HDV) movements, above which a detailed assessment of air quality impacts may be required. If increases in LDV and HDV movements are below the criteria, there are unlikely to be any significant air quality impacts as a result of

[9] Trackout is defined as the transport of dust and dirt from a construction site onto the public road network

[10] Non-Road Mobile Machinery is defined as any mobile machinery, transportable industrial equipment or vehicle fitted with an internal combustion engine not intended for passenger or goods transport by road. Explanatory Memorandum to the UK Non-Road Mobile Machinery (Emissions of Gaseous & Particulate Pollutants) (Amendment) Regulations (2006).

the proposed scheme and further assessment of air quality is not necessary. If the criteria are exceeded, the guidance states that either a simple or detailed assessment should be undertaken. If significant impacts are possible, then detailed dispersion modelling may be required.

The assessment criteria are detailed in **Table 13.1**.

Table 13.1 Road traffic screening criteria

Vehicle type	Criteria
LDVs	A change in annual average daily traffic (AADT) of more than 100 within or adjacent to an Air Quality Management Area (AQMA), or more than 500 elsewhere.
HDVs	An increase in HGV movements of more than 25 per day within or adjacent to an AQMA, or more than 100 elsewhere.

Where the criteria defined in **Table 13.1** were exceeded, a simple assessment has been carried out to consider the potential for exceedances of the UK Government's health-based air quality Objectives, taking into account the number of scheme-generated vehicles and baseline air quality conditions. Mitigation measures have been identified where required.

A13.1.3 Operational phase vessel and plant emissions

Air quality impacts associated with increases in marine vessel activity and/or a change in vessel mix have been screened, based on the number of additional vessel movements predicted as a result of the proposed scheme and the frequency and duration of these additional vessel calls. Professional judgement has been used to determine whether significant impacts may occur at existing receptors, taking into account baseline air quality and prevailing meteorological conditions.

Potential impacts on local air quality from NRMM to be used during operation have been assessed qualitatively, with reference to the proposed schedule of operational plant usage, the distance from such activities to sensitive receptor locations and the prevailing meteorological conditions. Control measures which would minimise emissions from these plant items have been identified.

In the assessment of significance of these impacts, the methodology presented in **Section A6.0** has not been followed. For quantitative assessments of air quality, the evaluation of impact magnitude is based on quantification of changes in pollutant concentrations, and determination of the overall significance is typically made using professional judgement, taking into account the total concentration in relation to the air quality Objectives (see **Section A13.2.2**) and the number of affected receptors. As the assessment presented in this section is qualitative, the magnitude of the impact has not been taken into account, and professional judgement has been used to determine whether, overall, the impact would be significant or not significant with regard to air quality, in the context of the expected concentration in relation to the air quality Objectives.

A13.2 Baseline conditions

A13.2.1 Pollution sources

The principal air pollution sources within the study area are likely to be emissions from road traffic and vessel activity associated with FIPASS, with a contribution from operations at the airport beyond. There is also a fuel storage facility located immediately to the east of the location of the proposed scheme.

The main pollutants of concern from these emission sources are nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO) and fine particulate matter of with an aerodynamic diameter of 10µm or less (PM_{10}) or 2.5µm or less ($PM_{2.5}$). Evaporative volatile organic compound (VOC) emissions may occur from the fuel storage and

distribution facility during loading and unloading activities. Concentrations of PM_{10} and $PM_{2.5}$ are also influenced by natural sources, such as sea salt aerosol and wind erosion.

A13.2.2 Baseline air quality conditions

As agreed with F.I.G. Planning and Building Services during the environmental scoping process, a baseline air quality survey has not been undertaken as part of this assessment on the basis that such a survey would be disproportionate given the level of risk associated with effects on local air quality.

Air quality is typically considered in relation to adopted air quality Standards and Objectives which relate to ambient pollutant concentrations in air, and are set based on medical and scientific evidence regarding how each pollutant affects human health. The current UK air quality Standards and Objectives of relevance to this assessment are outlined in **Table 13.2.**

