Gladesville Bridge Marina Pty Ltd

Gladesville Bridge Marina DA

Greenhouse Gas Assessment

October 2019

Abbreviations

Abbreviation	Definition
CH_4	Methane
CO_2	Carbon dioxide
CO_2-e	Carbon dioxide equivalent
GBM	Gladesville Bridge Marina
GBM Pty Ltd	Gladesville Bridge Marina Pty Ltd
GHG	Greenhouse gas
GWP	Global Warming Potential
kWh	Kilowatt hour
NGER	National Greenhouse and Energy Reporting
NSW	New South Wales
N_2O	Nitrous oxide

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1. Introduction

1.1 Background

GHD Pty Ltd (GHD) was commissioned by Gladesville Bridge Marina (GBM) to undertake a greenhouse gas assessment of the proposed redevelopment of the GBM ('the project'). The project is located in Gladesville, NSW.

Development consent is required for the development under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and is deemed a Designated Development requiring the preparation of an Environmental Impact Statement (EIS).

This assessment has been prepared to inform an EIS and development application under Part 4 of the EP&A Act. The assessment has been prepared in accordance with relevant statutory considerations.

1.2 Project overview

The proposed development constitutes alterations and additions to the marina berth layout to provide overall storage for 130 vessels comprising 15 swing moorings and 115 floating berths. The works include:

- removal of 29 existing moorings and retention of 15 existing swing moorings;
- construction of 65 new floating berth spaces of varying sizes, that increases the number of floating berths from 50 to 115;
- cessation of slipway activities;
- demolition of the slipway rails and demolition of the internal office mezzanine structure within the covered slipway area; and
- provision of 8 new valet car parking spaces within the existing slipway area.

It is understood that dredging is not required for mooring berth deepening as sufficient water depths exist for the proposed facility. Piles into rock (rock-socketed) are envisaged for the new mooring berths.

The development is located at the centre of Sydney Harbour in Gladesville / Drummoyne, which is ten minutes from Sydney's central business district by road or water.

The location of the development is shown in Figure 1.

