Mole Road. The docks and cruise liner terminal are to the southwest of the site. Directly to the east there is some light industry and warehouses. The existing Waterport Power Station is to the southeast and will stop operating when the new power station is online.

Public Access

4.7 The site is accessed from the North Mole Road and Mons Calpe Road. General public access to the area is restricted and controlled at the port entrance checkpoint on North Mole Road. Access is generally for local harbour operations and access for cruise liner passengers (by foot or by taxi).

Seascape

4.8 The Straits of Gibraltar is a narrow stretch of water separating the Atlantic Ocean and Mediterranean Sea and also separates Europe from North Africa. Gibraltar Bay separates Gibraltar from the southern part of Spain to the west and the North Mole extends into the Bay. The waters around the Bay are popular for sightseeing, sport fishing and diving, and cruise liners visiting Gibraltar also pass through these waters.

Landscape, Townscape, Seascape and Heritage Designations

4.9 There are no statutory landscape designations currently for the site and the immediate surrounding landscape. However there are designations that exist in the wider landscape. The Rock of Gibraltar, Windmill Hill and parts of the southern coastline have been designated as the Gibraltar Nature Reserve. This coincides closely with the 'Rock of Gibraltar' Special Area of Conservation (SAC) designated under the European Commission (EC) Habitats Directive and the EC Birds Directive.

Landscape Character

4.10 The Upper Rock dominates Gibraltar's landscape, which is now largely a nature reserve. The western side is well vegetated with scrubland and there is a series of obsolete gun batteries dotted along its ridge, to some of which the public can gain access and use as viewing platforms. There are also many tunnels with viewpoints looking over the north and west, also with visitor

access. The topography of the Rock and its MOD ownership in the upper areas has resulted in settlements being focused at the foot of its slopes. The proposed power station site is situated in the urban, industrial and port area of the northwestern edge of Gibraltar.

4.11 No existing Landscape Character Assessment data was available at regional or local level for the study area. The landscape character types of the study area have therefore been developed from desktop study of maps and field survey.

4.12 The existing character of the site and the local area is formed by industrial, commercial and port uses including the cruise liner terminal with some 7-8 storey residential blocks at some distance to the east. It is considered to be of low landscape quality and has low sensitivity to change. However, in a wider perspective, the whole of Gibraltar is a distinctive, iconic topographical form and the site forms part of this topography. In this wider context the contribution of the North Mole area to the overall iconic character of the Rock is considered to be important.

5 ASSESSMENT OF POTENTIAL SIGNIFICANT EFFECTS

5.1 This section presents the assessment findings for construction and operational efects of the proposed power station.

Construction Effects

5.2 Temporary landscape and visual impacts will result from alterations to the landscape during the construction of the proposed development. An assessment has been conducted for all landscape and visual receptors and considers the effects of the proposed construction of the new power station. Landscape receptors and receptors with potential views to the proposed development have been assessed in terms of sensitivity, the magnitude of the effect and the overall construction effect (Appendix LV1: Landscape Effects Table and Appendix LV2: Visual Effects Schedule).

5.3 Construction effects will be largely associated with the following site activities: introduction and movement of site vehicles and construction machinery, site preparation work, stockpiled material, site compounds, fencing and signage to the site. Large structures such as tower cranes will be restricted due to proximity to the airport runway.

5.4 This form of construction activity would not be uncharacteristic and out of context with the landscape character of the surrounding area. Adverse visual effects would also be minor given the context.

5.5 The potential landscape and visual effects will be mitigated and minimised by a Construction Environmental Management Plan (CEMP). The plan will identify the location and design of temporary site compounds, signage, and perimeter screen fencing. The plan will also address effective site management.

5.6 As a result of the proposed construction the overall temporary landscape effects, on the national, regional, local and immediate site character, is considered to be none or negligible adverse and therefore **not significant.** Temporary landscape effects on the character of the site itself would be **moderate adverse.**

5.7 Construction activities including plant movement will be visible from surrounding receptors. Large numbers of cruise liner passengers, users of North Mole Road and adjacent buildings would experience the closest and clearest views towards these activities. Cruise liner passengers are particularly sensitive receptors. Some passengers may remain on the ship and may have elevated views of the construction site. Other passengers will use North Mole Road on foot or by vehicle to travel to and from the city centre. Given the visual prominence of the route, it is considered that these receptors will experience temporary **moderate adverse visual effects** during the construction of the works.

Landscape Effects of the Operational Power Station

5.8 The landscape designations, landscape character assessments and site-specific character have been assessed in terms of sensitivity, magnitude of landscape effect and the overall effect (Appendix LV1: Landscape Effects Table).

5.9 The existing character of the site and the local area is formed by residential, industrial, commercial and port uses and includes an existing power station. The introduction of the new power station, which is at a similar scale to the surrounding development, is not considered to change this overall character.

Effects on Landscape Types

Landscape Designations

5.10 The Rock of Gibraltar SAC and the Gibraltar Nature Reserve designations cover a similar area with the nearest boundary approximately 1.5 km from the site. As these areas are elevated some views of the site are possible but the proposed development will merge with the surrounding uses. It is considered that there will be **no effect** on the character of these areas.

Transboundary Effects

5.11 The Spanish town of La Linea and the coast road are approximately 1-2 km to the north of the site. The town and port of Algeciras is at a distance of approximately 8 km to the west across the Bay of Gibraltar. Both of these

towns are at such distance, and not sufficiently elevated, that it is considered that there will be **no effect** on the landscape character of these areas.

Local Effects

5.12 Residential blocks of up to 8 floors in height begin at approximately 300 m from the site with commercial and harbour uses closer in. The cruise liner terminal is immediately adjacent. The site itself is industrial but will soon be cleared. It is considered that there will be negligible adverse effect on the character of these areas and therefore, **not significant**.

Visual Effects of the Operational Power Station

5.13 The study area within which views of the site might be available was established through desktop studies of mapped information and a site appraisal. The appraisal established that the main viewpoints were either very local to the site or at considerable distance.

5.14 Nine typical viewpoints were identified and the views photographed during May 2015. The viewpoint locations are shown on Figure LV3.1 (Volume 2: Figures). The photographs should be read in conjunction with the Visual Effects Schedule in Appendix LV2.

5.15 Receptors with potential views to the proposed development have been assessed in terms of sensitivity, the magnitude of the visual effect and the overall effect (Appendix LV2: Visual Effects Schedule).

Effects on Visual Receptors

Users of Designated Landscapes

5.16 The Rock of Gibraltar SAC and the Gibraltar Nature Reserve are very important tourist areas. Although at considerable distance the site can be seen from many places as the area is elevated. Typical views are illustrated from the Upper Cable Car Station at a distance of 2.3 km, View A (Figure LV5.1, Volume 2: Figures); from Princess Caroline's Battery at 1.6 km, View B (Figure LV5.1, Volume 2: Figures); and the top of the Moorish Tower, 1.5 km View C (Figure LV5.1, Volume 2: Figures). Receptors at these areas

are highly sensitive however due to distance and low magnitude of change there would be negligible adverse visual effect and therefore, is **not significant.**

Transboundary Effects

5.17 A typical viewpoint from the coast road at La Linea at a distance of 2 km is illustrated in View D and from Algeciras, 8 km in View E (Figure LV5.2, Volume 3 Figures). Receptors at these locations have low sensitivity and due to distance and low magnitude of change there would be negligible adverse visual effect and therefore is **not significant**.

Local Effect

5.18 View F is from the promenade in front of the residential blocks beside Harbour Views Road at a distance of approximately 500 m (Figure LV5.3, Volume 2: Figures). View G is looking along North Mole Road at a distance of approximately 200 m (Figure LV5.3, Volume 2: Figures). Users of this area are highly sensitive. However due to the low magnitude of change the visual effect is considered to be negligible adverse and therefore is **not significant**.

5.19 View G is looking west along North Mole Road from beside the existing power station at a distance of approximately 300m from the site. This view illustrates the mixed industrial, commercial and residential character of this area. This is also the route taken by cruise passengers travelling by foot or vehicle to and from the city centre. Again, these users are highly sensitive receptors, but as the magnitude of change is low, the visual effect will be negligible and therefore **not significant**.

5.20 View H is from the entrance to the cruise liner terminal with the site boundary at a distance of approximately 70 m (Figure LV5.3, Volume 2: Figures). The power station will be the first thing passengers will see on emerging from the terminal. Some of these liners are extremely large (View I (Figure LV5.4, Volume 2: Figures)) and we are informed that there can have up to 16 passenger decks. Therefore, some passengers remaining on the ship may have elevated views down into the proposed power station. These receptors are highly sensitive. However, the visual effect of such close views will

depend very much on the quality of the architectural design of the proposed power station and this is yet to be finalised. If the magnitude of change is low the visual effect would be minor adverse **(not significant)** but if the design created an improvement the effect could be negligible or beneficial.

5.21 View I is from an aircraft at the western end of the airport runway. The views from aircraft will be none or glimpsed. The receptors are considered to have low sensitivity and as the magnitude of change is low the visual effect would be none or negligible adverse and therefore **not significant.**

6 MITIGATION AND RESIDUAL EFFECTS

Construction Mitigation

6.1 During the construction phase, the temporary adverse visual effects will be mitigated as far as reasonably possible by: robust and attractive hoarding where appropriate; control of construction vehicle movements; protection of existing vegetation on the roadside and habitats within the surrounding area; prevention of dust; control of lighting at night, which will be directional. Controlled vehicle and personnel access routes will be designed to minimise disturbance to residents, visitors and other uses of the area. Restrictions on working at night and security lighting will be imposed. These measures will be made part of the CEMP, agreed in consultation with the Tourism Board, Port Authority and Town Planner leading to minor adverse visual effects and therefore **not significant**.

Operational Mitigation

6.2 During the detailed design process, care has been taken with the quality of the design of the proposed power station to provide a neat and well-ordered facility using good quality materials and finishes. Good design of the facility has been a specifically important mitigation element, in accordance with the Gibraltar Development Plan 2009 Policy Z3.2 to maintain North Mole as a visually attractive landscape.

6.3 New native tree and shrub planting on the North Mole Road boundary will help to soften the view of the facility particularly for cruise liner passengers traversing North Mole Road. Provision will be included in the parameters of the detailed design.

Residual Effects

6.4 The foregoing landscape and visual assessment shows that there will be a number of viewpoints from where the proposed power station will be visible in particular in close views. Mitigation measures will improve these views. Long distance views would not be affected. This results in **no significant residual effects** in the medium to longer term.

7 CUMULATIVE EFFECTS

7.1 There are several planned or new developments in the vicinity of the proposed power station that may influence landscape character and visual impact.

- North Mole Reclamation
- North Mole Sullage Plant
- Detached Mole Proposed floating oil storage vessel

7.2 These are all harbour related developments that will merge with the existing character of the area and will have adverse effect on landscape character or visual effect.

North Mole Industrial Park.

7.3 This is a business development with an outline planning application located on the north side of North Mole Road approximately 100 m from the site. The development partly reuses an existing building together with some new-build. It has the potential for improving the boundary with the road but overall it fits with the existing mixed character of the area and will have only a minor beneficial effect on landscape character or visual effect.

8 CONCLUSIONS

8.1 The proposed power station is located in an area of mixed harbour, industrial and commercial uses and as such it is considered that there will be **no significant adverse effect** on the existing character of the area.

8.2 Regarding visual effect, the main receptors will be cruise liner passengers who are considered highly sensitive to visual changes. However, as the magnitude of change is low the visual effect would be minor adverse and therefore **not significant.** This will be improved by very good architectural design of the facility.

8.3 Longer views both from Spain and from the Upper Rock are possible but due to distance and low magnitude of change there would be **no significant visual effect** on receptors in these areas.

8.4 The design will incorporate new native species of trees and shrubs, to soften the visual effect of the power station, along North Mole Road in particular. This will improve the local area for pedestrians and road users.

8.5 Construction visual effects will be managed under an approved CEMP, detailing the requirement for robust and attractive hoarding, effective dust control and routing of construction vehicles.

9 REFERENCES

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APPENDICES

APPENDIX LV1 – LANDSCAPE EFFECTS TABLE

Landscape type and reference	Sensitivity of Landscape		Magnitude of Landscape Effect	Notes	Overall Effect at Construction Phase	Overall Effect at Operational Phase
	Susceptibility to change High Medium Low	Value High Medium Low	Scale or Size of the Degree of Change. High Medium Low		Significant Not significant	Significant Not significant
Landscape Designations						
Rock of Gibraltar SAC and Gibraltar Nature Reserve.	Low	High	Low – Construction Low – Operation	The application site is outside the designation boundary at a distance of approximately 1.5km. The site merges with the surrounding industrial uses and is difficult to make out. It is considered that the development would have no effect upon the designated areas.	Not significant	Not significant
Landscape Character						
Transboundary effects La Linea, coast road and Algeciras	Low	Low	Low – Construction Low – Operation	La Linea and the coast road are approximately 1-2 km to the north. Algeciras is approximately 8 km to the west. The proposed development will merge with the surrounding industrial uses and be largely unnoticed.	Not significant	Not significant

Local Effects Residential blocks approximately 300m from the site. Commercial and harbor uses closer and the cruise liner terminal adjacent	Low	Medium	Low – Construction Low – Operation	The site forms a small part of this character zone. The change from industrial to power station use will go largely unnoticed and will merge with the surrounding industrial and port character.	Not significant	Not significant
Site Specific Character						
Character of the Site	Low	Low	Medium – Construction Low – Operation	The site itself is currently in industrial use but will be shortly cleared.	Not significant	Not significant

APPENDIX LV2 – VISUAL EFFECTS TABLE

View Ref	Receptor Type	Sensitivity of Visual Receptor		Magnitude of Visual Effect				Description / Notes	Overall Effect at Construction Phase	Overall Effect at Operational Phase
		Susceptibility to change High Medium Low	Value High Medium Low	Scale or Size of the Degree of Change. High Medium Low None	Approximate Distance from Application Boundary (km)	Nature of View Full Partial Glimpse None	Is the Visual Effect Permanent or Temporary		Significant Not significant	Significant Not significant
Landscape Designations										
A	Visitors to the Upper Rock Nature Reserve.	High	High	Low – Construction Low – Operation	2.3km	Full/ distant	Temporary – Construction Permanent - Operation	This elevated view is from the Upper Cable Car Station. The site is visible in the distance but difficult to distinguish from its surroundings	Not significant	Not significant
B	Visitors to the Upper Rock Nature Reserve.	High	High	Low – Construction Low – Operation	1.6km	Full/ distant	Temporary – Construction Permanent - Operation	This elevated view is from the Princess Caroline's battery. The site is visible in the distance but difficult to distinguish from its surroundings	Not significant	Not significant
C	Visitors to the Upper Rock Nature Reserve.	High	High	Low – Construction Low – Operation	1.5km	Full/ distant	Temporary – Construction Permanent - Operation	This elevated view is from the top of the Moorish Castle. The site is visible in the distance but difficult	Not significant	Not significant

								to distinguish from its surroundings		
Transboundary Effects										
D	Users of La Linea and the coast road	Low	Low	Low – Construction Low – Operation	2km	Partial	Temporary – Construction Permanent - Operation	Various intermittent views across the water. The site is difficult to distinguish from its surroundings.	Not significant	Not significant
E	Users in Algeciras	Low	Low	Low – Construction Low – Operation	8km	Partial	Temporary – Construction Permanent - Operation	Virtually no distinct views possible due to distance and limited view points	Not significant	Not significant
Local Effects										
F	Harbour Views Road Promenade	Medium	Low	Low – Construction Low – Operation	500m	Partial	Temporary – Construction Permanent - Operation	This is from the new promenade and recreation area in front of residential blocks. The site is visible but merges with the surrounding harbor and industrial uses.	Not significant	Not significant
G	Users of North Mole Road	High	Low	Low – Construction Low – Operation	300m	Full	Temporary – Construction Permanent - Operation	As well as residents and users of the local businesses this is the route taken by cruise passengers to and from the city centre.	Not significant	Not significant
H	Entrance to the cruise	High	Low	Low – Construction Low –	60m	Full	Temporary – Construction Permanent -	This will be the view of passengers emerging from the	Not significant	Not significant

	liner terminal.			Operation			Operation	terminal. Good design of the facility is therefore a priority.		
I	Air passengers	Low	Low	Low – Construction Low – Operation	750m	None/ Glimpse	Temporary – Construction Permanent - Operation	This view is from an aircraft on the runway. The photograph shows the scale of a large cruise liner in relation to the site.	Not significant	Not significant

CHAPTER 14

LAND USE AND COMMUNITY

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ABBREVIATIONS

CEMP	Construction Environmental Management Plan
EC	European Commission
EIA	Environmental Impact Assessment
FOD	Foreign Object Debris
IEEM	Institute of Ecology and Environmental Assessment
IEMA	Institute of Environmental Management and Assessment
GJBS	Gibraltar Joinery and Building Services Ltd
HM	Her Majesty's
km	Kilometre
m	Metres
MOD	Ministry of Defence
OLS	Obstruction Limitation Surface
SAC	Special Area of Conservation
TGS	Toyota Gibraltar Stockholdings
UK	United Kingdom

1 INTRODUCTION

1.1 This chapter describes the existing land uses around the proposed power station. Potential effects are assessed by comparison to existing conditions.

1.2 The assessment has included site visits and information gathering through consultation and desk studies. The study focuses on land within a radius of approximately 1 kilometre (km) of the proposed power station.

1.3 Consultation and information gathering has been undertaken with relevant Authorities. A full list of the sources consulted is provided in the Consultation Log, (Appendix 1, Volume 1: Main Report). Information has been obtained from consultation with various organisations, including departments of Her Majesty's (HM) Government of Gibraltar and the Ministry of Defence (MOD).

1.4 This chapter describes the methodology of the assessment, evaluates the current land use, assesses the potential effects of the development proposals upon land use, identifies appropriate mitigation where required and assesses any residual effects.

2 PLANNING POLICY CONTEXT

Policy Framework

2.1 Planning guidance is provided in the form of the Gibraltar Development Plan 2009.

Gibraltar Development Plan 2009

2.2 The Gibraltar Development Plan 2009 identifies nine zones in Gibraltar, and their characteristic uses, for land use planning purposes. The North Mole area is within Zone 3: Port and Harbour.

2.3 Policy Z3.2 – Potential impact on North Mole Road

> *"In considering proposals for new development that front onto, or are visually prominent from, North Mole Road, particular attention shall be paid to: a) the architectural character and appearance of the building; and b) the visual impact of the proposal on North Mole Road".*
>
> (HM Government of Gibraltar, 2009:99)

2.4 Policy Z3.3 – Desalination Plant – Safeguarding

> *"A reclaimed site to the north-west of North Mole Road shall be safeguarded for use as a desalination plant. Should it be decided that the site is not required for this purpose alternative uses for port-related activities, light industrial or warehousing will be favourably considered. Any proposal shall pay due regard, in the layout and design of buildings, of the site's prominent position".*
>
> (HM Government of Gibraltar, 2009:100)

2.5 No further plans have been published by the government with revisions on their intentions for the North Mole area.

Power Supply Objectives

2.6 Gibraltar requires a secure and sustainable energy supply as it does not have interconnection with any other country. By 2020, Gibraltar is committed to achieve 15% of its energy supply by renewable energy technology, including solar photovoltaics, micro-wind energy, wave energy, and potentially, tidal energy. However, immediate need for safe and secure supply has led the government to commit to using a more efficient and environmentally

sustainable fuel of natural gas, than the existing diesel generated power supply.

3 SCOPE AND METHODOLOGY

Scope

3.1 The initial scoping exercise identified potential effects upon land use from the proposed development. Consequently a full assessment of potential impacts has been undertaken.

3.2 The technical scope of this assessment has included existing land uses within and adjacent to the proposed power station. Potential significant effects have been addressed for construction and operational phases.

3.3 The geographical scope of the study area has been influenced by the sensitivity of receptors within a radius of approximately 1 km of the proposed power station.

Transboundary Effects

3.4 Although the 1 km boundary of assessment traverses the border to Spain, there are no transboundary effects to be considered in relation to land use and community, therefore, they have been scoped out of this assessment. This is because it is considered that potential impacts from the proposals would not extend geographically to affect land uses or local communities across the border.