Table 13.2 Air quality objectives

Pollutant	Air quality objective		To be Achieved by
	Concentration	Measured as*	
Nitrogen dioxide (NO_2)	200 µg.m^{-3}	1 hour mean not to be exceeded more than 18 times per year (equivalent to the 99.79th percentile of hourly means)	31/12/2005
	40 µg.m^{-3}	Annual mean	31/12/2005
Particles (PM_{10})	50 µg.m^{-3}	24-hour mean not to be exceeded more than 35 times per year (equivalent to the 90.41st percentile of 24-hour means)	31/12/2004
	40 µg.m^{-3}	Annual mean	31/12/2004
Particles ($PM_{2.5}$)	25 µg.m^{-3}	Annual mean (target)	2020
	15% cut in annual mean (urban background exposure)		2010 – 2020
Sulphur dioxide (SO_2)	266 µg.m^{-3}	15 minute mean	-
	350 µg.m^{-3}	1 hour mean not to be exceeded more than 24 times a year	31/12/2005
	125 µg.m^{-3}	24-hour mean not to be exceeded more than 3 times a year	31/12/2004
Carbon monoxide (CO)	10 mg.m^{-3}	Maximum daily running 8-hour mean	31/12/2004
Benzene	5 µg.m^{-3}	Annual mean	31/12/2010

Note: * how the Objectives are to be measured is set out in the UK Air Quality (England) Regulations (2000)

It is considered likely that air quality in the area is generally good, as there are relatively few sources of air pollution and the area is not typified by high traffic volumes or congestion which would typically give rise to elevated pollutant concentrations. As such, it is expected that the air quality Objectives outlined above would not be exceeded within the study area.

A13.2.3 Receptor locations

Air pollution can affect human health and sensitive ecological sites. Receptors sensitive to changes in air quality therefore include residential properties where people may be present for extended durations, or short-term areas of exposure such as outside seating areas.

Some habitats are sensitive to the effects of air pollution; airborne emissions can have an effect on all vegetation, whereas pollutant deposition as nutrient nitrogen and acid can affect habitats differently, depending on specific sensitivities.

The closest receptors to the location of the proposed scheme are located within 500m (to the south-west) (e.g. residences in east Stanley, the Seafarer's Mission and Stanley Growers) and, in terms of designated ecological sites, Stanley Common and Cape Pembroke NNR, located to the east and south. A very small area of the Cape Pembroke IPA is located within 200m at its closest point to areas of land required for bioremediation.

The Tussac House Extra Care Facility will be located in close proximity to the proposed scheme footprint once construction of that facility has been completed.

A13.2.4 Prevailing meteorological conditions

Local meteorological conditions can greatly affect the dispersion and dilution of air pollutants, particularly wind speed and direction. As noted in **Section A7.2.2**, manually recorded hourly time-series wind data was obtained from Stanley Airport covering periods when the airport was in operation between 2006 and 2020. This showed a dominant wind direction from the west (270°N).

Further wind data (frequency tables for Mount Pleasant Airport) was purchased from the UK Meteorological Office covering the period 2010 and 2019. This also shows a dominant wind direction from the west (270°N) with 25.2% of winds coming from this directional sector. However, the greatest wind speeds (up to 24 m/s) are from the north (0°N) and south-west (210°N) sectors (**Figure 7.4**). There is also a large proportion of higher wind speeds which will promote effective dilution and dispersion of pollutants.

As shown in **Figure 7.4**, the predominant wind direction is from the west, with only a small percentage of winds from the east.

A13.3 Potential impacts during construction

A13.3.1 Emissions from NRMM

During construction, onsite power will be provided by the main grid, and diesel generators will only be used for back-up or emergency use. As such, emissions would only occur from mobile plant used onsite.

Dismantling and construction works are proposed to be undertaken sequentially in a phased manner, which will limit the amount of plant in use at any one time. The closest residential property on Ross Road, the Tussac House Extra Care Facility and Stanley Growers are located approximately 400m west, 100m south-west and 120m south-west of the construction works at their closest point, and are not located downwind of emission sources with regard to the prevailing conditions. However, the Seafarer's Mission is located to the east of the proposed slipway that would be required for dismantling of the FIPASS barges, and therefore this receptor would be located downwind of emissions from plant used during construction of the slipway as well as the dismantling operations. The Seafarer's Mission has been included in the assessment as a worst-case scenario.

The dismantling operations are predicted to be undertaken over an approximately 18-month period, and therefore impacts would be temporary in nature and emissions are unlikely to have a significant effect in relation to annual mean air quality Objectives. In addition, baseline air quality within the area is expected to be good and it is therefore considered to be unlikely that any exceedances of the air quality Objectives would occur. As such, impacts of emissions from NRMM on human receptors are considered to be **not significant**.