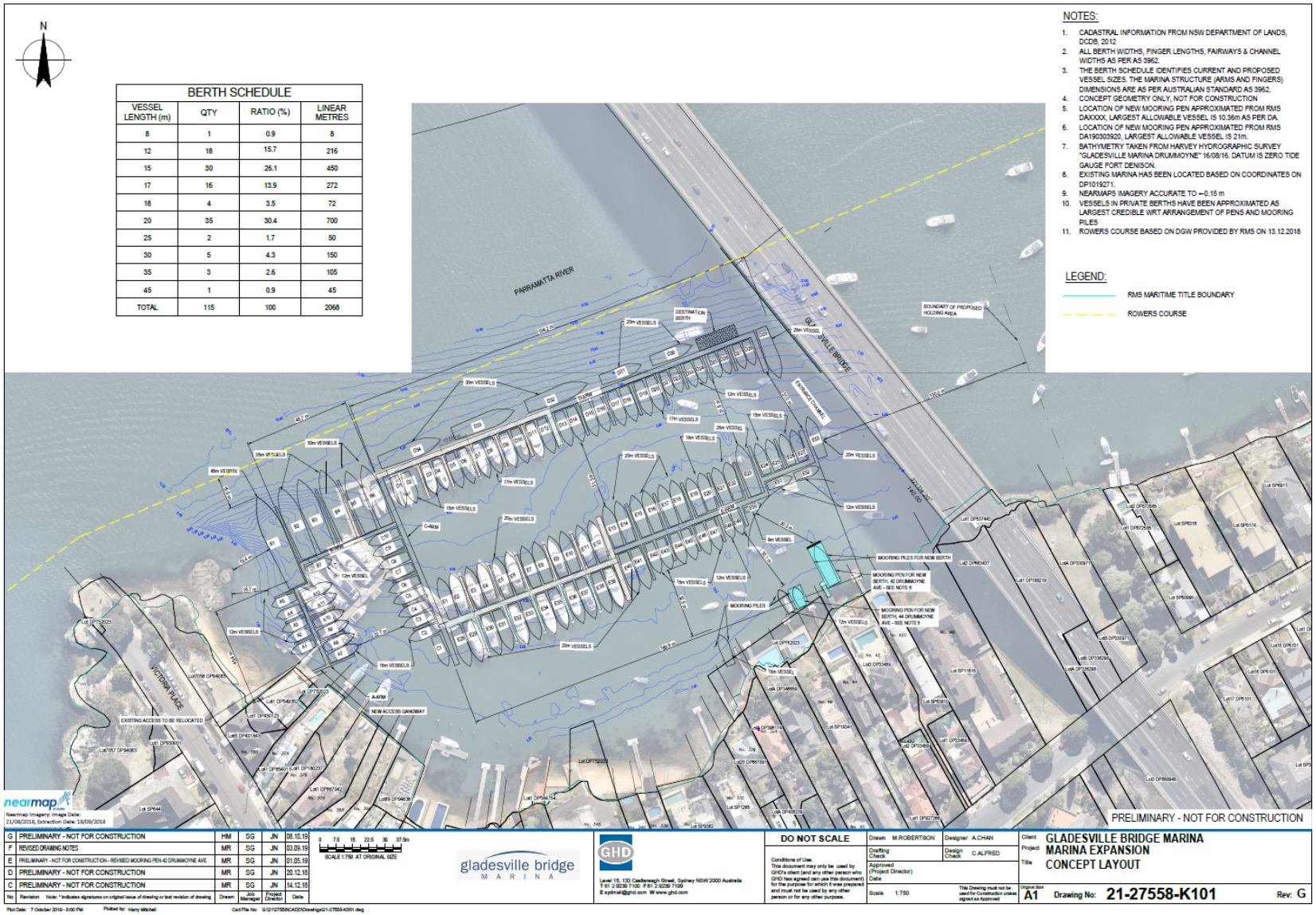

Figure 1 Site location (Source: Drawing No. 21-27558-K101 Rev G, GHD 2019)

1.3 Purpose of this report

The purpose of this report is to quantify greenhouse gas (GHG) emissions from the existing and proposed Gladesville Bridge Marina and to identify the potential greenhouse gas emissions impact of the Project.

1.4 Scope and limitations

This report has been prepared by GHD for GBM Pty Ltd and may only be used and relied on by GBM Pty Ltd. The emissions inventory has been prepared in accordance with relevant Australian guidelines for greenhouse gas inventories.

The method used was as follows:

- Defined an appropriate boundary for the greenhouse gas inventory, and identified the greenhouse gases to be covered including carbon dioxide, nitrous oxide and methane
- Identified relevant sources of GHG emissions from construction and operations
- Identified and applied appropriate emissions estimation methodologies for each source
- Determined the carbon dioxide equivalent emissions from each source and the total greenhouse gas emissions for the project
- Compared totals with State and national emissions totals
- Compared emissions from current operations and the expanded GBM.

GHD has prepared this report on the basis of information provided by Gladesville Bridge Marina Pty Ltd and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Methodology

2.1 Overview

The SEARS does not mandate a specific standard, protocol, or methodology for the greenhouse gas assessment. This assessment has been undertaken in accordance with the principles of ISO 14064-2 and the National Greenhouse and Energy Reporting (NGER) (Measurement) Determination 2008 for estimating emissions.

2.2 Greenhouse gases and global warming potentials

The greenhouse gases considered in this assessment and the corresponding global warming potential (GWP) for each gas are listed Table 2-1. GWP is a metric used to quantify and communicate the relative contributions of different substances to climate change over a given time horizon. GWP accounts for the radiative efficiencies of various gases and their lifetimes in the atmosphere, allowing for the impacts of individual gases on global climate change to be compared relative to those for the reference gas carbon dioxide. In this assessment, the GWPs from the current version of the National Greenhouse and Energy Reporting Regulations 2008 were used. These are reflective of radiative forcing over a 100 year time horizon.