Assessment Methodology

3.5 There is no specific land use assessment methodology available. The general guidelines provided by the Institute of Environmental Assessment (IEMA) have been used and the assessment principles given in the Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 6 (Land Use) have been adopted where relevant.

3.6 A desk study has included a review of:

- the Gibraltar Development Plan 2009
- aerial and ground photographs
- base mapping of Gibraltar.

3.7 Land use for the purpose of this assessment is defined as the use and management of any land directly or indirectly affected by the proposed development.

3.8 This assessment was also informed by several site surveys and consultation with the Town Planner, Civil Aviation Authority, Port Authority, MOD and the Royal Air Force (RAF).

3.9 Whilst there are no published 'standard' criteria for land use assessments, threshold levels for potential significant effects have been developed based upon practical experience and guidance from such bodies as the Institute of Ecology and Environmental Assessment (IEEM) and the IEMA. Significance is seen as an interaction of both the sensitivity of the potential receptor (e.g. international, national, regional, local importance) and the magnitude and scale of change.

Significance Criteria

3.10 The assessment has been carried out as a three-stage process using the criteria as outlined in Tables LC2.1 to LC2.3.

Table LC2.1 Criteria to Assess Sensitivity of Receptor

Sensitivity	Criteria
High	Areas of land use of national or international importance e.g. designated sites and neighbouring land uses, highly sensitive to the type of development proposed.
Medium	Areas of land of local importance, especially neighbouring land highly sensitive to the type of development proposed.
Low	Land uses of greater than local importance, although not particularly sensitive to type of development proposed.
None	Areas of land of no more than very local significance or not sensitive to the type of development proposed.

Table LC2.2 Criteria to Assess Magnitude and Scale of Change on Land Use

Sensitivity	Criteria
High	Existing land use will be unable to continue as a direct or indirect consequence of the development or a beneficial new land use that could not otherwise occur will be facilitated.
Medium	Where existing land use can continue but changes in land take, extent, profitability, enjoyment, etc. is likely to be noticed by the user.
Low	Small changes not materially affecting the continuation of existing use.
None	No predicted change.

Table LC2.3 Assessment of Significance of Potential Effects on Land Use

Sensitivity	Criteria
High	A land use of at least national importance which will be unable to continue or facilitated as a direct result of the development process.
Medium	A noticeable change in locally significant land use, which may be unable to continue; or a small change in nationally important land use.
Low	Small changes with no more than local effects.
None	Change will be negligible and/or land use not sensitive to this type of development process.

Approach to Mitigation

3.11 Opportunities to reduce and remedy or compensate for adverse significant effects on land use and community infrastructure resources have been identified where practicable and appropriate.

Assumptions and Limitations

3.12 Detailed mapping of the current land uses has not been available, and therefore it is possible that some land uses have not been identified in this assessment. The Applicant will be required to conduct a thorough public participation process, including advertising and notification to all affected parties as part of the application process. It is unlikely, therefore, that affected parties will be uninformed of the proposals.

4 EXISTING CONDITIONS

4.1 The primary study area comprises land defined by the permanent and temporary land take for the scheme. The study also identifies sensitive land uses extending a further 1 km from the proposed site, to place the primary land uses within their local context. Land use definitions have been developed as shown in Table LC3.1 below.

Table LC3.1 Land Use Definitions

Land Use	Definition
Industrial/Commercial	Land used for the pursuit of industrial and commercial work/interest
Residential Property	Land used for residential purposes
Military	Land occupied or used by the MOD
Leisure/Tourism	Land used for tourism and recreational purposes
Other Uses	Miscellaneous land uses and Special Area of Conservation (SAC)

Land Use

Industrial/Commercial

4.2 The site is presently occupied by a combination of light industrial and commercial businesses, which include:

- Toyota Gibraltar Stockholdings (TGS)
- M.H.Bland
- GFI Tracing
- Sacarellos
- a government catering facility.

4.3 Her Majesty's Government of Gibraltar will be relocating these businesses elsewhere in Gibraltar prior to the commencement of works. Temporary energy generating turbines also present on site will be removed before works associated with the proposed power station begin. These land uses are, therefore, outside of the scope of this assessment.

4.4 Directly to the east of the site, are further light industrial units. These are the nearest commercial receptors to the proposed development, and are mainly accessed from the north via Mons Calpe Road. Businesses include:

- Gibraltar Joinery and Building Services Ltd. (GJBS) - yard and workshop;
- Wiltrans (Gibraltar) Ltd. - warehousing and courier services;

- Gibmaroc Group - importers and distributors of fruit.

4.5 Sixteen temporary Caterpillar generator sets, currently under the management of Sparks Energy Ltd., also occupy land to the east of the proposed development site.

4.6 To the south of the site is North Mole Road, which is a restricted access road, used by goods vehicles that require access to small cargo and handling businesses and a pump station located to the south and southeast of the site, and the Gibraltar Port Authority located to the southwest.

4.7 The existing Waterport Power Station is approximately 400 metres (m) to the southeast of the proposed site.

Residential Property

4.8 Waterport Terraces is located approximately 300 m due east of the proposed development site. Developed as an affordable housing project by the government, Waterport Terraces provides 362 flats, 34 maisonettes and 140 senior citizen flats, as well as ground floor retail space to the North Mole Area. The dominant land use of Waterport Terraces is defined as residential due to the high density of housing.

4.9 Europlaza is a residential apartment complex, which provides luxury accommodation, located south-southeast of the proposed development site. From some properties in Europlaza, it may be possible to see the end of the North Mole, and therefore the proposed power station.

4.10 Other residential areas within a 1 km radius of the proposed power station development include Harbour Views, Westview Park, Montagu Gardens, Sir William Jackson Gardens, Varyl Begg Estate and Watergardens.

Military

4.11 To the east-northeast of the proposed power station is the military airfield for Gibraltar, which is operated by the Royal Air Force, on behalf of the Ministry of Defence. The airfield has a runway of approximately 1,830 m which runs from east to west, a third of which projects into the sea to the northeast of the proposed development site. The runway is bisected by a four lane public road (Winston Churchill Avenue), which is the only access to mainland Spain, and

is controlled using barriers to restrict traffic during flight take-offs and landings. The airfield has a shared function with the Gibraltar International Airport, servicing scheduled civilian flights to and from the United Kingdom (UK).

4.12 Due to the proximity of the proposed development to the airfield, special safety considerations are applied to the planning application.

Leisure and Tourism

4.13 The Gibraltar Cruise Terminal is located to the southwest of the proposed development. Cruise ships may berth on either side of the 940 m long quay which services up to four medium sized or two large sized vessels simultaneously. The Cruise Terminal contains facilities including telephones, Gibraltar Tourist Board Information office, bar/restaurant, toilets and shops. Passengers may travel from the terminal into the city centre via North Mole Road on foot, by taxi or minibus, passing the proposed development site en route. The Gibraltar Development Plan 2009 acknowledges that any development is this area, fronting the main access road to the Cruise Liner Terminal, must have an attractive frontage (HM Government of Gibraltar, 2009:93).

4.14 There are 218 cruise vessels scheduled in 2015 which are predicted to host a total of approximately 323,700 passengers (Gibraltar Port Authority, 2015a). This predicted large flow of passengers along the North Mole Road has the potential to be affected by construction and operational impacts of the proposed development.

4.15 The Gibraltar–Tangier Ferry Terminal, on North Mole, is no longer operational. Ferry services operate from the Western Arm of the North Mole on Friday evenings and Sunday evenings. There are no plans to create a new ferry terminal. Operation of ferry services are, therefore, unlikely to be affected by the proposed development.

4.16 The Gibraltar International Airport is located to the northeast of the proposed development site. As afore mentioned, the airfield is owned by the Ministry of Defence and has unique shared military and civilian operations. In 2014, Gibraltar International Airport handled 3,730 civilian flights (Gibraltar International Airport, 2015). The close proximity of the proposed development

to the airport means that careful considerations must me made for design, construction and operation to prevent significant effects to the functions of the airfield.

4.17 Gibraltar's Ocean Village Marina and Marina Bay have a capacity of approximately 300 berths to accommodate 'superyatchs' with a maximum length of 90 m and maximum depth of 4.5 m (Gibraltar Port Authority, 2015b). These marinas are accessed via a narrow channel between North Mole and the Gibraltar International Airport runway and therefore have the potential to be affected by construction and operational impacts from the proposed power station.

Community Uses

4.18 The Flying Angel Club located directly south to the proposed development is home to Gibraltar's Mediterranean Mission to Seafarers' Centre which offers welfare services to merchant seafarers visiting the port and temporary accommodation. Its close proximity to the proposed development site means there is potential for the Flying Angel and its visitors to be affected during construction and operational phases.

4.19 Saint Bernard's Hospital is located approximately one kilometre south-southeast and is operated by the Gibraltar Health Authority. It is the only civilian general hospital of the UK Overseas Territory, providing a range of health care services including maternity, paediatrics, surgery, with a capacity for approximately 210 beds.

4.20 St Pauls First School and Westside Girls Comprehensive School are located in Varyl Begg Estate and on Queensway respectively.

5 FUTURE BASELINE

5.1 At the time of this assessment the following future developments have been identified by the Town Planner:

- North Mole Tank Farm (BA11849);
- Coaling Island Boats Marina (BA12306) – proposed 700 berth small boat marina with 480 m outer wharf berthing, public promenade and hard boat haulage areas to be located at Mid Harbour;
- North Mole Industrial Park (BA12692) – proposed four storey high quality office development to be built above the existing 'North Mole Business Park' on North Mole Road;
- North Mole Reclamation (BA12714) – placing of concrete caissons along the western and northern perimeter of the existing rock armour revetment to create a basin for the land reclamation of approximately 8,500 metres squared (m^2);
- North Mole Sullage Plant (BA12734) – a marine waste reception facility on the Western Arm of North Mole for the receipt and storage of waste oil and water from cleaning of oil tanks and engine rooms of ships;
- Western Beach Basin for land reclamation (BA13145) – construction of a rock armour revetment along the northern perimeter to create a basin for a land reclamation of 73,200 m^2, and the construction of sports facilities to be located at Western Beach;
- Coaling Island Reclamation (BA13479) – placing of concrete caissons adjacent to Coaling Island to create a basin for the land reclamation of approximately 23,000 m^3;
- Proposed floating oil storage vessel; steel barges to separate the storage vessel from the Detached Mole; a piping network on the Detached Mole; bunkering loading locations (BA13273).

6 POTENTIAL IMPACTS

Construction

6.1 Large components, to be delivered by road or sea, have the potential to impact nearby industrial and residential land uses due to disruption of local traffic. This has been fully assessed in Chapter 16 – Traffic and Transportation.

6.2 Contractors will have a duty within their provisions of the Construction Environmental Management Plant (CEMP) to limit environmental effects such as noise, general disturbance, vibration, traffic, air quality, ecology, fragmentation of land and general pollution under various EU Directives and Gibraltar laws.

Gibraltar Airfield Civil and Military

6.3 Any development with the potential to impact the safe operation of the airport leads to special considerations being applied for the application. The Aerodrome Authority, on behalf of the Ministry of Defence, and the Director of Civil Aviation consider any proposals for development that may affect aviation activity at Gibraltar International Airport and advise the Development and Planning Commission accordingly.

6.4 Consultation with the RAF and the MOD has helped inform the applications regarding restrictions associated with the airfield.

6.5 An aeronautical study has been undertaken under guidance from the Civil Aviation Authority, Military Aviation Authority's Manual of Aerodrome Design and Safeguarding. The study considered restrictions associated with both the commercial and military operation of the Gibraltar airfield. Elements assessed considered construction and operation based on Gibraltar Planning Guidance (Information Sheet 6, HM Government of Gibraltar, 2014), including:

- Obstruction Limitation Surface (OLS): The development complies to international standards related to physical safeguarding, including OLS. The design of the proposed development was altered to abide to stack and building height restrictions. Use of cranes during construction may lead to infringement of the physical safeguarding characteristics, however these infringements will be temporary in nature and managed in conjunction with airport operators in order to avoid conflict with airport operations. A crane management plan will be established to ensure compliance.

- Bird Strike: Features with potential to attract birds such as standing water, food sources, potential nest or roosting sites will be avoided during construction and operation in order to lower risk of bird strike.
- Foreign Object Debris (FOD): Appropriate management practices regarding FOD will be implemented and will include specific method statements to safeguard the airport operations and will be required under the approved the CEMP and OEMP.
- Lighting: In accordance with recommendations, building and development lighting will be designed to avoid pilot distraction or confusion, reducing strong light beams directed at or towards the airfield or within the line of approach/flight paths. Obstruction lighting (including mobile and fixed cranes) will be configured correctly and agreed with the Aerodrome Authority.
- Wind and turbulence: Wind conditions in Gibraltar are very distinct, and wind associated turbulence can have a significant effect on the operation of the airport. The design process for the proposed development has taken account of potential turbulence in association with the stack emissions.
- Reflectivity: The building design and construction materials have been carefully selected with consideration for potential distraction to pilots and air traffic controllers to minimise distraction from reflection of sunlight from surfaces on site.

6.6 The study concluded that the proposed development will not prejudice the safe operation of the Gibraltar Airport. And therefore, there is no significant effect arising from the proposed power station, upon the airport operations.

Utilities and Services

6.7 The site for the proposed power station is on existing reclaimed land, constructed during the 1990s. Prior to construction of the proposed power station, a detailed services assessment will be conducted to establish the precise location of any underground services. Fibre optic cables, service electricity lines, and drainage pipes have been identified running outside and alongside the proposed site. These will be protected during construction excavation and piling works in particular.

Operation

Industrial/Commercial

6.8 The proposed development will incur a permanent land use change from existing industrial activities to an energy generation facility. The movement of businesses presently on site prior to proposed development works are outside

the scope of this assessment. During its operation, and due to its distinct function, the proposed power station will not be in direct economic competition with other land uses in the vicinity.

7 ASSESSMENT OF POTENTIAL SIGNIFICANT EFFECTS

7.1 This section assesses the potential significance of effects of the proposed development on land use.

Construction

7.2 The main construction compound will be located within the site perimetre and all construction activities will be managed under a CEMP. Dust, noise, visual impacts, traffic routing, pollution prevention and waste management are all considered individually and any risks will also be managed under the CEMP. The significance of the effect of the site construction compound upon other land uses is considered to be **none**.

Operation

7.3 There will not be any other changes to land use, including those adjacent to the site, as a result of the proposed power station. No other technical assessment finds a significant effect of operations in the local vicinity. Community facilities, such as schools, emergency services and utilities will not be affected by the proposals. Therefore, under this assessment, there was determined to be **no significant effect** from the proposed development on land use and community.

8 MITIGATION AND RESIDUAL SIGNIFICANT EFFECTS

Construction Mitigation

8.1 Mitigation of the effects from construction will be made, primarily, through the development of a Construction Environmental Management Plan (CEMP).

Residual Significant Effects

8.2 The current land use is industrial in nature, and will remain industrial. This will therefore result in a permanent change with no **significant residual effect**.

9 CONCLUSION

9.1 This investigation has determined that there will be **no significant effects** to the environment associated with land use and community, if all appropriate CEMP and OEMP management measures are adhered to.

10 REFERENCES

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CHAPTER 15

NOISE AND VIBRATION

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GLOSSARY AND ABBREVIATIONS

Ambient Noise Level	The ambient noise level is the equivalent continuous 'A' weighted sound pressure level ($L_{Aeq,T}$) (see below). It takes account of both the number and level of noise events.
A-weighted decibels	The sensitivity of the ear is frequency dependent. Sound level meters are fitted with a weighting network which approximates to this response and allows sound levels to be expressed as an overall single figure value, in dB(A). The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain). An increase in noise level of 10 dB(A) is roughly perceived as a doubling of the sound source. A 3 dB(A) change in noise level is generally the minimum perceptible difference.
Baseline Noise Level	In this study, where the term baseline noise level is referred to, it is the equivalent continuous 'A' weighted sound pressure level, ($L_{Aeq,T}$) (see below) not including either construction noise or the operation of the power station.
BS	British Standard
CEMP	Construction Environmental Management Plan
CRTN	Calculation of Road Traffic Noise
dB	Decibel. The unit used to describe the magnitude of sound is the decibel (dB) and the quantity measured is the sound pressure level. The decibel scale is logarithmic and it ascribes equal values to proportional changes in sound pressure, which is a characteristic of the ear. Use of a logarithmic scale has the added advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed to a more manageable range of numbers. The threshold of hearing occurs at approximately 0 dB (which corresponds to a reference sound pressure of $2x10^{-5}$ pascals) and the threshold of pain is around 120 dB.
EIA	Environmental Impact Assessment
EU	European Union
Hz	Hertz. Measure of frequency is analogous to musical pitch. It depends upon the rate of vibration of the air molecules which transmit the sound and is measured as the number of cycles per second or Hertz (Hz). The human ear is sensitive to sound in the range 20 Hz to 20,000 Hz (20 kHz).
$L_{Aeq,T}$	Where noise levels vary with time, it is necessary to express the results of a measurement over a period of time in statistical terms. The most widely applicable unit is the equivalent continuous A-weighted sound pressure level ($L_{Aeq,T}$). It is an energy average and is defined as the level of a notional sound which (over a defined period of time, T) would deliver the same A-weighted sound energy as the actual fluctuating sound. T is the reference time period. Where no

	reference time period is specified for a noise level, the unit is presented as L_{Aeq}.
L_{Amax}	The maximum A-weighted noise level that was recorded during the monitoring period.
L_{Amin}	The minimum A-weighted noise level that was recorded during the monitoring period.
$L_{A10,T}$	The A-weighted noise level exceeded for 10% of the time period. L_{A10} is commonly used as a descriptor of road traffic noise.
$L_{A90,,T}$	The A-weighted noise level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.
mm/s	Millimetres per second
MoD	Ministry of Defence
NoiseMap	Industry-standard environmental noise modelling software.
ORC	Organic Rankine Cycle
PPG	Planning Policy Guidance (UK)
p.p.v.	Peak particle velocity. Relating to vibration, this is the maximum value of particle velocity obtained during a given interval.
VDV	Vibration dose value. Relating to vibration, this is a measure of exposure to vibration, taking into account both level and duration.
TRL	Transport Research Laboratory
WHO	World Health Organisation

1 INTRODUCTION

1.1 This chapter assesses the potential noise and vibration impact of the proposed North Mole Power Station to the nearest residences and commercial units.

1.2 The assessment considers:

- The construction phase of the development;
- The operational phase of the proposed North Mole Power Station.

1.3 The assessment has included:

- Review of existing and proposed site drawings;
- Advance liaison with The Department of the Environment and The Environmental Agency in Gibraltar to confirm in principle the approach of the background noise survey and assessment;
- Attended day, evening and night-time background noise survey over a five day period including a weekend at the nearest residences to the site;
- Above survey including a period of temporary night-time shutdown of the existing Waterport Power Station and temporary gensets noise sources to enable measurement of 'true' night-time background noise levels. Survey locations throughout survey also included 'screened' locations remote from the existing power station sources to minimise the noise contribution from them;
- Review of supplied information from employer's acoustic consultant including predictions of operational noise levels;
- Assessment of noise and vibration impact from proposed construction and operational phases;
- Recommendations for any noise and/or vibration control measures as necessary;
- Assessment of residual impact and cumulative effects.

1.4 Cross-references are made to Chapter 16 for information associated with Traffic and Transportation.

2 LEGISLATIVE CONTEXT

2.1 There are a number of recognised documents and planning policies relevant to the noise and vibration assessment of the proposed development, during both its construction and operational phases.

EU and Gibraltar Legislation

2.2 The Environmental (Assessment and Management of Noise) Regulations. (HM Government of Gibraltar, 2006) transposes EU Directive 2002/49/EC relating to the assessment and management of environmental noise into the law of Gibraltar. This EU Directive covers the process of strategic noise mapping and resulting action plans for Gibraltar.

Gibraltar Planning Policies

2.3 Policy ENV9 of The Gibraltar Development Plan states the following:

> *"In considering applications for noise-generating developments due consideration must be given to minimising the impact of noise on adjacent areas through the design and layout of the proposed development and by the use of other mitigating measures such as physical screening or hours of operation.*
>
> *In considering applications for all types of development the Development and Planning Commission will consider the likely short term impact from construction noise on adjacent areas, and where this is considered to be significant may impose conditions to mitigate the effects through, for example, limiting hours of construction work, or limiting the location of certain plant machinery within the site."*
>
> (HM Government of Gibraltar, 2009:30-31)

2.4 It is understood that there are no policies specific to vibration effects.

UK Planning Policies

2.5 Gibraltar refers to the UK planning policies for noise guidance. National Government Guidance for the UK is provided by the National Planning Policy Framework (NPPF). The NPPF sets out the UK government's planning policies for England and how these are expected to be applied.