The Stanley Common NNR is located in close proximity to the laydown and stockpile area, the concrete batching plant and the pre-cast storage area required during the construction phase (shown on **Figure 4.1**). A very small area of the Cape Pembroke IPA is located within 200m of the proposed remediation area which would house the geotubes.

Within these areas, there would be a small number of plant items used to move construction materials, which are not anticipated to be a significant source of pollutant emissions. In addition, the prevailing wind direction would disperse emissions towards the east, and therefore it is unlikely that a significant area of the NNR would be affected (however it is noted that the IPA is located to the east). The high wind speeds typically experienced in the area would ensure that pollutants are well dispersed.

The most intensive activities within the laydown and stockpile area are predicted to occur during construction of the causeway, which is estimated to occur over a period of approximately one year. As such, emissions from these activities would be short-term in nature. In addition, the works required within the remediation area would also be temporary in nature, with relatively limited plant required within this area.

It is also anticipated that, as air quality in the area is expected to be good due to there being few pollution sources in the vicinity, baseline pollutant concentrations and deposition rates within the NNR and IPA are likely to be sufficiently below the thresholds at which adverse effects may occur, and the Management Plan for Stanley Common (Falkland Islands Government, 2019) does not identify air emissions as an issue or threat to the NNR. Appropriate controls on emissions from NRMM are therefore expected to be sufficient to prevent significant impacts from occurring. As such, impacts on designated ecological sites are considered to be **not significant**.

As noted above, guidance provided by Defra (Defra, 2018) states that emissions from NRMM used on construction sites are unlikely to have a significant impact on local air quality where relevant control and management measures are employed. These control and management measures to be adopted during the proposed construction works are detailed on **Section A13.3.1.1**.

A13.3.1.1 Mitigation and residual impact

Defra technical guidance (Defra, 2018) states that NRMM and plant should be well maintained. If any emissions of dark smoke occur then the relevant machinery should stop immediately and any problem be rectified. In addition, the following controls should apply to NRMM:

- All NRMM should use fuel equivalent to ultralow sulphur diesel (fuel meeting the specification within EN590:2004).
- All NRMM should comply with the appropriate NRMM standards.
- All NRMM should be fitted with Diesel Particulate Filters (DPF) conforming to defined and demonstrated filtration efficiency (load/duty cycle permitting).
- The ongoing conformity of plant retrofitted with DPF, to a defined performance standard, should be ensured through a programme of onsite checks.
- Fuel conservation measures should be implemented, including instructions to (i) throttle down or switch off idle construction equipment; (ii) switch off the engines of trucks while they are waiting to access the site and while they are being loaded or unloaded and (iii) ensure equipment is properly maintained to ensure efficient fuel consumption.

A13.3.2 Dust and particulate matter emissions

A risk-based assessment of construction phase dust and PM_{10} emissions has been carried out in accordance with IAQM guidance (IAQM, 2016). The outputs of the assessment are presented below.

Step 1: Screen the need for a detailed assessment

IAQM guidance (IAQM, 2016) states that where human receptors are located within 350m of construction works, or ecological receptors within 50m, a detailed assessment should be undertaken. For projects in England, Natural England (as a statutory advisor to regulatory bodies) requests that consideration is given to impacts on ecological receptors which are within 200m of construction works; as such, this criterion was adopted to provide a conservative assessment.

Human receptors are present within 350m of the site boundary and the Stanley Common NNR is located in close proximity (inland) to the proposed laydown and stockpile area and concrete batching plant required during construction (shown on **Figure 4.1**). The NNR is designated for a range of endemic and rare plants which are assumed to be sensitive to the effects of dust deposition. A very small area of the Cape Pembroke IPA is located within 200m of the proposed remediation area (**Figure 4.1**). Therefore, in accordance with IAQM guidance (IAQM, 2016), a detailed assessment has been undertaken.