Table 2-1 Greenhouse gases and 100 year global warming potentials

Greenhouse gas	Global Warming potential
Carbon dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous oxide (N_2O)	298

2.3 Assessment boundary

The following GHG emissions have been considered:

- Scope 1 emissions from direct energy use during construction and operation
- Scope 2 emissions from indirect energy use from imports and exports of electricity, heat or steam
- Limited Scope 3 emissions from other indirect energy use.

The following emission sources were included in the assessment boundary:

1. Fuel consumption during construction activities (including piling and construction of the fixed floating berths and ancillary works)
2. Fuel and electricity consumption during slipway demolition
3. Vegetation removal – terrestrial and marine (mangroves and sea grasses, if any)
4. Construction personnel commuting
5. Transportation of materials and equipment to site by truck or other transport during construction
6. Waste material disposal during construction and operation
7. Energy (fuel and electricity) consumption during operation and maintenance of GBM (moorings, floating berths, on-water maintenance and repair activities)

2.4 Exclusions

This assessment considers only greenhouse gas emissions sources within the boundary of the project, and excludes upstream and downstream emissions.

Exclusions from this GHG assessment include:

- Downstream emissions associated with the use of vessels.
- Emissions which are likely to be negligible compared with other emissions from the project were excluded from the assessment, including:
  - Emissions associated with combustion of fuels used in minor quantities such as LPG, acetylene, solvents, oils and greases.
  - Emissions associated with the leakage of hydrofluorocarbons. The GBM may use negligible quantities of hydrofluorocarbons for refrigeration and air conditioning during operation.
- Emissions from fuel use in the utility vehicle used on site at the marina, which are understood to be minor and are not anticipated to change as a result of the project.
- Emissions from sulphur hexafluoride or perfluorocarbons – these substances are not used or stored as part of the project.
- Scope 3 emissions (such as those associated with embodied energy of construction materials) other than those mentioned in section 2.3.

2.5 Calculation procedures

Emissions were calculated as follows:

- For emissions during the construction phase:
  - Relevant activity data for vehicles, piling equipment and construction plant use was identified, and emissions factors were selected and applied
- For emissions during the operations phase:
  - Activity assumptions for vehicle use during employee commuting were made, and emissions factors were selected and applied

For both phases, emissions from fuel combustion and electricity use were estimated using Method 1 from the NGER (Measurement) Determination.

2.6 Assumptions

Assumptions used in estimating GHG emissions for the construction and operation of the project are listed in Table 2-2 and

Table 2-3. The assessment was based on emission factors available at the time of the assessment and future changes in emission factors were not considered.

Activity data used for the GHG assessment was provided by GBM Pty Ltd or other studies conducted as part of the EIS.

Table 2-2 Greenhouse gas assessment assumptions by source - construction

Parameter	Assumptions
Construction	
Construction timing and duration	Estimated construction duration is 0.5 years. It is assumed that construction activity will be limited to five days per week (i.e. Monday to Friday).
Diesel combustion – stationary energy purposes	Estimated diesel consumption for stationary energy is 11.1 kL, based on 300 L/week use for the crane, 100 L/week use for the barge generator and 200 L/week use for piling activities.
Diesel combustion – construction personnel commuting (road transport)	Estimated diesel consumption for road-based commuting is 0.006 kL. For the purpose of this assessment, 4 construction personnel are assumed to commute 40 km return to Rozelle for five days per week, with all vehicles diesel.
Diesel combustion – transport of materials and equipment to site (road and barge transport)	Estimated diesel consumption for the road transport of materials and equipment to site is 14.2 kL. 10 rigid trucks are assumed to be required to transport construction materials and equipment from Brisbane to Rozelle. From Rozelle, materials and equipment are transported to site by barge.
Diesel combustion – work boat for transport of people and materials (on-water transport)	Estimated diesel consumption for the transport of people and materials from Rozelle to site is 3.9 kL based on a work boat consuming 30 L/day. Materials, equipment and personnel would be transported from Rozelle approximately 20 km by barge to the site.
Vegetation removal	No terrestrial or marine vegetation is anticipated to be removed during construction. Construction would occur in a fully seawalled area.
Electricity use	Is assumed that no electricity would be used for construction plant and equipment, which would be powered directly by diesel or from diesel electricity generators.
Waste material transport	Assumed that major demolition materials and waste will be transported offsite on the barge used to transport materials to site (i.e. no additional barge trips for waste / demolition materials).
Waste disposal	1 m^3 per week of construction and demolition waste assumed to be produced during construction requiring landfill disposal. All other removed plant/ equipment and demolition materials are anticipated to be reused or recycled.