2.6 Paragraph 123 of section 11 of the NPPF, *'Conserving and enhancing the natural environment'* provides general guidance regarding planning and noise. It states:

> *"Planning policies and decisions should aim to:*
>
> *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
>
> *Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
>
> *Recognise that development will often cause some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established, and*
>
> *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*
>
> (NPPF, 2012:29)

2.7 The NPPF and its accompanying Explanatory Note (Noise: Planning Practice Guidance) provide only general guidance on planning and noise. Paragraph 005, ref. ID 30-005-20140306 of the Guidance recommends the following on noise exposure, its effects and recommended actions:

Table NV2.1 Noise: Planning Practice Guidance

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close	Observed Adverse Effect	Mitigate and reduce to a minimum

Perception	Examples of Outcomes	Increasing Effect Level	Action
	windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.		
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

2.8 However, it should be noted that there is no specific accompanying guidance provided on objective noise level thresholds or categories that apply to the above grades of noise exposure.

2.9 The recommendations provided by BS4142 (to rate and assess likely impact of sound from an industrial source) and BS8233 (for appropriate noise levels in residential and non-residential premises) have therefore been adopted to provide appropriate assessment criteria for the operational phase.

British Standards

2.10 The following British Standards have been used:

- BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound';
- BS 8233: 2014 'Guidance on sound insulation and noise reduction for buildings';

- BS 6472: 1992 ‘Guide to evaluation of human exposure to vibration ion buildings (1Hz to 80 Hz)’;
- BS 5228: 2009: ‘Code of practice for noise and vibration control on construction and open sites Part 1: Noise’;
- BS 5228: 2009: ‘Code of practice for noise and vibration control on construction and open sites Part 2: Vibration’.

3 SCOPE AND METHODOLOGY

Scope

3.1 The scope of the noise and vibration impact assessment considers the following:

- The construction phase of the proposed North Mole Power Station;
- The operational phase of the proposed North Mole Power Station.

3.2 The assessment has considered the potential impact from these sources at the nearest residential and commercial properties to the proposed development.

Transboundary Effects

3.3 The potential impact of the proposed development to the nearest noise-sensitive receptors across the border in Spain has also been considered (transboundary effects).

3.4 The nearest and worst-case receptors in Gibraltar range from approximately 30-540 metres away from the site depending on location and receptor type. The nearest receptors in Spain are all at very much greater distances from the site.

3.5 As a guide, the nearest receptors in Spain are approximately 1.4 km to the north-east (off Avenida Principe de Asturias in La Linea de la Conception across the frontier), 7.4 km to the west (in Algeciras across the bay) and 5.7 km to the north-west (in Palmones across the bay).

3.6 Any potential noise and vibration effects will attenuate very readily over these relatively large distances, typically at a rate of 6 dB reduction per doubling of distance from the source. It is therefore predicted that the impacts will be very considerably lower than has been predicted at the nearest receptors in Gibraltar. Any potential impacts from both the construction and operational phases at the more distant receptors involved are consequently expected to be **not significant**.

3.7 Transboundary effects have therefore been scoped out of the assessment.

Data Collection

3.8 A comprehensive background noise measurement survey has been undertaken at locations representing the nearest residences.

3.9 The survey has been carried out over representative day, evening and night-time periods, following UK Planning Policy guidelines. .

3.10 Measurement locations comprised 'exposed' and 'screened' residential locations to the existing Waterport Power Station and temporary North Mole genset noise sources for comparison. In addition, the survey included a night-time period of temporary shutdown of the existing power station noise sources, to enable measurement of 'true' background noise levels.

Sampling Techniques and Testing Strategy

3.11 In order to inform the noise baseline, a background noise survey was conducted at the nearest noise-sensitive receptors to the proposed development.

3.12 The background noise survey methodology and proposed measurement locations were agreed with the Environmental Agency and Department of the Environment in Gibraltar.

3.13 Attended noise measurements were recorded during representative day, evening and night-time periods from Thursday 16 April to Tuesday 21 April 2015. These represented the worst-case periods for the expected peak periods of power consumption (day and evening) and when background noise levels typically reduce to a minimum (night).

3.14 The existing use of the Waterport Power Station and the temporary generator sets on North Mole Road affected the noise climate in the area. To overcome this and to enable 'true' background noise levels to be measured at 'exposed' residential facades, the Waterport Power Station and 13 of the 20 temporary generator sets were switched off from around 00:00-01:30 hours on Tuesday 21 April, with the assistance of Gibraltar Electricity Authority. It was therefore possible to measure 'true' background noise levels at a limited number of locations for short durations.

3.15 Also, throughout the survey, measurements were recorded both at 'exposed' and 'screened' facades of the nearest residences to the Waterport Power Station noise sources for comparison. The 'screened' locations were acoustically screened as far as could be achieved by the intervening residential buildings. These locations were selected in an attempt to minimise as far as possible, rather than eliminate entirely, the noise contribution from the existing power station noise sources. However, the 'exposed' residential locations only have been considered in the subsequent assessment. These represent the nearest, most affected and worst-case locations and where 'true' background noise levels were able to be measured in the absence of noise from the existing power station sources.

Noise Measurement Locations

3.16 As agreed with The Environmental Agency, the nearest residential locations required to be included in the background noise survey comprised:

- Residential blocks at Waterport Terraces
- Residential blocks at Sir William Jackson Grove ('Gib V estate')
- Residential blocks at Harbour Views (off Europort Road)
- The Flying Angel social club.

3.17 Noise levels were therefore recorded at the agreed residential locations shown in Table NV3.1 below. The locations are shown in Figure NV3.1 (Volume 2: Figures).

Table NV3.1 Background Noise Survey Locations

Location no.	Residential location	Description	Comments
1	Honeysuckle House, Waterport Terrace	Flower bed outside entrance to Honeysuckle House (free-field conditions)	'Screened' location to existing Waterport Power Station/temporary generators
2	Candytuft House, Waterport Terrace	Flower bed outside entrance to Candytuft House (free-field conditions)	'Exposed' location to existing Waterport Power Station/temporary generators

Location no.	Residential location	Description	Comments
3	Rear of Rosemary Court, Gib V estate	Paved area in courtyard by central stone bench (free-field conditions)	'Screened' location to existing Waterport Power Station/temporary generators
4	Front of Rosemary Court, Gib V estate	Verge by zebra crossing (free field conditions)	'Exposed' location to existing Waterport Power Station/temporary generators
5	West of Tilbury Court, Harbour Views	Paved area by flower beds outside NW corner of Tilbury Court (free field conditions)	'Screened' location to existing Waterport Power Station/temporary generators
6	West of Freemantle Court, Harbour Views	Paved area by central lamp-post (free field conditions)	'Exposed' location to existing Waterport Power Station/temporary generators
7	The Flying Angel[a]	To east of The Flying Angel over manhole cover	'Exposed' location to existing Waterport Power Station/temporary generators

[a] 'Screened' location not available at this position. The Flying Angel is the location of the Mediterranean Mission to Seafarers. The building use is understood to be a clubhouse on the ground floor and hostel accommodation at first floor level.

3.18 A series of attended 10 minute noise measurements were recorded at each location in rotation. All noise measurements were undertaken using fully-calibrated instrumentation comprising a RION NA-28 Type 1 sound level meter (serial no. 00991176), pre-amplifier model NH-23 (serial no. 81217) and microphone model UC-59 (serial no. 01421). The calibration of the meter was checked before and after the survey, using calibrator model NC-74 (serial no. 34794362) with no variation in level noted. The equipment was mounted on a tripod approximately 1.2-1.5 m above ground with a windshield fitted to the microphone at all times. All locations were in free-field conditions, i.e. at least 3.5 m from any noise-reflecting surface with the exception of the local ground level.

3.19 Weather conditions throughout the survey from Thursday 16-Tuesday 21 April were dry, sunny/clear skies and with little or no wind (very much less than 5 m/s wind speed). These therefore represented good conditions for noise measurement. Stronger winds were noted during the last daytime measurement round on Tuesday 21 April, when mean wind speeds of up to 4.3 m/s were measured (gusting up to 9.8 m/s).

Assessment Methodology

Construction Phase

3.20 The construction schedule below represents the assumed main items of noise-generating plant required, which has been used as the basis for the noise calculations:

- *Phase 1*: Site preparation (e.g. access, temporary services, construction compound) requiring 1 no. bulldozer, 1 no. excavator, 1 no. front end loader and 4 no. dump trucks;
- *Phase 2*: Earthworks requiring 1 no. bulldozer, 1 no. excavator, 1 no. front end loader and 4 no. dump trucks;
- *Phase 3*: Laying of foundations and piling requiring 1 no. excavator, 1 no. front end loader, 1 no. dump truck, 1 no. back hoe and 1 no. piling rig (auger);
- *Phase 4*: Construction of permanent site infrastructure (roadways, water supply etc.) requiring 1 no. excavator, 1 no. front end loader, 2 no. dump trucks, 1 no. back hoe, 1 no. vibrating roller, 1 no. grader;
- *Phase 5*: Construction of permanent buildings requiring 2 no. 50T mobile cranes, 1 no. flat truck, 1 no. telescopic handler;
- *Phase 6*: Testing/start-up of equipment requiring no specific construction plant;
- *Phase 7*: Removal of all temporary facilities and waste requiring 1 no. front end loader and 1 no. dump truck; and
- *Phase 8*: Landscaping work including new planting requiring 1 no. front end loader and 1 no. dump truck.

3.21 The appropriate guidance provided by Annex E of BS 5228-1: 2009 has been used to assess the significance of construction noise effects. It has been assumed that construction will be undertaken during standard working hours of 08:00-20:00 hours Monday to Saturday and at no other times including Sundays and Public Holidays unless absolutely necessary.

Operational Phase

3.22 Reference has been made to relevant data provided by the design team's acoustic consultants (dB Vib Consulting) in their report 'Noise Impact Assessment Outdoor Acoustic Study' ref. WP3/900/AO/GIB2/DBV/Rep/002/D dated 7/7/15). Relevant tables and information have been extracted from this report and included in Appendix NV1. The cumulative noise level from the operational site has been predicted at various locations, including the nearest and most exposed residential receptors, which have been reviewed to form the 'sound rating level' in accordance with BS4142. The noise predictions are understood to take account of factors such as:

- Distance attenuation;
- Acoustic screening provided by any existing or proposed intervening structures/buildings and any reflected noise contributions;
- Any on-time corrections for noise sources;
- Acoustic feature corrections (e.g. for tonality, intermittency, impulsiveness or any other acoustic feature).

3.23 The sound rating level has been compared with the pre-existing L_{A90} background noise levels to assess the potential noise impact. A realistic assessment has been undertaken, based on 'true' background noise levels measured during the temporary night-time shutdown of the existing power station sources. The current contribution from the existing power station sources has therefore been removed from the assessment where possible to consider the worst-case night-time period.

3.24 Noise levels have also been predicted at the nearest commercial/industrial premises. These have been compared with the recommendations for absolute noise level ranges (i.e. not relative to background) of BS8233: 2014 for these uses.

3.25 The assessment of the operational scenarios are:

- Four engines in 2017
- Five engines in the future, when demand requires. This is assessed as 2027.

Sensitive Locations

3.26 The assessment considers the following nearest residential locations:

- Residential blocks at Waterport Terraces (background noise measurement Location 2)
- Residential blocks at Sir William Jackson Grove ('Gib V estate') (background noise measurement Location 4)
- Residential blocks at Harbour Views (off Westside Road) (background noise measurement Location 6)
- The Flying Angel social club & residential flat above (background noise measurement Location 7).

3.27 The following nearest existing commercial/industrial premises are also included:

- Gibraltar Port Authority offices to the west
- MH Bland to the south
- JBS depot to east.

3.28 The following proposed commercial development has also been included:

- Proposed office development rising to fifth floor level over the current building at North Mole Industrial Park, Mons Calpe Road.

3.29 Sensitive residential and commercial/industrial receptors are shown in Figure NV3.2 (Volume 2).

3.30 Where applicable and to provide a worst-case view, the assessment considers the potential noise impact at the upper floor levels of the receptors, where the effect of acoustic screening provided by any intervening structures will be minimised.

Significance Criteria

Construction Phase

BS 5228: 2009: 'Code of practice for noise and vibration control on construction and open sites Part 1: Noise 2009'

3.31 BS 5228: 2009 provides recommendations for basic methods of noise and vibration control relating to construction and open sites where work activities/operations generate significant noise levels. Part 1 provides guidance concerning methods predicting and measuring noise and assessing its impact on those exposed to it, whilst also recommending procedures for the

establishment of effective liaison between developers, site operators and authorities.

3.32 Annex E of BS 5228: Part 1 describes methods for assessing the significance of noise effects from construction activities on occupiers of noise-sensitive properties. Annex E includes guidance on assessing construction noise effects. It states:

> *"A pragmatic approach needs to be taken when assessing the noise effects of any construction project, i.e. the guidance below* [on assessing noise impact] *would generally only apply to projects of significant size, and lesser projects might not need to be assessed or might only require general consideration of noise effects and mitigation."*
>
> (BS 5228, 2009:117)

3.33 Construction methods and types and numbers of plant have been assumed based on the best current estimate of proposed works. It is also anticipated that any vibration from proposed construction works will not be excessive, as the site is at considerable distance from the main existing residences.

3.34 Section 6.3 of BS5228 states that in relation to construction noise:

> *"…it is generally assumed that a greater difference* [between ambient noise level at the residence with and without construction noise present] *might be tolerated, than for an industrial noise source, when it is known that the operations are of short or limited duration, and the critical issues are likely to include interference with speech communication and/or sleep disturbance."*
>
> (BS 5228, 2009:7)

3.35 Construction noise can be adequately controlled by appropriate planning condition. This can be typically achieved by restricting hours of operations and by ensuring the contractor follows recognised industry guidance on reducing construction noise levels wherever possible, complying with an agreed Construction Environmental Management Plan (CEMP). If required, there would also be recourse to control construction noise under sections 60 and 61 of the Control of Pollution Act 1974 (UK).

3.36 Additionally, BS5228: Part 1 provides relevant guidance on measures available to reduce construction noise where possible.

3.37 The examples shown in Appendix E of BS5228 may be viewed as options to recommend appropriate noise targets at existing residences. The statement of Annex E of BS5228 that not all construction projects will require a noise assessment should also be borne in mind.

3.38 Also to note is that construction noise is by its nature temporary in duration. The general perception by residents of construction noise impact is that temporary construction noise tends to be considered less disturbing than, for instance, a permanent, industrial noise source of a similar magnitude. This is recognised by section 6.3 of BS5228.

3.39 Construction noise criteria may not therefore be required at all for this proposal but the following guidance is available from BS5228.

3.40 The appropriate guidance provided by Annex E of BS 5228-1: 2009 has been used to assess the significance of construction noise effects.

3.41 Annex E provides a number of example criteria for the assessment of the significance of noise effects. In summary, these are:

Significance Based on Fixed Noise Limits

3.42 For daytime working (07:00-19:00 hours) outside living rooms and offices.

- 70 dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise;
- 75 dB(A) in urban areas near main roads in heavy industrial areas.

Significance Based on Noise Change

3.43 Two examples are provided which reflect the more conventional EIA methodologies for noise.

3.44 Example method 1 is 'The ABC method'. This is based on the change in noise level at the residential receptors before and after the introduction of construction noise. Table E.1 of BS 5228 Part 1 describes the 'ABC method' of setting appropriate construction noise thresholds and determining the significance of construction noise impact. This is reproduced in Table NV3.2:

Table NV3.2 Example Threshold of Significant Effect at Dwellings (Table E.1 of BS5228)

Assessment category & threshold value period (L_{Aeq})	Category A[A)]	Category B[B)]	Category C[C)]
Night-time (23:00-07:00)	45	50	55
Evenings & Weekends [D)]	55	60	65
Daytime (07:00-19:00) & Saturdays (07:00-13:00)	65	70	75

Note 1: A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.

Note 2: If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3 dB due to construction activity.

Note 3: Applied to residential receptors only.

[A)] Category A: threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are less than these values

[B)] Category B: threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values

[C)] Category C: threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values

[D)] 19:00-23:00 weekdays, 13:00-23:00 Saturdays and 07:00-23:00 Sundays

3.45 Example method 2 is the '5 dB(A) change'. This states that construction noise is deemed to be significant if the total noise (pre-construction ambient plus construction noise) exceeds the pre-construction noise by 5 dB or more. This is subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq,period}$ from construction noise alone for the day, evening and night-time respectively and a duration of one month or more. These criteria are applicable to the following building uses:

- Residential housing

- Hotels and hostels
- Buildings in religious use
- Buildings in educational use
- Buildings in health and/or community use.

3.46 Of the various assessment techniques above relevant to the proposed development, the following construction noise criteria (shown in Table NV3.3) have been adopted. The pre-existing ambient noise levels are shown relevant to each location. To consider the worst-case, the nearest and most exposed residential facades have been considered (background noise measurement Locations 2, 4, 6 and 7).

3.47 Note that noise from the existing Waterport Power Station and temporary generator sets will remain during the construction phase. The background levels as measured are therefore relevant to consider the potential impact of the construction programme phase.

3.48 It is understood that construction works will typically be restricted to standard daytime hours only (08:00-20:00 hours Monday to Saturday). For completeness, Table NV3.3 shows the adopted noise criteria for day, evening and night-time periods at the most exposed receptor locations only, based on the corresponding existing ambient noise levels (shown in section 4 'Existing Conditions').

Table NV3.3 Adopted Construction Noise Criteria

Receptor Type	Existing L_{Aeq} ambient noise level	Adopted Construction Noise Criteria	Comments
Residential			
Loc 2 (Waterport Terrace – 'exposed')	65 day 62 eve 60 night	70 day 65 eve 55 night	'The ABC Method' of BS5228
Loc 4 (Gib V estate – 'exposed')	63 day 60 eve 52 night	70 day 65 eve 55 night	
Loc 6 (Harbour Views – 'exposed')	56 day 56 eve 54 night	65 day 60 eve 55 night	
Loc 7 (Flying Angel)	76 day 76 eve 76 night	75 day 65 eve 55 night	

Receptor Type	Existing L_{Aeq} ambient noise level	Adopted Construction Noise Criteria	Comments
Commercial/ Industrial		75 dB L_{Aeq}	BS5228 fixed noise limit outside offices (daytime - in urban areas near main roads in heavy industrial area). No guidance available for construction noise outside daytime hours.

Operational Phase

BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound'

3.49 BS4142: 2014 describes the method for rating and assessing sound of an industrial and/or commercial nature and to assess the likely affects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

3.50 Appropriate corrections are applied to form the 'rating level' of the sound, for acoustic features such as tonality, impulsivity, intermittency and other sound characteristics.

3.51 BS4142 compares the noise rating level of the noise source being assessed with the pre-existing background noise level. To assess impact it states that:

> *"The greater the difference, the greater the magnitude of impact;*
>
> *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
>
> *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and*
>
> *The lower the rating level relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact, depending on the context."*
>
> (BS4142, 2014:16-17)

3.52 The adopted significance criteria for operational noise at residential locations are shown in Table NV3.4.

Table NV3.4 Significance Criteria outside Residences – Operational Noise

Significance	Difference Between Rating Level [a] and L_{A90} Background [b]
Not significant	≤ 0
Low	0 to +5 dB
Medium	+5 to +10 dB
High	≥ +10 dB

[a] Includes acoustic feature correction, where applicable. [b] represented by 'true' background noise in absence of existing power station noise sources.

BS 8233: 2014 'Guidance on sound insulation and noise reduction for buildings'

3.53 The relevant desirable criteria recommended by BS8233: 2014 inside non-domestic buildings are shown in Table NV3.5 below.