Step 2A: Define the potential dust emission magnitude

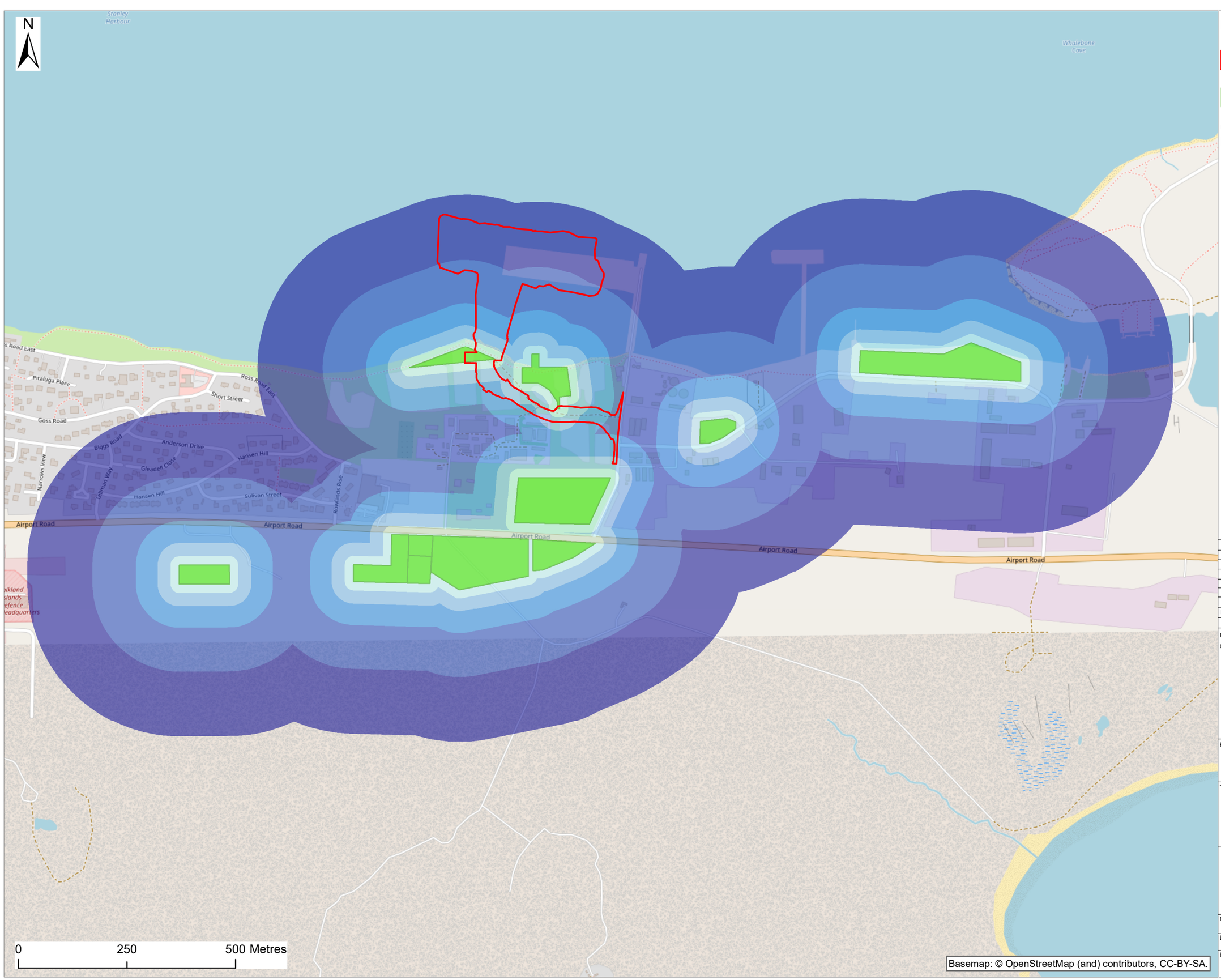
The IAQM guidance recommends that the dust emission magnitude is determined for demolition, earthworks, construction and trackout. The dust magnitudes for these activities have been determined from the proposed scheme drawings contained in **Section A4.0** and the IAQM methodology; these are summarised in **Table 13.3**.

Table 13.3 Dust emission magnitude

Construction activity	Calculated dust magnitude	Rationale
Demolition	Small	FIPASS is constructed of materials with a low potential for dust release (i.e. steel) and therefore the dismantling activity is unlikely to generate significant volumes of dust. All dismantling would be carried out at ground level.
Earthworks	Large	Some of the working areas required for construction will require stripping of vegetation and topsoil prior to construction of hardstanding. The areas to be stripped for hardstanding total approximately 47,000m^2. In addition, earthworks will be required to construct the proposed access road (including the road drainage system).
Construction	Large	There will be on-site concrete batching undertaken and large stockpiles of aggregate material will be kept onsite to facilitate construction of the causeway. Surficial silts removed from the proposed quay footprint will be dewatered on land in the remediation area. The surficial silts will remain in the geotubes until dried, at which point they would either be transported to landfill for disposal or beneficially re-used (if laboratory analysis proves the material is suitable for re-use and there is a demand for such use).
Trackout	Large	There will be greater than 50 outward HGV movements per day from the site.