Table 2-3 Greenhouse gas assessment assumptions by source - operation

Parameter	Assumptions	
	Existing activity	With project
Operations		
Diesel use – on-water maintenance and repair activities	Estimated diesel use for on-water maintenance and activities, including towing boats for repair in the slipway area, is 120 L/week (6.2 kL/annum).	Estimated diesel use for on-water maintenance and activities is 30 L/week (1.6 kL/annum). This is based on the assumption that there will no longer be boat towing for repair in the slipway area.
Diesel use – moorings and floating berths	No fuel use – boats do not refuel at GBM.	No fuel use – boats do not refuel at GBM.
Electricity use – ground floor offices and part of workshop	44,608 kWh/annum.	Estimated electricity use is 15,000 kWh/annum, based on a decrease in the amount of mechanical work occurring in the workshop.
Electricity use – marina	71,044 kWh/annum. The marina currently has permission for 99 boats.	Estimated electricity use is 150,000 kWh/annum. The marina will increase to 130 boats. Electricity use will approximately double due to an increase in electric boats and an increase in the size of boats.
Electricity use – water treatment	378 kWh/annum.	Estimated electricity use is 0 kWh/annum – there will no longer be a water treatment plant.
Electricity use – floor 2 offices	13,833 kWh/annum.	Estimated electricity use is 13,833 kWh/annum. Electricity use in floor 2 offices is not anticipated to change.
Electricity use – ground floor workshop	7,251 kWh/annum.	Estimated electricity use is 3,000 kWh/annum based on a decrease in the amount of mechanical work occurring and the removal of the slipway winch.
Waste disposal	595 m^3 of municipal solid waste is estimated to be generated per year (476 t/annum) based on 8.2 m^3/week waste generated during winter, 12.3 m^3/week generated during summer and 16.4 m^3/week generated during peak holidays.	775 m^3 of municipal solid waste is estimated to be generated per year (620 t/annum) based on 10.8 m^3/week waste generated during winter, 16.3 m^3/week generated during summer and 21.6 m^3/week generated during peak holiday. Waste generation will increase due to an increase in the number of boats.

3. Impact assessment

3.1 Construction emissions

A summary of estimated GHG emissions occurring as a result of construction activities for the Project is presented in Table 3-1 below. This represents emissions across the entire construction period.

Table 3-1 Construction emissions

Activity	Scope 1 Emissions (t CO_2-e)	Scope 2 Emissions (t CO_2-e)	Scope 3 Emissions (t CO_2-e)
Diesel combustion (stationary energy)	30	0	0
Diesel combustion (commuting)	0.02	0	0
Diesel combustion (materials transport)	39	0	0
Diesel combustion (work boat for materials and people transport)	11	0	0
Electricity use	0	0	0
Waste disposal	0	0	8
Total	79	0	8

3.2 Operational emissions

A summary of estimated annual greenhouse gas emissions from operation of the Project are available in Table 3-2 below.