Table NV3.5 Extract from Table 6 of BS 8233: 2014 Typical Noise Levels in Non-domestic Buildings

Activity	Location	Design range dB $L_{Aeq,T}$
Study and work requiring concentration	Staff/meeting room, training room	35-45
	Executive office	35-40

3.54 There are also industrial buildings (e.g. workshops/warehouses) included in the nearest commercial premises. BS8233 recommends that the maximum steady noise level inside such premises should not exceed 57 dB and 62 dB for reliable speech communication with a normal and raised voice respectively, when the communicators are 1m apart. These levels have been adopted as internal noise design criteria.

3.55 BS 8233 states that an open window typically provides 15 dB(A) attenuation and that a standard double glazed window when closed provides around 33 dB(A) attenuation.

BS 6472: 1992 'Guide to evaluation of human exposure to vibration ion buildings (1Hz to 80 Hz)'

3.56 BS 6472: 1992 rates the potential effects of vibration in terms of the probability of adverse comment from occupiers of buildings. The relevant dose values recommended by the Standard are shown in Table NV3.6 below:

Table NV3.6 Vibration Dose Values ($ms^{-1.75}$) Above Which Various Degrees of Adverse Comment may be Expected

	Vibration Dose Values ($ms^{-1.75}$)		
	Probability of Adverse Comment		
	Low	Possible	Probable
Residential buildings (16 hr day)	0.2 – 0.4	0.4 – 0.8	0.8 – 1.6
Residential buildings (8 hr night)	0.13	0.26	0.51
Office buildings (16 hr day)	0.4	0.8	1.6

Employer's Requirements

3.57 The government (employer) has issued the employer's requirements and the relevant parts which are pertinent to this chapter are shown below:

> *"The noise level during construction and operation including background and contribution from the new power plant shall not exceed the background noise level by more than 5 dB(A) at any noise-sensitive receptors taking into account that the Waterport Power Station will not be in operation once the new power station is operational.*
>
> *The noise level measured at a distance of 1m from the power station boundary shall in any case not exceed 70 dB(A) and shall not exceed 45 dB(A) (night-time reading) at a distance of 200m radius from the site boundary at ground level, noise-sensitive receptors and at the highest point of any residential buildings in the vicinity (with the assumption that the noise generated by the existing Waterport Power Station will disappear."*
>
> (Government of Gibraltar, 2014:1.18)

"The Contractor shall take measures to ensure that the ground-borne vibration at the buildings in the area surrounding the power station, during construction, and with the initial number of generating sites in operation at the maximum load available during testing shall not exceed the limits indicated in Table 1.

Table 1 Maximum weighted rms values for continuous and impulsive vibration acceleration (m/s^2) 1-80Hz

		Maximum values	
Location	***Assessment period[2]***	***z-axis[1]***	***x- and y-axes***
Continuous vibration			
Critical areas[3]	*Day- or night-time*	*0.0050*	*0.0036*
Residences	*Daytime*	*0.010*	*0.0071*
	Night-time	*0.007*	*0.005*
Offices, schools, educational institutions and places of worship	*Day- or night-time*	*0.020*	*0.014*
Workshops	*Day- or night-time*	*0.04*	*0.029*
Impulsive vibration			
Critical area[3]	*Day- or night-time*	*0.0050*	*0.0036*
Residences	*Daytime*	*0.30*	*0.21*
	Night-time	*0.10*	*0.071*
Offices, schools, educational institutions and places of worship	*Day- or night-time*	*0.64*	*0.46*
Workshops	*Day- or night-time*	*0.64*	*0.46*

[1] z-axis is vertical
[2] Daytime is 7.00 am to 10.00 pm and night-time is 10.00 pm to 7.00 am
[3] Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. There may be cases where sensitive equipment or delicate tasks require more stringent criteria than the human comfort criteria specified above. Stipulation of such criteria is outside the scope of this policy and other guidance documents (e.g. relevant standards) should be referred to. Source BS 6472-1992."

(HM Government of Gibraltar, 2014:1.19-1.20)

3.58 The above requirements provide further safeguarding for managing and minimising the potential for noise and vibration impact.

Limitations and Assumptions

3.59 This impact assessment has incorporated a degree of conservatism to allow for uncertainties. The limitations and assumptions of the assessment include the following:

- Presence of noise from existing power station facilities prevent measurement of extensive 'true' background noise levels;
- Reliance on 'true' background noise measurements to assess operational noise, was limited to temporary night-time shutdown of existing power station;
- therefore the quietest period has been measured, ie at night when the Waterport Power Station and temporary generators were shut down.
- Construction noise sources are assumed but based on the best current estimate.
- The noise levels from the plant have been provided to Engain by a third party and can not be verified by Engain. The actual measurements of noise emitted from the power station can not be obtained directly for the design. Therefore, this assessment is a prediction of the future and hence may not represent actual emitted levels, which may be lower and will reflect factors such as wind direction and operating scenarios. At this design stage, it is not possible to quantify actual noise emissions. The design has followed specific parameters for noise. The most reasonable worst case scenario has therefore been assessed.
- The employers requirements of limits to noise levels at 1 metre and 200 metres from the power station are conservative. Noise levels at the sensitive receptors will be significantly lower than these.

4 EXISTING CONDITIONS

With and Without Existing Power Station Sources

Residential Receptors

4.1 In order to inform the noise baseline, a background noise survey was conducted at the nearest residential receptors to the proposed development, in accordance with procedures agreed with the Environmental Agency.

4.2 A summary of the mean measured levels for the main noise descriptors at each location is shown in Table NV4.1 below. The full measurement results appear in Appendix NV2.

Table NV4.1 Mean Measured Background Noise Levels

Loc no.	Residential location	Period	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
1	Honeysuckle House, Waterport Terrace ('screened')	Day Evening Night *(Night – Waterport Power Station switch off)*	64 63 47 *41*	83 83 57 *50*	56 54 48 *42*	47 46 45 *40*
2	Candytuft House, Waterport Terrace ('exposed')	Day Evening Night *(Night – Waterport Power Station switch off)*	65 62 60 *54*	84 81 79 *76*	68 63 60 *51*	57 55 55 *41*
3	Rear of Rosemary Court, Gib V estate ('screened')	Day Evening Night	59 55 47	77 76 59	59 55 48	51 48 45
4	Front of Rosemary Court, Gib V estate ('exposed')	Day Evening Night *(Night – Waterport Power Station switch off)*	63 60 52 *47*	77 75 68 *65*	64 62 53 *50*	58 55 48 *39*
5	West of Tilbury Court, Harbour Views ('screened')	Day Evening Night	62 53 46	89 75 65	57 54 46	48 47 43

Loc no.	Residential location	Period	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
6	West of Freemantle Court, Harbour Views ('exposed')	Day Evening Night *(Night – Waterport Power Station switch off)*	56 56 54 *44*	70 67 64 *65*	57 57 55 *47*	53 54 53 *40*
7	The Flying Angel[a] ('exposed')	Day Evening Night *(Night – Waterport Power Station switch off)*	76 76 76 *71*	85 81 77 *72*	77 77 76 *72*	75 76 75 *71*

[a] 'Night - Waterport Power Station switch off' is period when Waterport Power Station and majority of temporary generator sets were temporarily switched off to measure 'true' background levels.

4.3 Noise levels were affected by road traffic, pedestrians, aircraft etc. At all locations, noise from the existing Waterport Power Station and temporary generator sets was also audible to a larger or lesser degree as continuous and steady tonal noises depending on location and time of day/night. The existing power station sources were generally controlling the measured L_{A90} background noise levels throughout, and subjectively dominating the noise climate at the more 'exposed' locations (Locations 2, 4, 6 & 7). Existing power station noise was perceived as being more audible and noticeable during the evening and night-time periods when other noise sources in the area (e.g. road traffic) had typically reduced.

4.4 As would be expected, L_{A90} background noise levels at the 'screened' locations (Locations 1, 3 & 5) were generally lower than at the 'exposed' locations of the relevant residential blocks (Locations 2, 4 & 6). Acoustic screening was provided here to the existing power station and other ambient noise sources in the area, e.g. road traffic, watercraft, airport.

4.5 Under the normal operating conditions of the existing power station sources, subjectively the Waterport Power Station generated a constant mid-high frequency tonal noise, whilst the temporary generators were the source of a lower frequency continuous tone. The continuous nature of these sources tended to control the measured L_{A90} background noise level, particularly at night.

4.6 During the temporary shutdown of the existing power station sources, the night-time L_{A90} background noise levels measured at the nearest and most exposed residential facades reduced accordingly. Under these conditions, existing power station noise was not audible at the residences and minimum night-time L_{A90} background noise levels of 40 dB, 41 dB, 39 dB and 40 dB were recorded at Locations 1, 2, 4 and 6 respectively during the shutdown.

4.7 The levels measured at Location 7 (The Flying Angel) were dominated by the nearby temporary generator sets and therefore showed little variation throughout the survey. During the temporary night-time shutdown, the L_{A90} background noise level reduced to 71 dB from the typical existing level of 75 dB, but was still controlled by the remaining 7 no. temporary generators in use nearby and so was not representative of 'true' background noise.

Commercial/Industrial Receptors

4.8 In accordance with the recommendations of BS5228 (construction phase) and BS8233 (operational phase), the impact assessment to commercial/industrial receptors in the vicinity of the site considers absolute noise levels, rather than those relative to background. It is not therefore appropriate or necessary to undertake background noise measurements at the non-residential receptors.

5 FUTURE BASELINE

5.1 The future baseline noise level (i.e. noise level in the absence of any power station sources, whether existing or proposed) will change upon closure of the Waterport Power Station and temporary generator sets in North Mole Road.

5.2 The above existing power station noise sources are currently dominating the baseline noise levels in the vicinity of the site and at the nearest residences.

5.3 The closure of these two distinct sites will lead to a significant reduction in the baseline noise level.

5.4 As the existing power station facilities cannot be shutdown for an extended period, it is not possible to accurately quantify the level of reduction that is likely.

5.5 However, as an approximate guide, the levels measured during the temporary shutdown shown in Table NV4.1 above indicate the 'true' background noise levels during the temporary power station shutdown and in the absence of any audible power station noise.

5.6 The proposed office development at North Mole Industrial Park, Mons Calpe Road may increase the future noise baseline, potentially increasing local road traffic numbers and introducing new items of mechanical services plant. The outline planning application does not provide data and therefore it is not possible to quantify any change likely from the proposed North Mole Industrial Park with the proposed power station. The Traffic and Transportation chapter (Chapter 16) of this ES has assumed a future 2% increase of traffic generated by planned developments. This does not represent a significant increase to affect the future noise baseline.

5.7 Other than these, it is expected that there will be no other significant additional noise sources or removal of existing noise sources that are likely to affect the future baseline.

6 POTENTIAL IMPACTS

6.1 The potential impacts from noise and vibration from the proposed development are as follows.

6.2 To residential receptors, the main potential impacts are the effect on sleep (in bedrooms) and on resting, studying, listening and communicating (in other rooms).

6.3 To commercial/industrial receptors, the potential impacts might include the effect on industrial working conditions, on speech and telephone conversation and on conditions for study and work requiring concentration and acoustic privacy.

7 POTENTIAL SIGNIFICANT EFFECTS

Construction

7.1 The best current estimate of the construction methods and sequence identified in section 3 of this chapter has been assessed for the eight phases of the construction programme.

Construction Noise Assessment: Residential Receptors

7.2 The main residences (Waterport Terrace, Gib V estate and Harbour Views) are at considerable distance from the site and there will be significant noise attenuation over distance. The Flying Angel is very much closer to the site and construction noise levels will be higher here.

7.3 Table NV7.1 below presents the predicted construction noise levels at the nearest residences to the site. Two scenarios are considered, when construction activities are taking place i) in the closest part of the site to the receptor concerned (worst-case) and ii) in the central part of the site. These are compared with the construction noise thresholds adopted in Table NV3.3 of section 3 of this chapter.

Table NV7.1 Construction Noise Levels at Residential Receptors, L_{Aeq} dB

Receptor	Adopted Construction Noise Criteria	Location of works on site	Calculated Noise Level per Construction Phase							
			1	2	3	4	5	6	7	8
Loc 2 (Waterport Terrace)	70 (day) 65 (eve) 55 (night)	Closest to receptor	56	58	53	55	49	0	50	50
		Centre of site	54	55	51	53	47	0	48	48
Loc 4 (Gib V estate)	70 (day) 65 (eve) 55 (night)	Closest to receptor	50	51	46	49	42	0	43	43
		Centre of site	49	50	45	47	41	0	42	42
Loc 6 (Harbour Views)	65 (day) 60 (eve) 55 (night)	Closest to receptor	57	58	54	56	47	0	51	51
		Centre of site	56	57	53	55	46	0	50	50
Loc 7 (Flying Angel)	75 (day) 65 (eve) 55 (night)	Closest to receptor	75	76	71	74	65	0	68	68
		Centre of site	71	72	67	70	61	0	64	64

7.5 For daytime construction (period of works extending to 19:00 hours as defined by BS5288), the predictions show that construction noise is not predicted to exceed the adopted criteria in all cases for the nearest residences at Waterport Terrace, Gib V estate and Harbour Views. The noise effect here will **not be significant**.

7.6 The only exception during the daytime is when works will be taking place at the closest site location to The Flying Angel, where for construction phase 2 (earthworks), where the adopted threshold of 75 dB will be exceeded by 1 dB(A). This is an excess which is below the 3 dB(A) change that is the minimum perceptible and will only occur for a very limited period of the construction programme. It is therefore deemed insignificant. When works will take place centrally on site, the predicted noise level at The Flying Angel is below the threshold and **will not result in a significant effect**.

7.7 For any necessary evening construction works (19:00-23:00 hours), the adopted criteria will not be exceeded at the residences at Waterport Terrace, Gib V estate and Harbour Views, with a resulting **no significant effect**. There will be an excess over the adopted evening criteria at The Flying Angel for

most of the proposed construction phases. This will result in a **significant adverse** effect during these phases at this location only during the evening. The CEMP will encourage the Contractor to restrict particularly noisy construction activities, such as piling, to the most tolerable parts of the day, avoiding early mornings and evenings.

7.8 Should any exceptional construction work be required at night (23:00-07:00 hours), the adopted night-time criterion would not be exceeded at the Gib V estate, resulting in an **insignificant effect** here. For the residences at Waterport Terrace and Harbour Views, the majority of the construction phases would not exceed the adopted night-time criteria. However, some phases would exceed by up to 3 dB resulting in a **low significant effect** at night depending on the construction phase and location. The adopted night-time criterion at The Flying Angel would be exceeded in all cases to result in a **high significant effect** here.

Construction Vibration Assessment: Residential Receptors

7.9 With the exception of The Flying Angel, the permanent residential receptors are at significant distance from the development site, the nearest being Waterport Terrace at approximately 290 m from the centre of the site.

7.10 The site and its environs are built on reclaimed land which is understood to be predominantly reclaimed sand. This 'soft' geology is not considered to be an efficient conductor of ground-borne vibration.

7.11 Given the large separation distances and the 'soft' geology, it is therefore predicted that there will be **no significant vibration effects** to residents at Waterport Terrace from the construction phase.

7.12 The Flying Angel is significantly closer, at around 75 m from the centre of the site. There may be temporary vibration **significant effects** to these residents..

7.13 The proposed CEMP and employer's requirements both provide safeguarding measures to mitigate the vibration effects to local residential receptors. Compliance with the employer's requirements will ensure that recognised vibration thresholds will not be exceeded. The CEMP will, where relevant,

incorporate the General Principles of Construction Noise and Vibration Control described in Appendix NV3.

Construction Noise Assessment: Non-Residential Receptors

7.14 Following the same scenarios, the construction noise predictions to the non-residential receptors is shown below (Table NV7.2).

Table NV7.2 Construction Noise Levels at Non-Residential Receptors, LAeq dB

Receptor	Adopted Construction Noise Criteria - Day	Location of works on site	Calculated Noise Level per Construction Phase							
			1	2	3	4	5	6	7	8
Gibraltar Port Authority	75	Closest to receptor	87	88	83	86	77	0	80	80
		Centre of site	75	76	71	74	65	0	68	68
MH Bland	75	Closest to receptor	69	70	66	68	59	0	63	63
		Centre of site	67	68	63	66	57	0	60	60
JBS Depot	75	Closest to receptor	67	68	64	66	57	0	61	61
		Centre of site	63	65	60	62	54	0	57	57

7.15 The adopted criteria are predicted to be met in all cases for the MH Bland and JBS depot sites. The effect will **not be significant**.

7.16 Predicted levels are typically higher at The Gibraltar Port Authority (GPA) building, which is significantly closer to the proposed development site. When works occur in the central area of the site, the criteria will be met in all cases with the exception of a 1 dB(A) excess, which is **insignificant**, during phase 2 (earthworks).

7.17 When works will be taking place at the closest site location to the GPA building, all construction phases (except phase 6) will exceed the adopted criteria, by 2-13 dB depending on phase. The level of effect in this case is therefore **significant adverse**. However, works will occur at the closest part of the site to the GPA building for only a limited period of the total construction programme.

7.18 By its nature, the construction phase will be temporary with an anticipated build period of approximately 24 months.

7.19 In addition, noisy construction works will typically be restricted to standard daytime construction hours of:

- 08:00-20:00 hours Monday to Saturday;
- No works on Sundays or Public Holidays.

7.20 A CEMP will be employed which will include a number of measures to minimise noise and vibration effects.

7.21 These will include typical measures as recommended by BS5228 Part 1 & Part 2, outlined in Appendix NV3.

Construction Vibration Assessment: Non-Residential Receptors

7.22 The nearest non-residential receptors are relatively close to the proposed development site. There is potential for construction vibration to affect non-residential occupiers.

7.23 The proposed CEMP and employer's requirements will both provide safeguarding measures to mitigate the vibration effects to local non-residential receptors. Meeting the employer's requirements will ensure that vibration levels will not exceed recognised vibration thresholds.

Construction Traffic

7.24 The Traffic and Transportation Chapter (Chapter 16) confirms that a large proportion of construction materials will be delivered to site by water craft rather than by road. It confirms that there will typically only be 2 no. HGV trips (4 no. HGV movements) per day, rising to a worst-case of 10 no. HGV trips (20 no. HGV movements) per day occurring vary rarely.

7.25 It is understood that the proposed CEMP will include a restriction on hours to allow HGV access to the construction site avoid the peak morning and evening periods.

7.26 The worst-case has been assumed that all HGV trips will occur during a single hour and the change in noise level has been predicted for residences on North Mole Road West (road to entrance to port).

7.27 Even assuming the worst-case above, the predicted change in road traffic noise level is from 0-1 dB(A) for 2 no. HGV trips and up to 2 dB(A) for 10 no. trips. In reality the vehicle trips will be spread across the day resulting in an even lower predicted change in noise level.

7.28 To provide context, these changes in noise levels are below the 3 dB(A) change which is the minimum perceptible and very considerably below the 10 dB(A) change which is perceived as a halving or doubling of sound.

7.29 Noise from construction traffic is therefore predicted to have **insignificant effect**.

Operation

7.30 The operational scenarios assessed are described in Section 3.25 and are as follows:

- four generating halls in use in 2017
- five generating halls in use in 2027.

7.31 Reference has been made to the report titled 'Noise Impact Assessment Outdoor Acoustic Study' undertaken by dB Vib Consulting on behalf of the design team, the relevant data from which are presented in Appendix NV1. The main noise sources during the operational phase will be the following:

- Noise breakout from the building;
- Air inlets (Generator Engine (GE) Box);
- Air inlets (GE Box);
- Air inlets turbo;
- Exhaust ducts;
- Stack influence;
- Chimney outlets;
- ORC (Organic Rankine Cycle) room;
- Boiler;

- Dry coolers;
- Aero-condensers;
- Duct turbine aero-condensers.

7.32 A number of high specification noise control measures have been incorporated into the design to reduce noise break-out from the building and minimise at source noise and vibration levels from plant items.

7.33 For the proposed building, these measures include:

- 300mm thick concrete construction of south, west and east elevations and roof;
- High performance acoustic cladding (Arval IN 227 SP) to north elevation;
- Acoustically rated doors (Door PIL 50) to engine rooms;
- 300mm thick concrete wall and high performance cladding (Arval CN 125) to ORC room;
- Acoustically rated doors (Door PIL 50) to ORC room;
- Acoustic absorbent linings within generator engine rooms to reduce reverberant noise;
- High performance attenuators to ventilation/air supply apertures to building (air inlets, air outlets and air inlet turbos serving the generator engine rooms and ventilation openings to ORC room).