Step 2B: Define the sensitivity of the area

The sensitivity of human and ecological receptors to dust soiling and health effects of PM_{10} associated with construction and trackout activities during construction of the proposed scheme have been determined and are summarised in **Table 13.4**. The distance bands around the construction compounds are shown in **Figure 13.1**.



Key

- Proposed scheme footprint
- Construction phase site layout

Construction Phase Buffers

- 20 m
- 50 m
- 100 m
- 200 m
- 350 m

REV	DATE	DESCRIPTION	BY	CHK	APP
P02	01.12.21	SECOND ISSUE	FC	CG	SR
P01	14.05.21	FIRST ISSUE	FC	CG	SR

CLIENT

PROJECT

New Port Facility at the Falkland Islands

TITLE

Construction Phase Distance Buffers

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DRAWN	CHECKED	APPROVED
FC	CG	SR
DATE: 01.12.21	SCALE: 1:8,000	REF.
FIGURE No.: 13.1	SUITABILITY: S2	REVISION: P02

Path: I:\N522041Technical_Data\Projects\Falklands\MXDs\ES\AirQuality\Fig_13_2_ConstructionPhaseDistanceBuffers_RH_20211201.mxd

The various parcels of land required to support with construction of the proposed scheme are located within 50m of 10 - 100 medium sensitivity receptors. Examples of medium sensitivity receptors include places of work, or car parks. The closest high sensitivity residential receptors would be located at the Tussac House Extra Care Facility, approximately 100m from the construction works. Other residential properties at the Seafarer's Mission and off Ross Road would be located within 150m and 350m of the works respectively. Construction vehicles would access the working areas via Stanley Bypass/Airport Road and FIPASS Road, on which there are 1 – 10 residential receptors within 50m of the road, up to 500m from the working areas. The IAQM methodology assigns different levels of sensitivity to human health impacts based on the background concentrations of PM10. Background PM10 concentrations are expected to be less than 24µg.m^{-3} (the lowest threshold as noted in **Appendix 11**) and therefore the risk of exceedances of the PM10 Objective is low. Therefore, the sensitivity of the area to demolition, earthworks, construction and trackout activities is considered to be 'Medium' for dust soiling, and 'Low' for human health.

The Stanley Common NNR is nationally designated and contains important plant species which are assumed to be sensitive to dust deposition. A small area of the Cape Pembroke IPA is located within 200m of the proposed remediation area. Therefore, in accordance with IAQM guidance (IAQM, 2016) both the NNR and the IPA are classified as a medium sensitivity receptor.

The Stanley Common NNR and Cape Pembroke IPA are not located within 200m of the areas proposed to be used for dismantling of the FIPASS barges or within 200m of the proposed dismantling of polytunnels at Stanley Growers, and therefore the effects of demolition have not been considered. Furthermore, Stanley Common NNR and the Cape Pembroke IPA are not located in the immediate vicinity of the main roads which will be used to access the working areas, and therefore it is unlikely that these receptors would be significantly affected by the effects of trackout. However, to provide a conservative assessment, the consideration of impacts from trackout on ecological receptors has been considered.

It is recognised that the Stanley Growers area is adjacent to the proposed construction area. However, the rare plant survey reported in **Section A10.2.5** did not identify any rare plants (or important plant species) in the area. In addition, although Stanley Growers land is in very close proximity to the construction area, the prevailing winds are westerly. These factors contribute to a low likelihood of dust deposition on Stanley Growers land and therefore an assessment of deposition on Stanley Growers land has not been undertaken.

Table 13.4 Outcome of defining the sensitivity of the area

Potential impact	Sensitivity of the surrounding area			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Medium	Medium	Medium	Medium
Human health	Low	Low	Low	Low
Ecological effects	N/A	Medium	Medium	Low

Step 2C: Define the risk of impacts

The dust emission magnitude detailed in **Table 13.3** is combined with the sensitivity of the area detailed in **Table 13.4** to determine the risk of impacts with no mitigation applied. The risks concluded for dust soiling, human health and ecological effects are provided in **Table 13.5**.