Table 3-2 Annual operational emissions

Activity	Existing			With project		
	Scope 1 Emissions (t CO_2-e)	Scope 2 Emissions (t CO_2-e)	Scope 3 Emissions (t CO_2-e)	Scope 1 Emissions (t CO_2-e)	Scope 2 Emissions (t CO_2-e)	Scope 3 Emissions (t CO_2-e)
Diesel use – on-water maintenance and repair activities	17	0	0	4	0	0
Diesel use – moorings and floating berths	0	0	0	0	0	0
Electricity use	0	111	0	0	147	0
Waste disposal	0	0	666	0	0	868
Total	***17***	***111***	***666***	***4***	***147***	***868***

3.3 Impact of Emissions

The quantity of emissions estimated to occur during construction are estimated as approximately 87 tCO_2-e during the entire construction period. Construction emissions are estimated as approximately 9% of annual operational emissions. Construction emissions will be of limited duration. Construction emissions are negligible.

The quantity of emissions estimated to occur during operations are estimated as approximately 1,019 tCO_2-e per annum, equivalent to approximately 225 tCO_2-e per annum increase in emissions from current operations. The emissions associated with both the existing and proposed GBM are negligible.

Emissions associated with the project are way below the threshold for facility level reporting under the National Greenhouse and Energy Reporting (NGER) Act of 25,000 t CO_2-e so will not require annual reporting under the NGER scheme.

Australia's national greenhouse gas emissions, by sector, for the year to December 2018 are presented in Table 3-3 below. Total annual emissions are 538.2 Mt CO_2-e. Annual emissions from the project would account for approximately 0.0002 % of Australia's annual emissions, which is negligible.

The most recently published state-based emissions inventory is for 2017. NSW greenhouse gas emissions, by sector, for the 2017 year are also presented in Table 3-3 below. Total annual emissions are 131.5 Mt CO_2-e. Annual emissions from the project would account for approximately 0.001 % of NSW's annual emissions, which is also insignificant.

Table 3-3 Impact of project emissions on national totals

Emissions Source	2018 Australian Emissions (Mt CO_2-e) [1]	2017 NSW Emissions (Mt CO_2-e) [2]
Energy – Electricity	178.9	51.1
Energy – Stationary Energy excluding electricity	102.8	15.1
Energy – Transport	101.7	28.0
Energy – Fugitive Emissions	58.1	14.0
Industrial processes and product use	34.7	13.4
Agriculture	69.4	19.4
Waste	12.1	3.1
Land Use, Land Use Change and Forestry	-19.5	-12.7
Overall Total	538.2	131.5

Source:

1. Table 3, Department of the Environment and Energy "*Quarterly Update of Australia's National Greenhouse Gas Inventory: December 2018*" June 2019
2. Table 4, Department of the Environment and Energy "*State and Territory Greenhouse Gas Inventories 2017*" June 2019

4. Greenhouse gas reduction measures

4.1 Construction

The following measures will be undertaken to minimise / reduce greenhouse gas emissions and energy use during construction:

- All plant and equipment used during the construction works shall be regularly maintained to comply with the relevant exhaust emission guidelines
- The following measures will be considered by contractor(s):
  - Construction materials sourced locally where possible
  - Plant and equipment will be switched off when not in constant use and not left idling
  - Plant and equipment brought onsite will be regularly serviced and energy efficient vehicles or equipment will be selected where available
  - Any plant and equipment that is not working efficiently will be removed from site and replaced as soon as possible
  - Construction works will be planned to ensure minimal movement of plant and equipment, including barges

4.2 Operations

Opportunities for abatement of greenhouse gas emissions associated with operation of the GBM are minimal, since total emissions are negligible. The equipment will be maintained appropriately to minimise the risk of unintended emissions.

5. Conclusion

The quantity of emissions estimated to occur during construction are estimated as approximately 87 tCO_2-e during the entire construction period,

The quantity of additional emissions estimated to occur during operations as a result of the marina upgrade is estimated as approximately 225 tCO_2-e per annum, which is negligible. Annual emissions from the project would account for approximately 0.0002% of Australia's annual emissions and 0.001% of NSW's annual emissions, which is insignificant.

Measures will be implemented to minimise and reduce greenhouse gas emissions and energy.

GHD

Level 15
133 Castlereagh St
T: 61 2 9239 7100 F: 61 2 9239 7199 E: sydmail@ghd.com

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