7.34 For proposed plant items, the proposed acoustic control measures include:

- High performance attenuators to chimney outlet/exhaust gas terminations;
- Acoustic cladding to ducts serving the above;
- Mounting plant items on appropriate anti-vibration mounts and the use of flexible connectors for ducts, pipes and cabling to reduce structure-borne noise and vibration.

7.35 Cumulative noise levels have been predicted at the nearest residential and non-residential receptors shown in Tables NV.A1.2 to NV.A1.5 (Appendix NV1). The operating scenarios for the assessment of initial operation (four generating halls in use) and future operation (five generating halls in use) have been considered. The source noise levels, building acoustic insulation and attenuator performance data on which these predictions are based are also shown in Appendix NV1.

Operational Noise Assessment: Residential Receptors

7.36 Table NV7.3 below shows the summary of the predicted noise levels for the operational scenarios with four and five generating halls. This is without the proposed North Mole Industrial Park. The corresponding BS4142 assessment is shown for the night-time period during the temporary shutdown of the existing power station, and represents the worst-case.

7.37 The predictions have been assessed at the nearest and most exposed residential facades and where 'true' night-time background noise levels were measured (i.e. background measurement locations 2, 4, 6 & 7). True background noise levels will typically be higher during the day.

7.38 For comparison and to add context, the result of the approximate BS4142 assessment of noise from the existing Waterport Power Station and temporary generator sets is also shown (for the year 2015).

Table NV7.3 Operational Noise Assessment to Residential Receptors (without North Mole Industrial Park Proposal Developed) - Night

Residential Receptor	**Waterport Terrace (Loc 2)**		**Gib V estate (Loc 4)**		**Harbour Views (Loc 6)**		**Flying Angel (Loc 7)**	
Proposed North Mole Power Station								
Operation Scenario (no. generating halls)	4	5[d]	4	5[d]	4	5[d]	4	5[d]
Calculated Noise Level $L_{Aeq,T}$ (dB) [e]	44	45	37	38	39	40	53	54
Rating Penalty (dB)[a]	+4	+4	+4	+4	+4	+4	+4	+4
Rating Level (dB)	48	49	41	42	43	44	57	58
Background Sound Level (dB)	41	41	39	39	40	40	41[c]	41[c]
BS4142 Result	**+7**	**+8**	**+2**	**+3**	**+3**	**+4**	**+16**	**+17**
Description of Noise Effect	Medium	Medium	Low	Low	Low	Low	High	High
Residential Receptor	***Waterport Terrace* (Loc 2)**		***Gib V estate* (Loc 4)**		***Harbour Views* (Loc 6)**		***Flying Angel* (Loc 7)**	
Existing Waterport Power Station & Temporary Generator Sets *(approximate for reference)*	*2015*		*2015*		*2015*		*2015*	
BS4142 Result [b]	***+24***		***+17***		***+20***		***+39***	
Description of Noise Effect	*High*		*High*		*High*		*High*	

[a] +4 dB acoustic penalty applied assuming tonal noise will be 'clearly perceptible' (from BS4142)

[b] Includes +6 dB acoustic penalty as existing tonal noise is 'highly perceptible' (from BS4142). Intermediate calculation steps are not shown for clarity and conciseness.

[c] Unable to measure 'true' L_{A90} background noise at this location, so level measured at Waterport Terrace has been used as an approximation.

[d] Assumes no change in existing 'true' L_{A90} background sound level for assessment scenario with 5 no. generating halls.

[e] Data from dB Vib Consulting report in Appendix NV1

7.39 With reference to the adopted assessment criteria for operational noise at residences following the BS4142 assessment technique, a **low adverse** effect at night is predicted at the residences at the Gib V estate and Harbour Views for both operational scenarios (four and five generating halls in use). The noise level is not predicted to exceed 5 dB(A) and therefore meets the government's contractual requirements.

7.40 A **medium adverse** effect is predicted at night at the residences at Waterport Terrace for operational scenarios (four and five generating halls in use). The noise level is predicted to slightly exceed the 5 dB(A) threshold by 2 or 3 dB (for the commission year and future scenarios respectively). In consideration of the existing exposure to noise levels of approximately 65 dB at Waterport Terrace (see Table NV7.3 - background sound level plus contribution for the existing Waterport Power Station and temporary generators) the proposed power station represents a significant reduction in noise levels.

7.41 The effect at night is predicted to be **high adverse** at The Flying Angel for both assessment scenarios. However, the new power station will significantly reduce noise at The Flying Angel compared to the present (2015) situation (see Table NV7.3 - background sound level plus contribution for the existing Waterport Power Station and temporary generators).

7.42 The highest effect is predicted at The Flying Angel, which is particularly close to the site. In addition, its location in the harbour area ensures it is already exposed to significant noise levels over 24 hours from the nearby commercial/industrial units, harbour activities and ship movements.

7.43 The effect during other times of the day will typically be considerably lower than the worst-case night-time period assessed, as L_{A90} background sound levels will be significantly higher.

7.44 It can be seen that at all locations (including at The Flying Angel), the predicted noise effect from the proposed North Mole Power Station is significantly lower than that from the existing Waterport Power Station and temporary generator sets.

7.45 In addition, the proposed power station is required to meet the employer's requirements of 70 dB(A) at a distance of 1 m from the power station façade,

and 45 dB(A) (night-time) at 200 m from the façade. This will provide further safeguarding of noise emissions from the proposed site.

Cumulative Effects

7.46 The assessment has also considered the scenario assuming the proposed North Mole Industrial Park will be developed, currently at outline application stage. This proposal is for a building rising to fifth floor level and it would provide additional acoustic screening to residences beyond from the proposed North Mole Power Station.

7.47 It may reasonably be expected that the massing of this proposed fifth floor building would provide around 5 dB(A) attenuation from the proposed power station to residences at Waterport Terrace, where the line of sight is likely to be at least broken. Noise levels from the proposed site at other assessment locations are not expected to be so affected.

7.48 Table NV7.4 shows the noise effect assessment at night under these conditions, which are again compared with the outline effect from the existing power station sources (for the year 2015) for context.

Table NV7.4 Operational Noise Assessment to Residential Receptors (with North Mole Industrial Park Proposal Developed)– Night

Residential Receptor	**Waterport Terrace (Loc 2)**		**Gib V estate (Loc 4)**		**Harbour Views (Loc 6)**		**Flying Angel (Loc 7)**	
Proposed North Mole Power Station								
Operation Scenario (no. generating halls)	4	5[d]	4	5[d]	4	5[d]	4	5[d]
Calculated Noise Level $L_{Aeq,T}$ (dB)[e]	39[f]	40[f]	37	38	39	40	53	54
Rating Penalty (dB)[a]	+4	+4	+4	+4	+4	+4	+4	+4
Rating Level (dB)	43	44	41	42	43	44	57	58
Background Sound Level (dB)	41	41	39	39	40	40	41[c]	41[c]
BS4142 Result	**+2**	**+3**	**+2**	**+3**	**+3**	**+4**	**+16**	**+17**
Description of Noise Effect	Low	Low	Low	Low	Low	Low	High	High
Residential Receptor	***Waterport Terrace (Loc 2)***		***Gib V estate (Loc 4)***		***Harbour Views (Loc 6)***		***Flying Angel (Loc 7)***	
Existing Waterport Power Station & Temporary Generator Sets *(approximate for reference)*	*2015*		*2015*		*2015*		*2015*	
BS4142 Result [b]	***+24***		***+17***		***+20***		***+39***	
Description of Noise Effect	*High*		*High*		*High*		*High*	

[a] +4 dB acoustic penalty applied assuming tonal noise will be 'clearly perceptible' (from BS4142)

[b] Includes +6 dB acoustic penalty as existing tonal noise is 'highly perceptible' (from BS4142). Intermediate calculation steps are not shown for clarity and conciseness.

[c] Unable to measure 'true' L_{A90} background noise at this location, so level measured at Waterport Terrace has been used as an approximation.

[e] Data from dB Vib Consulting report in Appendix NV1

[f] Includes 5 dB(A) attenuation assumed from proposed North Mole Industrial Park building to this location

7.49 The noise effect is predicted to reduce to a **low adverse effect** (from a medium adverse effect) at the Waterport Terrace residences for both scenarios (2 dB for 4 no. generating halls operating and 3 dB for 5 no. generating halls operating) due to the additional acoustic screening that would be provided by the proposed North Mole Industrial Park. This is within the 5 dB(A) increase provided by the government contract conditions. The level of effect would be unchanged at the Gib V estate and Harbour Views (both **low adverse** effect) and at The Flying Angel (**high adverse** effect).

7.50 In this case, the predicted noise effect from the proposed North Mole Power Station is again significantly lower than that from the existing Waterport Power Station and temporary generator sets and even more so at the Waterport Terrace residences.

7.51 As stated previously, the level of effect will be considerably lower at other periods in comparison with the worst-case night-time conditions assessed.

Operational Vibration Assessment: Residential Receptors

7.52 The nearest permanent residences are at considerable distance from the development site, with a minimum separation distance of approximately 290 m from the centre of the site, with the exception of The Flying Angel.

7.53 Operational vibration will attenuate over distance and the large separation distances and relatively 'soft' geology of the reclaimed land are expected to result in **no significant vibration effects** to residents during the operational phase.

7.54 Vibration levels have the potential to be larger at The Flying Angel, which is considerably closer to the site. From a qualitative perspective, it is unlikely that The Flying Angel will be adversely affected by operational vibration. A number of outline vibration control measures are proposed for the development to minimise vibration from proposed plant items and to isolate them from the building structure and base. The power station will operate according to ISO 10816 Part 6 (International Organization for Standardization, 1995). This is achieved in the design by incorporating vibration reduction materials in covers, cladding, platforms, structures and pipework. The generating plant shall be

installed on flexible anti-vibration mountings to minimise transmission of vibration to foundations and surrounding areas.

7.55 In addition, the employer's requirements enable safeguarding measures to be put in place to reduce any vibration effects to local residents. Compliance with the employer's requirements will ensure that recognised vibration thresholds will not be exceeded.

Operational Noise Assessment: Non-Residential Receptors

7.56 The predicted operational noise levels at the nearest commercial (non-residential) locations to the site, as predicted by the dB Vib Consulting report for the assessment operation scenarios of 4 no. generating halls and future 5 no. generating halls are shown in Table NV7.5. The reference noise levels inside relevant non-residential locations recommended by BS8233 are also shown. The assessment considers the existing nearest receptor locations and the proposed North Mole Industrial Park, should this outline proposal proceed to development.

Table NV7.5: Operational Noise at Non-Residential Receptors

Non-Residential Receptor	**Gibraltar Port Authority**		**MH Bland**		**JBS Depot**		**North Mole Industrial Park**	
Operation Scenarios (no. generating halls)	4	5	4	5	4	5	4	5
Calculated Noise Level at facade $L_{Aeq,T}$ (dB)[c]	52	52	52	52	50	49	47	46
Predicted Internal Noise Level (Windows Open) $L_{Aeq,T}$ (dB)[a]	*37*	*37*	*37*	*37*	*35*	*34*	*32*	*31*
Outline Predicted Internal Noise Level (Windows Closed) $L_{Aeq,T}$ (dB)[b]	*19*	*19*	*19*	*19*	*17*	*16*	*14*	*13*
BS8233 Recommendation for Non-Residential Locations	*35-40 dB Executive Offices 35-45 dB Staff/Meeting Rooms 57-62 dB Workshops/Warehouses*							
Description of Noise Effect								
With Windows Open	Not significant (meets criteria for all		Not significant (meets criteria for all		Not significant (meets criteria for all		Not significant (meets criteria for all locations)	

Non-Residential Receptor	Gibraltar Port Authority	MH Bland	JBS Depot	North Mole Industrial Park
	locations)	locations)	locations)	
With Windows Closed	Not significant (meets criteria for all locations)	Not significant (meets criteria for all locations)	Not significant (meets criteria for all locations)	Not significant (meets criteria for all locations)

[a] Assumed that open window provides 15 dB attenuation (from BS8233).

[b] Assumed that closed window provides 33 dB attenuation (from BS8233 for 6/12/6mm insulated glazing)

[c] Data from dB Vib Consulting report in Appendix NV1

7.57 The predicted noise levels inside the nearest commercial receptors are calculated to meet or be better than the BS8233 recommendations for such spaces, with or without an open window at the receptor. This results in the effect being **not significant** at all non-residential receptor locations.

7.58 The existing noise climate at the non-residential receptors is currently dominated by noise from the temporary generator sets off North Mole Road, which do not appear to include any noise control measures. From the levels measured at The Flying Angel, it is expected that some or all of the existing commercial receptors are already exposed to noise levels in excess of the BS8233 recommendations.

Operational Vibration Assessment: Non-Residential Receptors

7.59 It is expected that over the separation distances involved and in particular with the 'soft' geology of the reclaimed land, that vibration levels will not be significant at the nearest non-residential receptors.

7.60 In addition, the employer's requirements include safeguarding measures requiring operational vibration levels not to exceed recognised vibration thresholds.

7.61 The proposed permanent power station plant installations and machinery will be designed to minimise vibration and structure-borne noise transmission to the site buildings and ground base. Appropriate anti-vibration mounts, couplings and pipework/ductwork will be incorporated into the design.

8 MITIGATION AND RESIDUAL SIGNIFICANT EFFECTS

Construction Mitigation

8.1 The main features described in BS 5228 may be considered and the relevant principles to control noise adopted in the contractor's proposed Construction Environmental Management Programme (CEMP). A brief summary of the main methods to control construction noise and vibration at source and its propagation included in BS 5228 are described in Appendix NV3.

8.2 There are considerable distances from the proposed development to the permanent residences in the area.

8.3 Whilst construction will inevitably generate some noise and vibration, construction work by its nature is temporary and will occur in phases in different areas of the site. It is therefore predicted that adopting some or all of recommendations (provided in Appendix NV3) would enable appropriate construction noise targets to be met at existing residences.

8.4 In particular, the use of an appropriate site hoardings as an acoustic screen is expected to enable construction noise levels to meet the adopted criteria at the nearest residential (The Flying Angel) and non-residential receptors to the site. This would further reduce the effect from the construction phase, expected to reach a low/medium level of significance.

8.5 The employer's requirements include requirements to limit the noise and vibration effect to reasonable levels at the nearest residential and commercial receptors. Compliance with these requirements will enable appropriate safeguarding to occupiers of these properties.

8.6 Noise from construction traffic is predicted to result in **insignificant** noise effect. No further specific measures are therefore required for this element.

Operational Mitigation

8.7 The BS4142 assessment has shown that potential **low to medium significant adverse noise effects** are predicted at the nearest permanent residences during the operational phase. This reduces to a low adverse effect at all permanent residences should the proposed development at North Mole

Industrial Park proceed, which would provide additional acoustic screening. High significant adverse noise effects are predicted at The Flying Angel.

8.8 However, it is to be borne in mind that the predicted effect from the proposed North Mole Power Station to the nearest residences is significantly lower than currently exists from the existing power station facilities of Waterport Power Station and the temporary generator sets. Therefore, the nearest residences will benefit from an overall improved noise environment.

8.9 A number of noise- and vibration-mitigating measures are proposed to be incorporated into the design of the new power station. These include:

- Attenuators to gas exhaust terminations;
- Attenuators to ventilation and inlet/exhaust openings in the generator halls;
- Appropriate acoustic upgrades to building fabric of the generator halls to minimise noise break-out; and
- Use of appropriate anti-vibration mounts to plant items and use of flexible couplings and pipework/ductwork connections.

8.10 There is potential for the use of other outline noise control and vibration control measures which may typically include:

- Use of localised acoustic screening/enclosures/acoustic louvres to externally sited plant (e.g. radiator units and air conditioning units on roof of proposed building); and
- Use of lower speed fans for some items (e.g. condenser and dry cooler units).

Residual Significant Effects

8.11 At night, it is predicted that a potential **low** to **medium significant adverse** effect (at permanent residences), reducing to a potential **low significant adverse effect** should the proposed North Mole Industrial Park proceed to development. A **high significant adverse** effect at The Flying Angel will remain following mitigation. The effects at other times of the day will typically be lower as background levels will be higher.

The existing Waterport Power Station and temporary generators will stop operating with the introduction of the proposed North Mole Power Station, and this will lead to an overall improvement from the existing noise environment at the nearest residences.

9 CONCLUSIONS

9.1 It is concluded that there will inevitably be some noise effects to the nearest residential and commercial receptors during the construction and operational phases of the proposed North Mole Power Station.

9.2 The effects can be minimised as far as possible with the implementation of appropriate procedures and specific noise and vibration mitigation measures.

9.3 Noise from the operation of the existing power station facilities are dominating the local noise climate and are already leading to significant adverse effects to residential and commercial receptors alike.

9.4 The proposed development provides an opportunity to significantly improve the overall noise climate of the area.

9.5 The employer's requirements require that the noise level from the operational site does not exceed:

- 70 dB(A) at 1m from the site boundary;
- 45 dB(A) (night-time) at a distance of 200m from the site boundary, noise-sensitive receptors and at the highest point of any residential buildings in the vicinity;
- 5 dB(A) above the background noise level at the nearest noise-sensitive receptors

9.6 The BS4142 assessment has predicted that there will be potential low to medium adverse significant noise effects from the operation of the new power station at the nearest permanent residences during the night. This would reduce to a potential low adverse significant effect should the proposed North Mole Industrial Park proceed to development and provide additional acoustic screening. A high adverse significant effect is predicted at The Flying Angel.

9.7 No significant effects are predicted to the nearest commercial/industrial receptors for the majority of the period of the construction phase and at all times of the operational phases.

10 REFERENCES

BS 5228-1 (2009) Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1; Noise.

BS 5228: (2009): Code of practice for Noise and Vibration Control on Construction and Open Sites - Part 2: Vibration

BS 4142. (2014): Methods for Rating and Assessing Industrial Noise and Commercial Sound.

BS 6472 (1992) Guide to Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz).

BS 8233 (2014) Guidance on Sound Insulation and Noise Reduction for Buildings.

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Calculation of Road Traffic Noise, Department of Transport, HMSO 1988.

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HM Government of Gibraltar (2009) The Gibraltar Development Plan, 2009. Department of Trade and Industry.