Table 13.5 Summary dust risk table to define site-specific mitigation

Potential impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Low Risk	Medium risk	Medium risk	Medium risk
Human health	Negligible risk	Low risk	Low risk	Low risk

Ecological effects	N/A	Medium risk	Medium risk	Low risk

The risk of dust soiling impacts during the construction phase were therefore described as 'low risk' for demolition and 'medium risk' for earthworks, construction and trackout. The impacts on human health were described as 'negligible risk' for demolition and 'low risk' for earthworks, construction and trackout. Impacts on ecological receptors were described as 'medium risk' for earthworks and construction and 'low risk' for trackout. Step 3 and Step 4 of the risk-based assessment, which are the 'site specific mitigation' and 'determining the significant effects', are discussed below.

A13.3.2.1 Mitigation and residual impact

Step 3: Site-specific mitigation

Step 3 of the IAQM guidance (IAQM, 2016) recommends appropriate mitigation measures to reduce the identified risks. The recommendations below for a 'medium risk' site will be detailed in a CEMP to prevent or minimise the release of dust and / or dust being deposited on nearby receptors. Particular attention should be paid to operations which must unavoidably take place close to the site boundary.

There are some specific activities to be undertaken which have the highest potential for dust emissions, and therefore controls which should be employed for these activities are specifically detailed below. A suite of more general site management and good practice measures are also provided which should be implemented during the construction works.

Remediation area

The Cape Pembroke IPA is within 200m of the proposed remediation area. It should be noted that the surficial silt will remain within the geotubes during the bioremediation process and therefore there is no mechanism for generation of significant dust as a result of this activity. However, there is potential for generation of dust once the bags are opened and the dried silt is exposed to the elements (it should be noted that the bags would only be opened once a decision has been made to either re-use or dispose of the silt and therefore any pathway for generation of dust would be temporary only).

As the material will be dried prior to re-use or disposal, it is unlikely that mitigation methods such as wet suppression would be desirable to manage potential dust once the bags are opened. The dust management measures listed below are to be adopted by the contractor where feasible to minimise the risk of dust being generated and transported elsewhere once the bags have been opened.

Aggregate stockpiles

The large stockpiles of aggregate required for construction of the causeway are proposed to be located to the south of Stanley Bypass, and therefore upwind and at a distance from the highest-sensitivity residential receptors. Although ecological receptors are located adjacent to this area (inland), with the dominant wind direction being west, no mitigation measures are considered necessary.

Concrete batching plant

The concrete batching plant should be operated to minimise the potential for dust emissions. This may include the following measures:

- Reduction of drop heights and use of chutes when loading and unloading aggregates and other materials.
- Use of appropriate filter systems on any proposed silos.
- Fencing, screening, covering or dampening down stockpiles of aggregate.

Other general measures

A list of mitigation measures that are highly recommended for a medium risk site by the IAQM are provided below. These would be adopted during the construction phase where appropriate and applicable to the nature of the works undertaken.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on-site.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary and the head or regional office contact information. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.

Dust management

- Develop and implement a CEMP, approved by F.I.G., which may include measures to control other emissions.
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.
- Carry out regular site inspections to monitor compliance with the CEMP, record inspection results and make an inspection log available when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on-site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable.
- Erect screening if visual inspections are indicating high levels of dust noting that it is not possible to cover or shield 4m high stockpiles due to volume of stockpiling needed for PWD to progressively produce the quarry materials. Take measures to control site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible.
- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Produce a CTMP to manage the sustainable delivery of goods and materials.
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on-site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Bonfires and burning of waste materials on site should not be permitted.

Measures specific to construction

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out where possible, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

Measure specific to trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site.
- Avoid dry sweeping of large areas.
- Ensure loaded vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud) prior to leaving the site where reasonably practicable.
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Locate site access gates at least 10m from receptors where possible.

A list of mitigation measures that are desirable for a medium risk site by the IAQM are provided below.

Dust management

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to note any dust deposition, record inspection results, and make the log available when asked.
- Impose and signpost a maximum-speed-limit of 15mph on surfaced, and 10mph on unsurfaced, on-site haul roads and work areas.

Measures specific to earthworks

- Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

Measures specific to construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Step 4: Determine significant effects

With the implementation of the above mitigation measures, the residual impacts from the construction phase of the proposed scheme are considered to be not significant, in accordance with IAQM guidance (IAQM, 2016).

A13.3.3 Emissions from road traffic exhausts

The number of baseline vehicle movements on each road link, and the additional vehicle movements generated during the construction phase of the proposed scheme, are detailed in **Table 13.6**.

Table 13.6 Predicted construction phase vehicle movements

Link ID	Road link	2022 AADT baseline traffic flows		2022 AADT construction-generated traffic flows	
		Total vehicles	HGVs	Total vehicles	HGVs
1	Darwin Road	1,761	137	374	370
2	Stanley Bypass	1,761	137	496	488
3	FIPASS Road (north of Coastel Road junction)	250	97	4	4
4	FIPASS Road (South of Coastel Road junction)	587	130	14826	11840
5	Coastel Road	341	35	16	2
6	New Port Facility Access Road	-	-	128	122

As shown in **Table 13.6**, the number of construction-generated vehicle movements exceeds the screening criteria detailed in **Table 13.1** on links 1, 2, 4 and 7 as a result of HGV traffic. A simple assessment is therefore required to consider the potential for significant impacts to occur.

Table 13.6 also details the base flows on each road link, which can be considered to be low. It is not anticipated that these levels of traffic movements would give rise to any elevated pollutant concentrations at sensitive receptors in the vicinity of these road links, and, as such, existing air quality in the area is expected to be good.

Given this, the increase in traffic flows generated during construction is unlikely to materially affect pollutant concentrations at receptors, and it is therefore unlikely that significant impacts would occur. Furthermore, the construction-generated traffic flows detailed in **Table 13.6** are peak figures, and the construction works would be temporary in nature.

To ensure a smooth transition and to provide continued berthing capacity during the construction phase, there would be a temporary period of concurrent construction and operation in 2024, prior to the full operation of the proposed scheme in 2025. However, it is not envisaged that a net increase in operational traffic (above the existing situation) will occur during the construction period, and therefore the effects of concurrent construction and operation have not been assessed.

In order to minimise vehicle trips during construction, the employee accommodation facilities have been sited adjacent to the works areas to minimise the need for workers to travel long distances to the site. This is therefore beneficial to local air quality.

Impacts of construction phase road traffic emissions are therefore considered to be **not significant**.

A13.3.3.1 Mitigation and residual impact

Impacts of construction phase traffic emissions were considered to be not significant, and therefore mitigation measures are not required. However, it would be good practice to ensure that construction phase vehicles meet a high Euro standard and that all vehicles are well maintained. The residual impact would be **not significant**.

A13.4 Potential impacts during operation

A13.4.1 Emissions from NRMM

All cargo handling plant to be used on the proposed quay during operation will be diesel powered (as currently occurs on FIPASS). NRMM predicted to be used includes a mobile harbour crane, straddle carrier and side lifters for moving containers. Vessel unloading will be facilitated by the ship's onboard equipment as per the current situation. Side lifters are currently in operation at FIPASS; whilst their frequency of use may increase on the new quay as a result of predicted increased vessel activity, it is unlikely that emissions from this equipment would give rise to significant increases in pollutant concentrations.

Although the proposed quay is to be operational for 24 hours a day, diesel-powered plant would be used only during loading operations, and therefore would not be continually in use. Furthermore, the prevailing wind direction is from the west, and therefore emissions from operational phase plant would be dispersed away from sensitive human receptors which are located to the south and south-west. As baseline air quality is expected to be good, it is therefore unlikely that any exceedances of the air quality Objectives would occur at receptors.

Plant emissions may, however, be dispersed towards the Cape Pembroke NNR located approximately 850m to the east. Given the separation distance, it is likely that emissions would be sufficiently dispersed and diluted to ensure that significant ecological impacts would not occur.

Impacts of emissions from NRMM on human and ecological receptors are therefore considered to be **not significant**.

A13.4.1.1 Mitigation and residual impact

Impacts of operational NRMM are not considered to be significant. However, similarly to construction phase plant, good practice controls on NRMM should be applied to minimise emissions where possible. These controls include the following:

- All NRMM should use fuel equivalent to ultralow sulphur diesel (fuel meeting the specification within EN590:2004).
- All NRMM should comply with the appropriate NRMM standards.
- All NRMM should be fitted with DPF conforming to defined and demonstrated filtration efficiency (load/duty cycle permitting).
- The ongoing conformity of plant retrofitted with DPF, to a defined performance standard, should be ensured through a programme of onsite checks.
- Fuel conservation measures should be implemented, including instructions to (i) throttle down or switch off idle construction equipment; (ii) switch off the engines of trucks while they are waiting to access the site and while they are being loaded or unloaded and (iii) ensure equipment is properly maintained to ensure efficient fuel consumption.

The residual impact would be **not significant**.