HM Government of Gibraltar (2014) Tender for: New Power Station North Mole. Volume 2 Part A: Employer's Requirements

APPENDICES

APPENDIX NV1 DATA EXTRACTED FROM DB VIB CONSULTING REPORT

Table NV.A1.1 dBVib Estimate Tables

		Unit	31.5	63	125	250	500	1000	2000	4000	8000	A
Engine Noise												
Air Borne Noise Pressure Level (Lp)	MAN V 51/60 DF (1)	Lp	102	104	105	105	104	103	103	100	98	109.1
	MAN V 51/60 DF (2)	Lp	111.4	111.2	107.1	106.6	108.2	106	105.8	99	96.1	110
Estimated Air Born Noise Power Level (Lw)	MAN V 51/60 DF (1)	Lw	127	129	130	130	129	128	128	125	123	134.1
Intake Noise Power Level (Lw)	MAN V 51/60 DF (3)	Lw	120	117	112	107	108	111	130	135	130	137.8
	MAN V 51/60 DF (4)	Lw	128	123	122	122	121	126	147	143	142	150
Exhaust Gas Noise Power Level (Lw)	MAN V 51/60 DF	Lw	150	150	142	138	136	135	134	132	131	141.1
Acoustic Level in Engine Box (MAN 6 x 14 V 51/60 DF) (Lp Interior)	GE Box Without Treatment	Lp (Interior)	111	113	114	114	113	112	112	109	107	118
	GE Box With Treatment	Lp (Interior)	111	112	111	110	107	105	105	102	100	112
North Side Cladding	Arval IN 227 SP	Insulation Coefficient	19*	30*	41	52	62	66	70	76	76*	
Doors	GE Doors PIL 50	Insulation Coefficient	7*	24	41	47	51	54	54	52	49	

Concrete Walls (South, East and West Sides and Roof)	300 mm Concrete	Insulation Coefficient	26*	35*	44	53	62	69	75	78	78*	
Air Inlet												
Air Inlet North Side	Acoustic Attenuator SGR 300/100 length 1800 mm	Insulation Coefficient	2*	10	25	37	51	55	53	37	28	
	Sound Pressure at 1 m to the Air Inlet of GE Box	Lp 1 m	107	101	87	75	61	56	57	70	76	80
Air Outlet												
Air Outlet South Side	Acoustic Attenuator SGR 300/100 length 2400 mm	Insulation Coefficient	2*	14	26	38	55	57	54	38	35	
	Sound Pressure at 1 m to the Air Outlet of GE Box	Lp 1 m	104	94	83	71	53	50	53	66	66	74
Air Inlet Turbo												
Air Inlet Turbo on Roof	Acoustic Attenuator (SGR 300/200/2000+)	Insulation Coefficient	1*	9	17	29	41	47	34	17	11	
	Acoustic Attenuator (SGR 200/100/2400)	Insulation Coefficient	1*	6	17	44	50	55	53	37	29	
	Global	Insulation Coefficient	2*	15	31	68	70*	70*	70*	51	33	
	Sound Pressure at 1 m to the Air Inlet Turbo on the Roof	Lp 1 m	117	99	83	67	62.5	61	68	79	97	96
Exhaust Duct**												

	Insulation Coefficient (Silencer)	Insulation Coefficient	46	47	50	50	50	57	55	55	55	
	Maximum Power Level by Square Metre	Duct Lw/m2	94	87	70	51	33	9	8	6	5	63
	Sound Pressure Level at 1 m to Exhaust Duct	Lp 1 m	85	78	61	42	24	.	.	.	.	53
Stack Influence												
	Maximum Power Level by Square Metre	Stack Lw/m2	87.5	82.5	67.5	54.5	36.5	11.5	.	.	.	58.5
	Sound Pressure Level at 1 m to the Stack	Lp 1 m	90	84	70	56	38	13	5	.	.	60
Chimney Outlet												
	Insulation Coefficient (Silencer - after exhaust, one silencer is present)	Insulation Coefficient	46	47	50	50	50	57	55	55	55	
	Chimney Outlet Maximum Power Level (6 Chimneys)	Lw/m2	104	103	93	90	88	84	83	80	77	91
	Sound Pressure at 1 metre to the Chimney	Lp 1 m	96	95	85	82	80	76	75	72	69	83
Building << ORC Noise >>	Sound power level given by Turboden (WP5-312-A81-GIB2-TUR-SPE-2-A) is around 95 dba ±2 dB											
	Estimated Power Level of All the Sources in the building	Lw/m2	100.6	103.6	104.6	104.6	104.6	102.6	100.6	97.6	62.6	107.8

	Acoustic Level in ORC (Lp Indoor). Without Treatment	Lp (Indoor)	85.5	88.5	89.5	89.5	89.5	87.5	85.5	82.5	77.5	93
South Side and East Side Cladding	Insulation Coefficients (the cladding to close these holes will be in Arval CN 125)	Insulation Coefficient	.	13*	16	25	33	41	43	48	51*	
Concrete Wall (South and East Sides)	Insulation Coeffiient (Concrete 300 mm)	Insulation Coefficient	26*	35*	44	53	62	69	75	78	78*	
Doors	Insulation Coefficient (ORC Door PIL 50 1&2 Ventaux)	Insulation Coefficient	7*	24	41	47	51	54	54	52	49	
	Sound Pressure level at 1 m to the door of the ORC	Lp 1 m	80	62	46	40	36	31	29	28	26	44
Ventilation	Acoustic Attenuator SGR 300/100 length 600 m	Insulation Coefficient	.	3	10	17	25	31	31	20	15	
	Sound Pressure Level at 1 m to the ventilation of the ORC	Lp 1 m	81	84	78	71	63	55	53	61	61	69
Boiler												
	Boiler Maximum Power Level by Square Metre	Lw/m2	85	73.9	58.2	42.1	25.5	15.4	10.6	.	.	51
	Sound Pressure Level at 1 m to the Boiler	Lp 1 m	86	75	59	43	26	15	10	.	.	52
Dry Cooler												

	Sound Power Noise for 414 Fans for the dry coolers	Lw	79	77	75	69	65	64	59	54	45	69
	Sound Pressure level at 1 m to the Dry Coolers	Lp 1 m	80	78	76	70	66	65	60	55	45	70
Aerocondensers												
	Sound Power Noise for each Aerocondenser Fan	Lw	88	85	86	82	80	78	72	65	56	82
	Sound pressure level at 1 metre fo the aerocondenser	Lp 1 m	76	73	73	70	68	65	60	53	43	70
Duct Turbine	Maximum power level by meter	Duct Lw/m	87	86	73	79	87	86	86	80	65	91
	Sound Pressure Level at 1 Metre to the Duct between Turbine and Aerocondenser	Lp 1 m	67	66	53	59	67	66	66	60	45	72

*extrapolated data

** Duct (width: 4 mm) are surrounded by: Rockwool width 5 cm, heavy mass of 10 kg/m2, rockwool width 5 cm, metal sheet

Lp – Sound Pressure Level

Lw – Sound Power Level

Table NV.A1.2 Residential Receptors Scenario 4 no. Generation Halls Operational

	Waterport Terrace	Gib V Estate	Harbour Views	Flying Angel
01_Building << Generator >>	31	23	26	38
02_ Air Inlet (GE Box)	34	22	25	35
03_Air Outlet (GE Box)	34	29	31	45
04_Air Inlet Turbo	31	27	29	36
05_Exhaust Duct	25	20	22	38
06_Stack Influence	24	20	22	37
07_Chimney Outlet	39	32	35	48
08_ORC	31	26	26	43
09_Boiler	17	10	12	31
10_Dry Coolers	30	27	27	26
11_Aerocondensers	32	27	27	29
12_Duct Turbine - Aerocondensers	36	29	31	48
Predicted Noise Level	44	37	39	53

Table NV.A1.3 Non-residential Receptors Scenario 4 no. Generation Halls Operational

	Gib Port Authority	MH Brand	JBS Depot	North Mole Industrial Park
01_Building << Generator >>	39	36	37	33
02_ Air Inlet (GE Box)	40	34	42	37
03_Air Outlet (GE Box)	45	43	38	37
04_Air Inlet Turbo	37	37	37	33
05_Exhaust Duct	35	35	29	27
06_Stack Influence	36	34	28	27
07_Chimney Outlet	49	47	43	39
08_ORC	34	39	33	31
09_Boiler	21	27	22	19
10_Dry Coolers	36	25	32	30
11_Aerocondensers	21	31	35	32
12_Duct Turbine - Aerocondensers	21	44	41	37
Predicted Noise Level	52	52	50	47

Table NV.A1.4 Residential Receptors Scenario 5 no. Generation Halls Operational

	Waterport Terrace	Gib V Estate	Harbour Views	Flying Angel
01_Building << Generator >>	31	23	26	38
02_ Air Inlet (GE Box)	36	23	26	36
03_Air Outlet (GE Box)	35	29	32	46
04_Air Inlet Turbo	33	28	30	37
05_Exhaust Duct	26	21	23	39
06_Stack Influence	25	21	23	39
07_Chimney Outlet	40	33	36	50
08_ORC	31	26	26	43
09_Boiler	19	13	15	33
10_Dry Coolers	31	28	28	26
11_Aerocondensers	32	27	27	29
12_Duct Turbine - Aerocondensers	36	29	31	48
Predicted Noise Level	45	38	40	54

Table NV.A1.5 Non-residential Receptors Scenario 5 no. Generation Halls Operational

	Gib Port Authority	MH Brand	JBS Depot	North Mole Industrial Park
01_Building << Generator >>	39	36	37	33
02_ Air Inlet (GE Box)	40	36	43	38
03_Air Outlet (GE Box)	45	44	39	38
04_Air Inlet Turbo	37	39	38	35
05_Exhaust Duct	36	36	30	28
06_Stack Influence	36	35	30	28
07_Chimney Outlet	49	48	44	40
08_ORC	34	39	33	31
09_Boiler	25	29	24	21
10_Dry Coolers	36	27	33	31
11_Aerocondensers	21	31	35	32
12_Duct Turbine - Aerocondensers	21	44	41	37
Predicted Noise Level	52	52	49	46

APPENDIX NV2 BACKGROUND NOISE SURVEY RESULTS

Table NV.A2.1 Measured Background Noise Levels – Location 1

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
Day	17/04/2015 12:46	17/04/2015 12:56	50.8	67.0	44.7	54.0	46.3	Boats, birds, waves, industrial noise (ship?)
	17/04/2015 14:40	17/04/2015 14:50	58.5	70.8	43.9	62.6	46.4	Boats, waves, pedestrian/dog
	18/04/2015 11:40	18/04/2015 11:50	51.7	65.9	42.6	54.8	46.3	Temporary generators, boats, pedestrians, sports pitches & whistle
	18/04/2015 13:28	18/04/2015 13:38	50.8	58.4	44.7	53.6	46.9	Boats, waves
	19/04/2015 11:33	19/04/2015 11:43	50.9	68.0	45.4	53.1	47.3	Boats, waves, pedestrians, dogs
	19/04/2015 13:22	19/04/2015 13:32	49.8	77.6	44.8	48.6	46.2	WPS, waves, bird scarer at airport, pedestrians, dogs
	20/04/2015 11:39	20/04/2015 11:49	71.7	90.5	44.2	71.9	47.3	Boats, waves, pedestrians, dogs, plane taxi & take-off to East
	20/04/2015 13:28	20/04/2015 13:38	48.7	73.9	41.2	49.9	43.4	Boats, pedestrians, bin moving
	21/04/2015 11:38	21/04/2015 11:48	68.7	89.5	48.3	61.9	50.1	Waves, pedestrians, dogs, boats, plane pass to East (aborted landing)
	21/04/2015 13:33	21/04/2015 13:43	50.9	65.3	44.9	53.1	47.1	Waves, boats, pedestrians, car pass & idle
Evening	16/04/2015 19:35	16/04/2015 19:45	57.6	70.5	43.9	62.1	45.6	Boats, waves, pedestrians/residents, temporary generators
	16/04/2015 21:28	16/04/2015 21:38	52.2	79.3	43.2	53.8	44.9	Boats, waves, pedestrians/residents, temporary generators, dogs
	17/04/2015 19:48	17/04/2015 19:58	72.9	92.0	41.8	74.8	44.4	Aircraft taxi/take-off to East, birdscarer airport, waves, birds, pedestrians
	17/04/2015 21:38	17/04/2015 21:48	53.3	74.8	42.6	49.7	44.5	Boats, waves, sports pitches & hooter, pedestrians, industrial noise (ship?)
	18/04/2015 19:34	18/04/2015 19:44	48.8	59.0	45.4	49.9	46.9	Boats, waves, dogs

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
	18/04/2015 21:23	18/04/2015 21:33	49.6	59.4	47.3	50.5	48.6	Temporary generators, waves
	19/04/2015 19:41	19/04/2015 19:51	49.2	68.6	46.5	49.8	47.8	Temporary generators, waves, dogs, bird alarm calls & car at airport, birds
	19/04/2015 21:38	19/04/2015 21:48	51.2	79.1	46.9	49.9	48.4	Temporary generators, waves, dog
	20/04/2015 19:45	20/04/2015 19:55	53.3	80.0	42.1	55.0	43.6	Pedestrians, dogs, sports pitches, road traffic, boats
	20/04/2015 21:33	20/04/2015 21:44	45.9	64.2	41.0	47.0	43.0	Birds, waves, residents, boat horn
Night	17/04/2015 00:45	17/04/2015 00:55	46.3	55.0	43.0	47.5	45.0	Temporary generators, waves
	17/04/2015 02:32	17/04/2015 02:42	45.7	49.6	43.3	46.6	44.8	WPS, temporary generators, waves, boat, birds
	18/04/2015 00:38	18/04/2015 00:48	43.1	63.3	39.8	43.4	41.6	Temporary generators, waves, pedestrians
	18/04/2015 02:26	18/04/2015 02:37	44.0	49.3	40.3	46.0	42.3	Temporary generators, boat, waves
	19/04/2015 00:46	19/04/2015 00:56	49.7	54.4	47.6	50.6	48.9	Temporary generators, waves, boat, birds
	19/04/2015 02:40	19/04/2015 02:50	48.6	53.1	45.3	50.0	47.0	Temporary generators, waves, ship & boat pass
	20/04/2015 00:37	20/04/2015 00:47	47.2	59.1	42.8	48.1	45.5	Temporary generators, industrial noise (ship?), waves, birds
	20/04/2015 02:25	20/04/2015 02:35	46.5	57.0	43.6	47.6	45.3	Industrial noise (ship?), impact noises
	21/04/2015 01:07	21/04/2015 01:12	41.2	50.0	39.1	42.3	40.1	WPS/SOME TEMPORARY GENERATORS OFF. Waves, plant (only 5 min measurement possible)

[a] throughout Appendix Tables, WPS refers to Waterport Power Station.

Table NV.A2.2 Measured Background Noise Levels – Location 2

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
Day	17/04/2015 13:02	17/04/2015 13:12	66.3	85.9	55.0	68.5	57.1	Road traffic, WPS, pedestrians, horns
	18/04/2015 11:52	18/04/2015 12:02	64.9	83.4	54.5	68.1	55.7	WPS, road traffic, dogs
	19/04/2015 11:46	19/04/2015 11:56	63.5	75.3	56.4	66.8	58.2	WPS, temporary generators, road traffic, pedestrians
	20/04/2015 11:51	20/04/2015 12:01	65.9	86.4	53.2	68.3	55.3	Road traffic, fork lift truck, pedestrians, WPS, HGV horn
	21/04/2015 11:57	21/04/2015 12:07	63.8	77.6	54.1	67.5	56.2	Road traffic, horns, WPS
	17/04/2015 13:02	17/04/2015 13:12	66.3	85.9	55.0	68.5	57.1	Road traffic, WPS, pedestrians, horns
Evening	16/04/2015 19:48	16/04/2015 19:58	61.0	73.7	56.0	63.6	57.5	WPS, temporary generators, road traffic, birds, pedestrians
	17/04/2015 20:01	17/04/2015 20:11	61.9	78.6	53.1	64.9	54.4	Road traffic, WPS, scooter pizza delivery, pedestrians, horn
	18/04/2015 19:47	18/04/2015 19:57	61.1	79.6	55.0	62.7	56.7	WPS, temporary generators, pedestrians, road traffic, horn, birds
	19/04/2015 19:54	19/04/2015 20:04	63.5	84.8	53.4	61.6	55.1	WPS, temporary generators, birds, road traffic
	20/04/2015 19:58	20/04/2015 20:08	59.6	80.8	51.3	62.7	52.9	Road traffic, WPS, bagpipe band, pedestrians, scooter parking
Night	17/04/2015 00:57	17/04/2015 01:07	57.7	70.9	54.4	58.6	55.6	Generators, WPS, road traffic, birds
	18/04/2015 00:51	18/04/2015 01:01	58.0	75.8	52.0	58.8	52.9	WPS, road traffic, horn
	19/04/2015 00:59	19/04/2015 01:09	60.3	80.0	55.6	61.3	57.5	WPS, temporary generators, taxi arrival, road traffic
	20/04/2015 00:50	20/04/2015 01:00	61.6	82.2	53.6	60.3	54.5	WPS, temporary generators, road traffic

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
	21/04/2015 00:10	21/04/2015 00:20	50.9	68.8	39.7	52.1	42.1	WPS/SOME TEMPORARY GENERATORS OFF. Boats, local & distant road traffic, pedestrians, birds, car idle
	21/04/2015 00:55	21/04/2015 01:05	55.1	78.5	38.5	49.9	40.2	WPS/SOME TEMPORARY GENERATORS OFF. Plant noise (not WPS), local & distant road traffic

Table NV.A2.3 Measured Background Noise Levels – Location 3

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
Day	17/04/2015 13:17	17/04/2015 13:27	63.2	80.5	53.7	64.5	58.6	Construction works, pedestrians
	17/04/2015 14:23	17/04/2015 14:33	52.0	71.8	47.5	53.1	49.5	Road traffic, pedestrians, horns, birds
	18/04/2015 12:08	18/04/2015 12:18	51.4	65.7	46.4	53.1	48.5	WPS, road traffic, pedestrians, dogs, doors
	18/04/2015 13:13	18/04/2015 13:23	53.1	78.2	45.8	53.4	47.6	Road traffic, pedestrians, dogs, birds, siren
	19/04/2015 12:01	19/04/2015 12:11	54.1	74.7	47.5	55.4	49.5	WPS, road traffic, pedestrians, dogs, birds, children
	19/04/2015 13:06	19/04/2015 13:17	54.1	72.0	47.1	56.3	49.4	WPS, road traffic, pedestrians, dogs, horns, child playing
	20/04/2015 12:17	20/04/2015 12:28	58.4	76.7	48.0	61.7	51.7	Road traffic, construction noise, pedestrians, plane take-off
	20/04/2015 13:12	20/04/2015 13:22	52.2	66.4	45.2	55.1	48.1	Road traffic, pedestrians, dogs, horn
	21/04/2015 12:25	21/04/2015 12:35	61.7	74.9	51.6	66.4	53.6	Road traffic, construction noise , dump truck, pedestrians
	21/04/2015 12:35	21/04/2015 12:45	65.0	81.8	50.2	69.2	54.0	Road traffic, construction noise , dump truck, pedestrians

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
Evening	16/04/2015 20:21	16/04/2015 20:31	55.2	68.2	49.0	57.4	51.3	Road traffic, dogs, pedestrians/residents, WPS, temporary generators, car horns
	16/04/2015 21:44	16/04/2015 21:54	52.8	77.7	45.3	54.1	47.6	Road traffic, WPS, temporary generators, birds, residents
	17/04/2015 20:16	17/04/2015 20:26	52.9	73.5	47.1	54.0	49.2	Road traffic, pedestrians, dogs, birds
	17/04/2015 21:22	17/04/2015 21:32	55.2	79.7	44.8	56.6	46.8	Birds, WPS, road traffic, pedestrians, dogs
	18/04/2015 20:02	18/04/2015 20:13	51.2	64.5	46.7	53.0	48.8	Road traffic, pedestrians, birds, WPS
	18/04/2015 21:06	18/04/2015 21:16	53.8	75.1	47.3	56.6	49.2	Road traffic, WPS, pedestrians, birds, impact noise
	19/04/2015 20:15	19/04/2015 20:26	55.6	74.7	46.6	53.6	48.7	WPS, road traffic, pedestrians, birds, impact, plane pass
	19/04/2015 21:19	19/04/2015 21:29	60.6	80.0	46.7	62.6	48.6	WPS, road traffic, pedestrians, plane pass x2, dogs
	20/04/2015 20:25	20/04/2015 20:35	49.9	65.1	44.6	52.0	46.3	Road traffic, WPS, residents, WPS
	20/04/2015 21:18	20/04/2015 21:28	47.6	64.6	43.2	49.6	45.0	WPS, road traffic, residents, dogs
Night	17/04/2015 01:12	17/04/2015 01:22	48.0	60.8	44.2	49.4	45.7	WPS, temporary generators, road traffic, birds, dogs
	17/04/2015 02:16	17/04/2015 02:26	47.7	53.5	45.2	48.7	46.5	WPS, temporary generators, birds, road traffic
	18/04/2015 01:06	18/04/2015 01:16	45.7	61.9	42.3	47.2	43.6	Road traffic, WPS, dogs, pedestrians, door
	18/04/2015 02:11	18/04/2015 02:21	45.7	54.0	43.2	46.7	44.4	WPS, birds
	19/04/2015 01:14	19/04/2015 01:25	48.2	61.6	44.6	49.1	46.0	WPS, birds, car alarm, road traffic, horns
	19/04/2015 02:23	19/04/2015 02:33	47.4	57.5	44.6	48.6	46.1	WPS, temporary generators, road traffic

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
	20/04/2015 01:07	20/04/2015 01:17	44.8	52.9	42.1	46.4	43.2	WPS, pedestrians, road traffic, birds
	20/04/2015 01:59	20/04/2015 02:09	45.2	56.3	43.2	46.0	44.3	WPS, road traffic, pedestrians

Table NV.A2.4 Measured Background Noise Levels – Location 4

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
Day	17/04/2015 13:29	17/04/2015 13:39	60.1	77.5	53.0	62.7	56.0	Road traffic, horns, construction noise, dog
	18/04/2015 12:19	18/04/2015 12:29	61.0	74.4	52.6	63.9	55.7	Road traffic, construction noise, horns, dogs
	19/04/2015 12:13	19/04/2015 12:23	58.4	68.8	51.7	60.1	55.1	WPS, road traffic, pedestrians, birds, horn
	20/04/2015 12:05	20/04/2015 12:15	65.5	79.9	57.9	68.4	60.5	Road traffic, construction noise & plant, pedestrians, plane take-off to East
	21/04/2015 12:13	21/04/2015 12:23	64.1	78.1	57.0	66.2	60.4	Road traffic, construction noise, horns
Evening	16/04/2015 20:03	16/04/2015 20:13	61.1	76.2	51.7	63.1	55.2	Road traffic, WPS, temporary generators, car horns, birds
	17/04/2015 20:28	17/04/2015 20:38	60.0	76.5	50.3	62.8	54.3	Road traffic, pedestrians, dogs, birds
	18/04/2015 20:14	18/04/2015 20:24	59.6	72.0	50.3	62.2	54.5	Road traffic, dogs, birds, horn, WPS
	19/04/2015 20:28	19/04/2015 20:38	59.5	77.2	52.1	61.3	54.6	WPS, road traffic, birds, dogs
	20/04/2015 20:13	20/04/2015 20:23	58.9	70.7	50.1	61.5	53.7	Road traffic, WPS, birds, pedestrians
Night	17/04/2015 01:24	17/04/2015 01:34	51.1	65.9	47.3	53.6	48.2	WPS, temporary generators, road traffic, horns
	18/04/2015 01:18	18/04/2015 01:28	51.9	67.0	45.3	54.8	46.5	Road traffic, pedestrians, WPS, birds, horns

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
	19/04/2015 01:27	19/04/2015 01:37	54.5	71.7	47.2	55.9	48.9	WPS, road traffic
	20/04/2015 02:11	20/04/2015 02:21	48.5	57.6	46.6	48.9	47.7	WPS, road traffic
	21/04/2015 00:23	21/04/2015 00:34	48.9	67.1	36.9	51.9	38.9	WPS/SOME TEMPORARY GENERATORS OFF. Road traffic (Measurement stopped before 10 mins to avoid noise from nearby pedestrian)
	21/04/2015 01:21[a]	21/04/2015 01:27[a]	45.0	59.5	37.1	48.9	38.2	WPS/SOME TEMPORARY GENERATORS OFF. Road traffic, plant noise

[a] only time available for 5 minute measurement here.