A13.4.2 Emissions from road traffic exhausts

The number of baseline vehicle movements on each road link, and the additional vehicle movements generated during the operational phase of the proposed scheme, are detailed in **Table 13.7**.

The number of vehicle movements predicted to be generated during operation on all road links are below the screening criteria detailed in **Table 13.1**, with the exception of link 7, namely the proposed new access road feeding onto the causeway. This link exceeded the screening criterion for HGV movements. However, it is considered that the impact on annual mean air quality at receptors resulting from operational phase traffic movements would be negligible, and impacts would be **not significant**.

Table 13.7 Predicted operational phase vehicle movements in 2025

Link ID	Road link	2025 AADT baseline traffic flows		2025 AADT operational phase traffic flows	
		Total Vehicles	HGVs	Total Vehicles	HGVs
1	Darwin Road	1,767	138	127	49
2	Stanley Bypass	1,767	138	127	49
3	FIPASS Road (north of Coastel Road junction)	84	46	0	0
4	FIPASS Road (South of Coastel Road junction)	593	131	127	49
5	Coastel Road	347	35	73	28
6	New Port Facility Access Road	-	-	367	142

A13.4.2.1 Mitigation and residual impact

Impacts of operational phase traffic emissions were considered to be not significant, and therefore mitigation measures are not required. However, as for construction, it would be good practice to ensure that operational phase vehicles meet a high Euro standard and that all vehicles are well maintained. The residual impact would be **not significant**.

A13.4.3 Emissions from vessel activity

The average number of annual vessel calls made at FIPASS between 1999 and 2019 was approximately 300. As reported in **Section A4.4.1**, the proposed scheme is predicted to result in an increase to the number of annual vessel movements to 488 in 2025 (when the full quay is proposed to be constructed and fully operational). There is therefore predicted to be an increase of approximately 200 vessel movements per year, or less than one vessel per day. This is considered to be the worst-case scenario from an environmental impact perspective based on high / high growth scenario over the 50 year design lifespan.

The greatest contribution to impacts at landside receptors from vessel activity is typically experienced whilst vessels are berthed and using their auxiliary engines, particularly for large vessels such as cruise ships which have a high power demand whilst berthed to power onboard facilities. The number of cruise vessels visiting FIPASS in 2019 was 32; this is predicted to increase to 47 in 2025, an increase of 15 vessels per year.

The duration of each cruise vessel call (12 hours, see **Section A18.0** for further detail) is not expected to materially change. Whilst container vessels and research/ops vessels have longer berthing durations (32 hours and 45/73 hours respectively, see **Section A18.0**), their auxiliary engines and power demand are significantly lower. As such, it is not anticipated that, in relation to annual mean pollutant concentrations, the predicted increase in vessel activity would result in any significant impacts. Furthermore, emissions from vessels berthed at the proposed quay would be dispersed away from human receptors for the majority of the time and it is therefore unlikely that any exceedances of the air quality Objectives would occur, particularly as baseline air quality is expected to be good.

There may be short-term increases in pollutant concentrations whilst vessels are berthed; however, given the daily increase in vessel calls versus the existing scenario, and that pollutant emissions would be dispersed away from receptors, it is considered to be unlikely that human receptors would experience significant short-term increases in pollutant concentrations.

As noted for NRMM emissions, emissions from additional vessels berthed at and approaching the proposed quay have the potential to affect habitats at the Cape Pembroke NNR, as the prevailing westerly winds would disperse emissions towards this receptor, located to the east. Vessels approaching the proposed quay would pass close to Cape Pembroke NNR; however, emissions from vessels whilst cruising or in the reduced speed zone are typically lower in magnitude than those experienced during berthing, and, as the emission source is moving, it does not contribute to increases in pollutant concentrations over a sustained period of time. As such, emissions from moving vessels are unlikely to give rise to significant impacts at ecological sites over the short or long term.

Whilst vessels are berthed, they would be located approximately 850m from the NNR. Across this distance, it is expected that pollutant concentrations would be sufficiently diluted and dispersed to prevent significant impacts from occurring.

Given the above, it is expected that impacts on human and ecological receptors as a result of emissions from vessels would be **not significant**.

A13.4.3.1 Mitigation and residual impact

Impacts of emissions from vessels are not considered to have a significant effect on human or ecological receptors, and therefore mitigation measures are not required. However, minimisation of engine and/or fuel use whilst vessels are berthed would minimise emissions. Engines should also be appropriately serviced and maintained. The residual impact would be **not significant**.