Table NV.A2.5 Measured Background Noise Levels – Location 5

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
Day	17/04/2015 13:44	17/04/2015 13:54	52.3	70.9	43.9	55.5	46.4	Road traffic, pedestrians, WPS, horns
	17/04/2015 14:08	17/04/2015 14:18	55.0	74.8	44.9	56.8	47.2	Road traffic, pedestrians, WPS, siren blast, horns, construction noise
	18/04/2015 12:35	18/04/2015 12:45	56.2	70.6	45.0	59.2	48.5	Construction noise, pedestrians, dogs, road traffic
	18/04/2015 12:59	18/04/2015 13:09	56.1	75.0	45.0	58.4	48.3	WPS, construction noise, road traffic, pedestrians
	19/04/2015 12:27	19/04/2015 12:37	56.2	73.5	46.9	57.4	48.9	WPS, temporary generators, pedestrians, road traffic, plane take-off to West
	19/04/2015 12:52	19/04/2015 13:03	54.2	68.9	47.7	55.9	50.0	WPS, temporary generators, road traffic, pedestrians, dogs, plant noise (at flat)

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
	20/04/2015 12:32	20/04/2015 12:42	54.1	74.2	45.7	55.7	48.1	Road traffic, construction noise, pedestrians, dogs, birds
	20/04/2015 12:42	20/04/2015 12:53	70.7	99.3	44.2	58.5	48.9	Road traffic, construction noise, pedestrians, dogs, birds
	21/04/2015 12:49	21/04/2015 12:59	54.4	73.0	44.6	56.9	47.3	Road traffic, WPS, pedestrians, temporary generators
	21/04/2015 12:59	21/04/2015 13:09	53.1	77.6	44.6	54.9	46.6	Road traffic, WPS, pedestrians, temporary generators
Evening	16/04/2015 20:39	16/04/2015 20:49	51.0	65.6	45.5	53.5	47.6	Car idling, pedestrians/residents, birds, temporary generators, car horns
	16/04/2015 21:57	16/04/2015 22:07	49.0	66.9	43.1	51.2	45.2	Temporary generators, birds, road traffic, pedestrians
	17/04/2015 20:42	17/04/2015 20:52	53.9	80.6	44.2	55.3	47.4	Road traffic, birds, pedestrians, scooter
	17/04/2015 21:09	17/04/2015 21:19	49.9	64.5	43.0	52.9	45.1	Birds, dogs, pedestrians, road traffic, horn, WPS
	18/04/2015 20:29	18/04/2015 20:39	55.7	81.0	44.2	55.4	47.1	Road traffic, WPS, pedestrians, birds
	18/04/2015 20:53	18/04/2015 21:03	54.3	72.1	44.8	55.4	47.1	WPS, temporary generators, pedestrians, dogs, birds, road traffic
	19/04/2015 20:42	19/04/2015 20:52	53.9	73.3	45.9	55.6	49.1	WPS, road traffic, pedestrians, dogs, plant (at flat), birds
	19/04/2015 21:06	19/04/2015 21:16	54.5	75.0	45.1	56.5	47.9	WPS, temporary generators, road traffic, pedestrians, birds
	20/04/2015 20:39	20/04/2015 20:49	49.8	64.7	43.1	52.7	45.1	Road traffic, pedestrians, WPS, temporary generators, birds
	20/04/2015 20:49	20/04/2015 20:59	49.7	66.5	43.1	51.6	44.6	Road traffic, pedestrians, WPS, temporary generators, birds
Night	17/04/2015 01:38	17/04/2015 01:48	47.0	68.7	41.8	46.8	43.2	WPS, temporary generators, road traffic, pedestrians, birds

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
	17/04/2015 02:02	17/04/2015 02:12	45.5	54.4	42.8	46.6	43.9	WPS, temporary generators, pedestrians, birds
	18/04/2015 01:33	18/04/2015 01:43	47.9	71.0	39.4	48.0	40.5	WPS, pedestrians, WPS, birds, car idle
	18/04/2015 01:57	18/04/2015 02:07	44.9	58.8	42.0	45.7	43.5	WPS, temporary generators, birds, pedestrians, road traffic
	19/04/2015 01:42	19/04/2015 01:52	45.8	57.0	42.6	46.7	44.3	WPS, road traffic, birds
	19/04/2015 02:09	19/04/2015 02:19	46.4	57.5	42.9	47.4	44.5	WPS, temporary generators, car unload, road traffic, birds
	20/04/2015 01:21	20/04/2015 01:31	44.1	62.6	40.7	44.1	41.9	WPS, temporary generators, road traffic, pedestrians, birds
	20/04/2015 01:45	20/04/2015 01:55	44.0	61.8	40.0	44.7	41.6	WPS, temporary generators, birds, road traffic

Table NV.A2.6 Measured Background Noise Levels – Location 6

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
Day	17/04/2015 13:56	17/04/2015 14:06	52.4	65.0	49.0	53.5	50.3	WPS, temporary generators, birds, road traffic, pedestrians
	18/04/2015 12:46	18/04/2015 12:56	51.7	59.6	49.3	52.7	50.7	WPS, construction noise, road traffic, birds
	19/04/2015 12:40	19/04/2015 12:50	58.6	69.1	54.1	60.3	56.6	WPS, temporary generators, road traffic, boats, birds, dogs
	20/04/2015 12:55	20/04/2015 13:05	55.0	68.4	51.6	57.0	53.0	WPS, temporary generators, road traffic, dogs, ship horn, idling dump truck
	21/04/2015 13:15	21/04/2015 13:25	57.3	75.7	50.6	59.2	53.0	WPS, boats
Evening	16/04/2015 20:52	16/04/2015 21:02	56.0	61.5	52.5	57.2	54.5	Temporary generators, WPS, road traffic, birds, dogs

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
	17/04/2015 20:54	17/04/2015 21:04	52.3	63.4	48.4	54.1	50.1	WPS, pedestrians, birds, boats
	18/04/2015 20:40	18/04/2015 20:50	57.2	63.5	52.8	58.8	55.0	Road traffic, WPS, temporary generators, birds
	19/04/2015 20:53	19/04/2015 21:03	59.2	64.5	55.1	60.7	57.4	WPS, temporary generators, road traffic, boats
	20/04/2015 21:01	20/04/2015 21:11	54.0	72.1	49.6	54.7	51.5	WPS, temporary generators, birds
Night	17/04/2015 01:50	17/04/2015 02:00	53.8	57.6	51.2	54.9	52.7	WPS, temporary generators
	18/04/2015 01:45	18/04/2015 01:55	54.7	59.0	51.0	56.3	52.4	WPS, temporary generators, road traffic, ship, birds
	19/04/2015 01:54	19/04/2015 02:07	55.1	60.6	52.0	56.4	53.7	WPS, temporary generators, boat
	20/04/2015 01:33	20/04/2015 01:43	52.5	68.2	49.8	53.2	51.3	WPS, temporary generators, crane & impact noise
	21/04/2015 00:38	21/04/2015 00:48	44.4	65.2	38.2	47.3	40.0	WPS/SOME TEMPORARY GENERATORS OFF. Distant road traffic, boat, birds

Table NV.A2.7 Measured Background Noise Levels – Location 7

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
Day	17/04/2015 12:32	17/04/2015 12:42	76.6	82.6	74.7	77.0	76.0	Temporary generators, road traffic, fork lift trucks, tour buses, pedestrians
	18/04/2015 11:24	18/04/2015 11:34	75.9	79.3	74.7	76.3	75.6	Temporary generators, road traffic
	19/04/2015 11:18	19/04/2015 11:28	75.3	79.3	73.4	75.8	74.8	Temporary generators, road traffic, taxis, pedestrians
	20/04/2015 11:24	20/04/2015 11:34	76.6	86.5	73.8	77.1	75.8	Temporary generators, road traffic, fork lift truck, impact noises

Period	Time Start	Time End	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	Comments
	21/04/2015 11:23	21/04/2015 11:34	77.1	88.6	74.4	77.8	75.9	Temporary generators, road traffic, horns, fork lift truck, crane/container unloading, plane pass to East (aborted landing)
Evening	16/04/2015 21:14	16/04/2015 21:24	76.4	80.8	75.2	76.9	76.1	Temporary generators, birds, road traffic
	17/04/2015 19:32	17/04/2015 19:42	75.6	77.8	74.3	76.2	75.0	Temporary generators, road traffic, container ship unloading
	18/04/2015 19:20	18/04/2015 19:30	75.7	77.7	74.1	76.1	75.3	Temporary generators, fork lift truck, pedestrians, road traffic
	19/04/2015 19:21	19/04/2015 19:31	76.1	79.7	75.0	76.5	75.7	Temporary generators, road traffic
	20/04/2015 19:30	20/04/2015 19:40	76.3	84.2	74.8	76.6	75.7	Temporary generators, road traffic
Night	17/04/2015 00:30	17/04/2015 00:40	76.2	77.5	75.2	76.6	75.8	Temporary generators
	18/04/2015 00:23	18/04/2015 00:34	75.5	78.5	74.2	76.0	75.0	Temporary generators, road traffic
	19/04/2015 00:32	19/04/2015 00:42	75.5	76.7	74.5	75.9	75.2	Temporary generators, scooter
	20/04/2015 00:23	20/04/2015 00:33	75.4	76.3	74.0	75.7	75.1	Temporary generators, road traffic, impact noise
	17/04/2015 00:30	17/04/2015 00:40	76.2	77.5	75.2	76.6	75.8	Temporary generators
	21/04/2015 01:15[a]	21/04/2015 01:16[a]	71.3	72.1	70.5	71.6	70.9	WPS/SOME TEMPORARY GENERATORS OFF. Temporary generators (short measurement as noise stable & continuous)

[a] measurement less than one minute (steady, continuous generator noise level).

APPENDIX NV3 GENERAL PRINCIPLES OF CONSTRUCTION NOISE & VIBRATION CONTROL

A summary of the main methods to control construction noise and vibration at source and its propagation included in BS 5228 Parts 1 and 2 are described below. For the vast majority of the nearest residences, there are significant and considerable distances from the proposed development. In addition, construction work by its nature is temporary and will occur in phases in different areas of the site. It is therefore predicted that adopting some or all of the outline recommendations would enable any agreed construction noise and vibration targets to be met at existing residences.

General Noise Control Measures

Local Authority agreements

- Preparation of a Construction Environmental Management Plan (CEMP) as a means of specifying construction noise controls, for agreement with the Gibraltar Authorities; and
- As necessary, use of section 60 and section 61 agreements under the Control of Pollution Act 1974 (UK Government, 1974).

Community relations

- Initiate and maintain good community relations with nearby residents; and
- Keep residents informed of progress and deal effectively with any complaints.

Hours of work

- Standard construction works should be restricted to reasonable daytime hours only, such as 0800-1800 hours on Monday to Friday and 0800-1300 hours on Saturday, with no noisy works on Sundays or Public Holidays.

General

- Undertake any significantly noisy works at distance from residences if possible;
- Avoid unnecessary revving of plant engines;
- Keep internal haul routes well maintained;
- Reduce impact noise with dumper trucks etc. where possible;
- Minimise drop heights of materials;
- Start up plant sequentially and only when required, rather than simultaneously; and
- Minimise possible disturbance from audible reversing alarms where possible.

Plant Selection/Modification

- Use best practicable means selecting construction plant to ensure low noise items, where necessary; and
- Modify plant where required, in accordance with manufacturers' requirements, to include noise control measures.

Enclosures or Screens

- Use of screens or enclosures to reduce noise from significant noise sources can be effective; and
- Use of site buildings etc. and/or early construction of development buildings near existing residences to act as acoustic screen to continuing works behind.

Use and Siting of Equipment

- Where possible, locate significant noise sources or activities generating high noise levels at locations remote from residents.

Maintenance

- Regularly maintain and repair plant to ensure it does not generate any unnecessary noise.

Piling Works

- Care and consideration should be given to any piling works proposed to reduce noise levels wherever possible; and
- Use of continuous flight auger piling methods, rather than percussive, driven piling, typically generates lower noise levels.

Noise Control Targets

- Setting and monitoring of noise control targets at residences if considered necessary.

General Vibration Control Measures

Community relations

- Initiate and maintain good community relations with nearby residents;
- Keep residents informed of progress and deal effectively with any complaints.

Hours of work

- Standard construction works should be restricted to reasonable daytime hours only, such as 0800-2000 hours on Monday to Friday and 0800-1300 hours on Saturday, with no noisy works on Sundays or Public Holidays.

Substitution

- Replace plant and/or methods generating significant vibration levels with less intrusive methods where reasonably practicable.

Vibration isolation at source

- Use of resilient mountings for fixed/stationary plant (e.g. compressors, generators, pumps etc) when located close to sensitive receptors.

Controlling spread of vibration

- Locate vibration-generating equipment remotely from sensitive receptors;

- Use of isolating trenches where appropriate.

Vibration control targets

- Setting and monitoring compliance with vibration control targets;

Reducing vibration from piling

- Use of alternative methods, such as continuous flight auger, pressed-in pre-formed, auger bored piling in preference to driven/impact piling.
- Removal of hard obstructions (e.g. old foundations) by other means than with piling rig;
- Use of cut-off/isolation trenches, as close as possible to source or receiver;
- Reduction of energy per blow;
- Reduction of resistance to penetration;
- Excavation under support fluid, reducing need for vibratory/percussive equipment
- Avoid rig/leg contact with sensitive buildings;
- Removal of plug when using casing vibrators;
- Bottom-driving in preference to top-driving;
- Use of variable moment vibrators.

CHAPTER 16

TRAFFIC AND TRANSPORTATION

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ABBREVIATIONS

CEMP	Construction Environmental Management Plan
CTMP	Construction Traffic Management Plan
Dft	Department for Transport
DMRB	Design Manual for Roads and Bridges (UK)
EIA	Environmental Impact Assessment
ES	Environmental Statement
Ha	Hectare
HGV	Heavy Goods Vehicle
HM	Her Majesty's
IEA	Institute of Environmental Assessment
IEMA	Institute of Environmental Management and Assessment
IHT	Institute of Highways and Transportation
ITPTP	Integrated Traffic, Parking and Transport Plan
MOD	Ministry of Defence
STTPP	Sustainable Traffic, Transport and Parking Plan
UK	United Kingdom

1 INTRODUCTION

1.1 This chapter presents an assessment of the potential traffic and transportation issues associated with the proposed new power station on the North Mole, Gibraltar.

1.2 The assessment covers the proposed site and surrounding area, which includes the connecting highway network and cruise terminal, and is primarily focussed on the potential issues from construction traffic, since traffic during the operation of the power station will be minimal, although it is described in this report.

1.3 The chapter discusses the relevant European, national and local policy; the transport related aspects of the proposed development site and location; the assessment methodology used to assess the baseline conditions of the site and surrounding area; the potential significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant effects, including a Construction Traffic Management Plan (CTMP); and the potential residual significant effects. The assessment methodology includes the means of calculating future traffic flows.

1.4 The scope of the study has been informed by site visits, statutory consultation and from an Environmental Scoping Report and the Town Planner's Environmental Scoping Opinion that were produced for the proposed development (Volume 1: Main Environmental Statement (ES), Appendix 2 and 3 respectively).

2 PLANNING AND LEGISLATION

2.1 Specific Gibraltar plans referred to are the Gibraltar Development Plan (2009), the Integrated Traffic, Parking and Transport Plan (ITPTP) (2009) and the Draft Sustainable Traffic, Transport and Parking Plan (STTPP) (2010).

The Gibraltar Development Plan (2009)

2.2 The Gibraltar Development Plan (2009) is *"intended to guide land use planning in Gibraltar for the next ten years [until 2019], although it is anticipated that it would be reviewed well before then and rolled forward"* (HM Government of Gibraltar, 2009a, pg. 1). The Plan was formulated with and subjected to extensive public participation so "*it must be seen as the plan having the support of the community"* (HM Government of Gibraltar, 2009a, pg. 1). The strategic principles of the plan target seven areas of Gibraltar, which includes transport and shipping.

2.3 Specifically for transport, the Plan identifies the intrinsic link between land use and transport: Gibraltar has developed a reliance on private motor vehicles. This has led to a lack of parking spaces across Gibraltar, but specifically within the centre, and means that new developments are required to include parking facilities. The government is also focussed on increasing the uptake of non-private vehicle travel methods, including public transport and cycling, which provide significant environmental and health benefits.

2.4 The Plan also includes details of proposed road schemes: Devil's Tower Road widening, Airport to Frontier Land connections and Europort to Coaling Island connections. Specific policies from the Plan are outlined in table TT2.1 below.

Table TT2.1 The Gibraltar Development Plan (2009), Relevant Policies

Policy	
No.	**Name***
TR1	Promotion of Alternative Means of Transport
TR2	Highway Considerations
TR3	Construction Activities
TR4	Car Parking
TR5	Provision of Car Parking for New Development
TR6	Loss of Public On-Street Car Parking
TR7	Parking Proposals in Underground Structures
TR8	Public Parking Provision for Disabled Persons
TR9	Parking Provisions for Disabled Persons in New Developments

Policy	
No.	**Name***
TR10	Cycling Routes
TR11	Cycling Parking Facilities
TR12	Coach Park
TR13	Gibraltar Airport
GDS2	Design

*For further detail see Appendix TT2

Integrated Traffic, Parking and Transport Plan (October 2009)

2.5 The ITPTP (HM Government of Gibraltar, 2009b) details the government's electoral commitment towards Gibraltar's perennial traffic and parking issues. The ITPTP is constrained by the size of Gibraltar, the limited number of roads or space for new infrastructure, number of vehicles on roads (locals and visitors) and the behaviour and extent of road use in Gibraltar. The plan has identified that it is not possible to eliminate traffic build up during peak times ('rush hours').

2.6 Key considerations of the ITPTP are:

- car parking facilities and schemes
- policing and enforcement of parking schemes
- new roads
- traffic management and calming measures
- further enhancement of public transport and other alternatives.

2.7 The ITPTP envisaged a three-year period for the completion, with much completed within two years. A new traffic, parking and transport plan is currently being drafted which will set policies for the next ten years.

Draft Sustainable Traffic, Transport and Parking Plan (April 2015)

2.8 The Draft STTPP outlines the government's intension in building a sustainable and safe transport network for Gibraltar. The plan addresses the government's manifesto commitments to reduce congestion and ease traffic movement problems; of particular concern is increasing traffic congestion and the subsequent contribution to declining air quality.

2.9 The STTPP provides a vision of the transport network from 2015 to 2025, with the expectant 6.5% increase in traffic levels and prioritises providing a high

quality transport system with suitable non-car transport alternatives. The key aims of the STTPP are to provide an efficient transport network, improve environmental conditions and encourage healthier, sustainable, travel choices for residents and tourists. The plan also supports wider goals to improve accessibility to facilities and services and improving transport security and safety. The STTPP also identifies the need to balance transport needs against long-term social economic and environmental needs.

3 SCOPE AND METHODOLOGY

3.1 This section explains the technical and spatial scope of the traffic and transportation assessment, and describes the methodology used for the assessment.

3.2 The assessment follows the best practice guidelines as outlined by the Institute of Environmental Management and Assessment (IEMA), guidelines for the EIA of road traffic (Guidance Note No. 1) (IEMA, 2004) and the United Kingdom Department for Transport (DfT) Design Manual for Roads and Bridges (DMRB) Volume 11: Environmental Assessment (DMRB, 2007). The IEMA Guidelines also consider the Chartered Institution of Highways and Transportation (IHT) Guidelines for Traffic Impact Analysis (IHT, 1994).

3.3 Utilising the IEMA and DMRB Guidelines ensures a consistent EIA approach that is compliant with all relevant regulations, legislations and policies. The IEMA and DMRB Guidelines also provide guidance on the assessment methods, including: necessary inclusions, potential significant effects, potential scoping-out of effects, threshold values and sensitive receptors; and reporting methods, including: assessment principles, screening, scoping, impact analysis, mitigation, environmental statement, review, decision making, follow up and conclusions.

3.4 The proposed power station is described in Chapter 5; the aspects relevant to the assessment of traffic and transport are highlighted here.

Scope

3.5 The scope of the traffic and transport assessment has been informed by a scoping assessment and the scoping opinion produced for the Town Planner. The scope of the EIA has also been guided by the ES for the North Mole Land Reclamation (HM Government of Gibraltar, 2014).

3.6 The study area is limited to the roads that are most likely to experience environmental effects from the proposed development. The assessment focuses on seven roads, which include the local roads that directly connect to the site and main roads that provide connections into the wider highway network and services, including the Gibraltar-Spain border, the Gibraltar

airport and the North Mole harbour (including the cruise and ferry terminals). The assessment is further limited to roads that have an adequate carrying capacity for construction traffic, including Heavy Goods Vehicles (HGVs). The assessed roads are Devil's Tower Road; Winston Churchill Avenue; Glacis Road; Waterport Road; Mons Calpe and North Mole Road East and West. Figure TT3.1 (Volume 2: Figures) shows the roads in the area.

3.7 The cruise liner terminal, located in close proximity to the west of the proposed power station, causes, when cruise liners are docked, significant increases to pedestrian, taxi and minibus movements along the North Mole Road as well as through the wider and connecting highway network.

3.8 Potential significant transport effects during the operational phase of the power station were scoped out (Appendix 2, Main Report). This is because no significant changes are predicted against current traffic levels, with the maximum potential trips of 25 cars and 15 motorcycles per day, and there will be no fundamental change in traffic levels to the wider highway network. Therefore, the assessment specifically focuses on the potential impacts of HGVs during the construction phase.

3.9 The assessment includes:

- Identifying the methodology employed to assess the impact of the proposed development on the local transport network;
- Identifying the baseline condition in terms of existing traffic volumes;
- Assessing the impact of the change in traffic flows on the local highway network;
- Assessing the impact of the change in traffic flows on the prevalence of accidents or other potential effects;
- Identifying measures to offset potential negative impacts and identifying any remaining residual effects.

Assessment Methodology

3.10 The assessment addresses the likely impacts from the proposed development on a hierarchy of car and non-car transport modes: pedestrians, cyclists, public transport, vehicle drivers and passengers, HGVs and shipping. The scope of the EIA only covers the construction phase.

3.11 The assessment has been undertaken using site visits and desktop study. The site visit identified key transport routes, pedestrian amenities and traffic flows. The desktop study utilised previous studies in the North Mole area, as identified by the Technical Services Department and the Town Planning Department (HM Government of Gibraltar, 2014). The baseline traffic data analysed covers 12 hours (from 07:00 to 19:00) including the working day and peak travel times. Analysed data includes two-way traffic numbers, routes and timings, and the changes in HGV trips.

3.12 Future traffic flows have been calculated using professional opinion and the designed access and exit routes for the power station generated traffic and the predicted changes in HGV trips.

Sensitive Receptors and Magnitude of Impact

3.13 Sensitive receptors are designated as:

- **Very High** – Internationally designated receptor;
- **High** – Nationally recognised receptor;
- **Medium** – Regionally important receptor;
- **Low** – Locally important receptor; or
- **Negligible** – Receptor only of local importance and with resilience to change.

3.14 The magnitudes of impact are designated as:

- **Very High** – Permanent changes over the whole development area and beyond;
- **High** – Permanent changes over much of the development area;
- **Medium** – Noticeable, but temporary changes over a partial area;
- **Low** – Noticeable, but temporary changes with little area or time extent; or
- **Negligible** – Changes not discernable from background conditions.

Significance Criteria and Magnitude of Effect

3.15 Potential effects are assessed by comparing the magnitude of an impact against the sensitivity of a receptor. Where the sensitivity of a receptor is low and the magnitude of an impact is low it is unlikely that there will be a significant effect, however where the sensitivity of a receptor is high-very high and the magnitude of effect if high-very high it is very likely that there will be a

significant effect. The interaction between sensitivity of receptors and magnitude of impact is shown in table TT3.1 below.

Table TT3.1 Significance Criteria and Likelihood of Significant Effects

Likelihood of Significant Effects		Magnitude of Impact			
		Low	Medium	High	Very High
Sensitivity of Receptor	Low	None	Minor	Medium	Medium
	Medium	Minor	Medium	Medium	High
	High	Medium	Medium	High	Very High
	Very High	Medium	High	Very High	Very High

3.16 Effects can be direct, indirect, secondary or cumulative, short, medium or long-term, positive or negative, and permanent or temporary. Assessment guidelines also highlight the potential for interactions between effects.

Likely Significant Effects

3.17 The DMRB best practice guidelines set out the recommended list of environmental effects that could be significant if the proposed development gives rise to changes in traffic flows. Likely traffic effects to the highway network and the local community are shown in Table TT3.2 below.

Table TT3.2 Potential Significant Effects

Effect	Description
Severance	The isolation of residents/communities from facilities or services because of changes to the road network and/or traffic flow. Severance is also dependent on the availability of crossing points. Children, the disabled and the aged are particularly vulnerable to severance.
Driver Delay	The change (increase) in journey time for current, non-site traffic.
Pedestrian and Cycle Delay	The change in pedestrian and cyclist journey time, which is dependent on the level of severance and the installation of crossing facilities.
Pedestrian Amenity	The pleasantness of a journey, assessed via quantitative and qualitative factors including traffic criteria: vehicle speed, frequency and proportion of HGVs; the visual impact of the site; footpath width and separation from traffic; and the existence and quality of street furniture or planting.
Fear and Intimidation	Pedestrian-related factor dependent on traffic volumes, speeds, and HGV occurrences as well as availability and width of footpaths, crossing points and separation or barriers against traffic.
Accidents and Safety	Measurement of the occurrence of traffic incidents and qualitative assessment. It includes all road users and is dependent on the road quality and carriageway type, traffic

Effect	Description
	speeds and volumes as well as the existence of crossing facilities, traffic calming measures and street lighting.
Hazardous and Dangerous Loads	The provision for the transport of dangerous/hazardous loads, which includes explosives, gases, flammable liquids and solids, oxidising substances, radioactive material, corrosive substances and miscellaneous dangerous goods.
Public Transport and Accessibility	The provision and accessibility of non-private car modes of transport, including buses.

3.18 Thresholds of significance for these effects are based on IEMA, DMRB and IHT best practice guidelines. These are:

- 30% increase in overall road traffic movements, including HGVs;
- 10% increase in overall road traffic movements relating to sensitive receptors, such as hospitals and schools;
- 50% change in lorry movements affecting pedestrian amenity.

3.19 Where it is expected that an effect will fall significantly below a threshold of significance, best practice guidelines indicate that effects can be scoped out.

Limitations of Study

3.20 The study has been based on the availability of accurate, current traffic data. The assessment relies on data from previous studies conducted for HM Government of Gibraltar, and utilises professional opinion to predict the changes in traffic flow during construction phases.

4 EXISTING CONDITIONS

4.1 Information on the existing traffic conditions has been informed by site visits and existing traffic counts (HM Government of Gibraltar, 2014).

Site Location, Existing Traffic Network and Surrounding Land Use

4.2 The site is located along the North Mole of Gibraltar, to the northwest of the country. General site details are described in Chapter 1, but specific traffic and transportation related aspects are provided here.

4.3 The proposed site and the surrounding North Mole (including the existing temporary generators, the cruise terminal, the Port Authority building and the Flying Angel social club and residence) is currently immediately accessed from North Mole Road through a barriered and guarded entrance.

4.4 The local and main highway routes that provide access to the site and to local services and facilities are Devil's Tower Road, Winston Churchill Avenue, Glacis Road, Waterport Road, Mons Calpe Road and North Mole Road (East and West); these are shown in Figure TT3.1 (See Volume 2: Figures).

Devil's Tower Road

4.5 Devil's Tower Road runs east to west for approximately 700 m between the Sir Herbert Road in the east, which follows the east coast of Gibraltar, and the Sundial Roundabout in the west. The Sundial Roundabout, a four-arm roundabout that connects Devil's Tower Road, Bayside Road and Winston Churchill Avenue (north and south), has been identified as a key sensitive receptor.

4.6 Devil's Tower Road is a dual carriageway with a central reservation and pedestrian footpaths on either side of the carriageway; it is lit and subject to a 50 kph (31 mph) speed limit.

Winston Churchill Avenue

4.7 Winston Churchill Avenue runs north to south for approximately 1 km between the Spanish border in the north, where it serves as the only access between

Spain and Gibraltar, and approximately 250 m south of the Sundial Roundabout (at Victoria Stadium) where it becomes Glacis Road.

4.8 Winston Churchill Avenue is a dual carriageway with a central reservation and pedestrian footpaths on either side of the carriageway; it is lit and subject to a speed limit of 50 kph (31 mph).

4.9 Winston Churchill Avenue intersects Gibraltar International Airport's runway and movable barricades restrict access when planes are landing or taking off.

Glacis Road

4.10 Glacis Road runs northeast to southwest for approximately 350 m from Winston Churchill Avenue to a three-arm roundabout (Fountain Roundabout) between Waterport Road and Queensway Road. Glacis Road is a single carriageway with pedestrian footpaths on either side of the carriageway; it is lit and subject to a speed limit of 50 kph (31 mph).

Waterport Road

4.11 Waterport Road runs approximately northwest to southeast for approximately 600 m from a three-arm roundabout with Glacis Road and Queensway Road to a 300 m north of a three-arm roundabout with North Mole Road. Waterport Road is a dual carriageway for approximately 275 m, until it meets North Mole Road at a three-arm roundabout, and then continues as a single carriageway. Waterport Road is lit with pedestrian footpaths on either side for its duration; it is subject to a speed limit of 50 kph (31 mph).

North Mole Road

4.12 North Mole Road runs approximately east to west from a three-arm roundabout with Waterport Road into Gibraltar North Mole. North Mole Road is a dual carriageway for approximately 250 m west after the roundabout with Waterport Road, but becomes a single carriageway after a four-arm roundabout (at the evacuation memorial) with Europort Road. North Mole Road connects to the Cruise Terminal as well as the services and infrastructures in the port area.

4.13 North Mole Road is split into two sections, North Mole east and west: east denotes the approximately 250 m of dual carriageway road, from the three-arm Waterport roundabout to the four-arm Europort roundabout (at the evacuation memorial); and west denotes the 550 m single carriageway that connects the western exit of the four-arm roundabout to the cruise ship terminal.

4.14 Both sections of North Mole Road are lit and have pedestrian footpaths on either side of the carriageway. North Mole Road east is subject to speed limits of 50 kph (31 mph) and North Mole Road west is subjected to variable speed limits between 50 kph (31 mph) and 30 kph (19 mph).

Mons Calpe Road

4.15 Mons Calpe Road runs approximately north for 100 m from the three-arm Europort roundabout (at the evacuation memorial) and then west for 800 m, where it connects to the Cruise Terminal and reconnects to North Mole Road west.

4.16 Mons Calpe Road is a single-carriageway that is lit and has pedestrian footpaths on both sides of the carriageway. Mons Calpe Road is subject to a speed limit of 50 kph (31 mph).

Existing Baseline Traffic Flows

4.17 Existing baseline traffic flows have been based on information by HM Government of Gibraltar (2014), provided via the Technical Services Department and the Town Planning Department. No additional traffic surveys have been conducted. It is assumed that traffic flows have not significantly changed from the survey conducted in 2013.

4.18 The relevant traffic data, summarised in Table TT4.1 (and detailed in Appendix TT2) shows overall traffic numbers are maintained throughout the day, with peak travel occurrences from 08:00 to 10:00 and from 15:00 to 18:00. The total traffic on Winston Churchill Avenue identifies the carriageway as a key thoroughfare in Gibraltar. The data also shows that the volume of HGV traffic is low, with hourly HGV percentages typically below the 10% level. Where the percentage of HGVs exceeds 10%, this is due to reduced total traffic numbers rather than increased HGV travel.

Table TT4.1 Baseline Road Traffic Data

Road	Traffic Total	Hourly Average	Hourly Max.	Hourly Min.	HGV Total	HGV %Max
Devil's Tower Road	15651	1305	1605	661	826	8.23
Winston Churchill Avenue	29440	2454	2793	1675	1355	6.78
Glacis Road	14334	1195	1353	773	1098	11.48
Waterport Road	18308	1526	1710	1359	1002	6.98
North Mole Road (East)	15621	1302	1510	670	769	6.71
North Mole Road (West)	6430	536	632	340	335	8.06
Mons Calpe Road	1057	89	113	58	1	1.76

Link Capacities

4.19 The baseline road traffic data as shown in Table TT4.1 has been used to assess the link capacities of the major links within the vicinity of the site using the methodology outlined in Volume 5, Section 1 of the DMRB (TA 79/99). The results of the link capacity assessment are outlined in Table TT4.2 below.

Table TT4.2 Link Capacity Assessment

Location	Width	Category	Hourly Link Capacity (2-way)	Peak Hour Survey Flows (2-way)		Used Capacity	
Winston Churchill Ave	14.00	UAP2	3,356	AM =	2525	AM =	75.2%
				PM =	2603	PM =	77.6%
Glacis Road	8.00	UAP3	2,267	AM =	1122	AM =	49.5%
				PM =	1284	PM =	56.6%
Waterport Road	14	UAP2	3,356	AM =	1563	AM =	46.6%
				PM =	1284	PM =	38.3%
North Mole Road (East)	14	UAP2	3,284	AM =	1376	AM =	41.9%
				PM =	1370	PM =	41.7%
North Mole Road (West)	9	UAP3	2,550	AM =	664	AM =	26.0%
				PM =	548	PM =	21.5%

4.20 Table TT4.2 shows that, as expected, the majority of the links operate at or below half capacity in both peak periods.

4.21 Table TT4.2 also shows that the most congested link is Winston Churchill Avenue recording 75.2% and 77.6% on the AM and PM peak respectively. However, the link is deemed to still work well within capacity.

4.22 In view of this, it can be said that the traffic flows on the individual links do not generate any capacity issues on the identified links and subsequently do not result in any congestion or queuing.

Barriers to Movement

4.23 Access to the North Mole Road west is restricted by a guarded barrier entrance, it is necessary to show a pass to access this area, whether by vehicle or on foot.

Parking

4.24 Gibraltar has a reliance on private motor vehicles and there is a general scarcity of parking, particularly in the centre. Developments in Gibraltar must therefore consider parking and vehicle accessibility. The proposed power station will include parking provision for approximately 25 cars and 15 motorcycles, which is considered adequate to accommodate the workforce and any visitors to the site, and is in line with the Town Planner's Scoping Opinion.

Public Transport, including Taxis and Tourist Minibuses/Coaches

Buses

4.25 Gibraltar contains an extensive bus network, with stops located approximately every 200-400 m along the road network and consists of eight bus routes (numbered 1-9, excluding 6) and these routes are focussed in the northwest of Gibraltar. The closest stops to the proposed site are located on North Mole Road (East) and Europort Road and are approximately 600 m from the site. The main bus station for Gibraltar is located off Fountain Roundabout, approximately 1 km from the site.

4.26 Bus routes 1, 3, 4, 5, 7, 8 and 9 all travel on roads that are anticipated to be utilised for site-traffic. Buses run between approximately 06:30 and 21:30 at 15 to 30 minute intervals during the week and there is a reduced weekend service. The operation times and routes for these services mean they could be utilised for construction or operation site workers.

Cruise Liner Arrivals

4.27 The Gibraltar Cruise Terminal is located at the western extent of the North Mole. When cruise ships are at berth there is a significant increase in pedestrian, and taxi and minibus movements. The increase in trips is dependent on cruise liner size and passenger numbers, passenger nationality and passenger destination.

4.28 In 2015, 212 cruise ships have been scheduled, which is consistent to numbers in previous years. Cruise ships have capacities of 100-4500 passengers and an average of 1500.

4.29 The number of traffic trips is greatest during the periods of peak cruise liner arrival (April to May and September to November), where cruise ship arrivals are approximately daily. Cruise companies typically organise their own transport and excursions, which follow individual routes, therefore predicting changes to the local highway network are more difficult; however, all traffic is first directed towards Waterport Road and then continues either northeast via (and to) Winston Churchill Avenue or south along Europort Road.

4.30 There is also a weekly ferry between Gibraltar and Morocco that berths south of the Cruise Liner Terminal at the western extent of the North Mole.

Pedestrian and Cyclist Movements

4.31 Pedestrian footpaths and street lighting are present on either side of the carriageway for the majority of the identified roadways in Gibraltar. Crossing points, including protected island and zebra and pelican crossings, are present at road intersections and every approximately 200 m on carriageways. Winston Churchill Avenue also contains a pedestrian flyover-bridge.

4.32 There are no identified cycle facilities in Gibraltar, such as cycle lanes, advance stop lines and limited formal cycle storage.

5 FUTURE BASELINE

5.1 The future baseline is the expected future traffic conditions if the proposed development does not proceed, but assumes that any other committed developments in the area are progressed. The new power station construction phase is expected to take 24 months to complete with anticipated construction start in August 2015 and operation start in August 2017.The STTPP predicts a future increase in traffic from 2015 to 2025 of 6.5%, therefore a 2% increase by August 2017, over the duration of the construction phase, represents a conservative estimation for the future baseline.

5.2 Cruise ships numbers are expected to be consistent to current levels, therefore there are no changes in passenger numbers or subsequent taxi or minibus trips from the cruise liner terminal during the construction period.

Future Committed Developments

5.3 Future committed developments are those that have planned consent/approved. There are planning applications that are being considered, these are:

- North Mole Tank Farm (planning reference number: BA11849)
- Coaling Island Boats Marina (BA12306)
- North Mole Industrial Park (BA12692)
- North Mole Reclamation (BA12714)
- North Mole Sullage Plant (BA12734)
- Western Beach Basin for land reclamation (BA13145)
- Coaling Island Reclamation (BA13479)
- North Mole Security Upgrades, Ticket Office and Taxi Bay with Canopy (BA13480)

5.4 Details of the construction and operation programmes and of the predicted traffic changes for the committed developments are not available, therefore the expected traffic changes have been assumed based on professional judgment. The worst case cumulative potential traffic impacts for the construction period from August 2015 to August 2017 is based upon, professional assessment of, the planned developments and the expected 2% future increase in baseline traffic.