

10.7.2.1 Potential Effect Mechanisms: Effects on Behaviour due to Underwater Noise

The potential effect mechanisms of behavioural change due to underwater noise are the same for NP humpback whales as those for NR killer whales and are assessed using the same vessel transit and berthing examples.

Tankers and tugs operating within the CCAA will contribute low frequency underwater sounds to the marine environment. Humpback whales are most sensitive to sounds below 1,000 Hz (Richardson et al. 1995). Therefore, the predominantly low frequency (50 to 500 Hz) underwater sounds of tankers and tugs operating within the CCAA will be highly audible to humpback whales. Sounds will be detectable by humpback whales over very large areas. Acoustic modelling of sound levels above those of humpback whale hearing was not extended to the lower detection limits, but spatial extents presented will specify the received sound levels at the furthest extent of modelling.

As in the NR killer whale assessment, one berthing example and four tug and vessel examples in select areas in the CCAA are modelled (see Figure 10-15).

Berthing

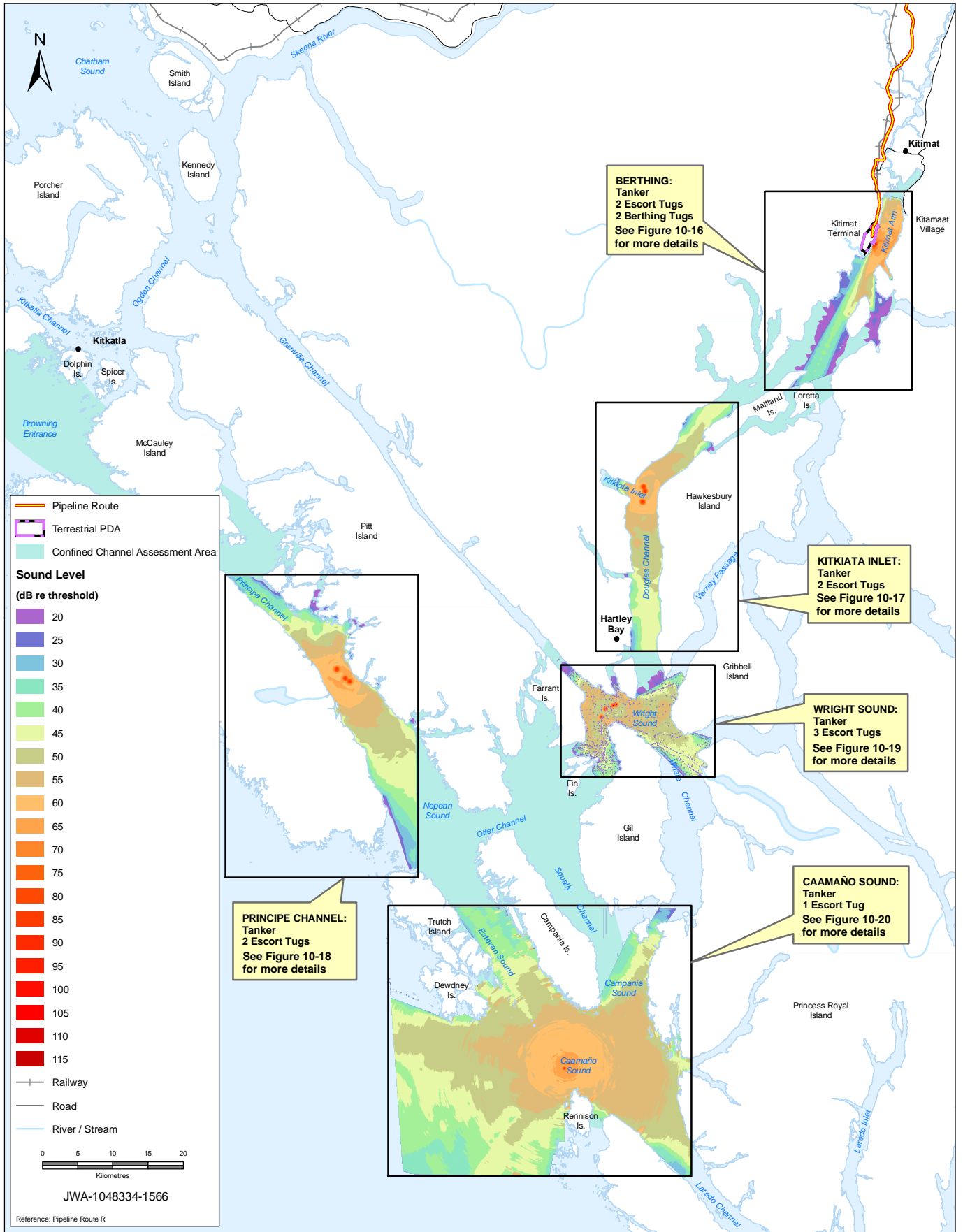
Approximately four hours of berthing or unberthing will occur daily at the Kitimat Terminal. The predicted area in which sound will be audible to humpback whales for berthing extends northward to the entrance of Minette Bay; humpback whales will hear sound levels of 35 dB above the threshold up to 26 km south (to mid-Maitland Island; see Figures 10-15 and 10-16).

Vessel Transit Operations

The predicted noise from transiting vessels that would be audible to humpback whales was modelled separately in four areas to provide an overall representation of acoustic changes throughout different habitats in the CCAA. For predicted sound contours for NP humpback whales at each site, see Figure 10-15.

Transit through Douglas Channel (Kitkiata Inlet)

The area in which sound will be audible to humpback whales will extend across Douglas Channel (average width of roughly 4 to 5 km), and sound levels of 45 dB above the hearing threshold will be received up to 22.2 km from the vessels in either direction along the channel (see Figure 10-17).



REFERENCES: NTDB Topographic Mapsheets provided by the Majesty the Queen in Right of Canada, Department of Natural Resources. All rights reserved.

CONTRACTOR:

Jacques Whitford AXYS Ltd.

PREPARED BY:

PREPARED FOR:



ENBRIDGE NORTHERN GATEWAY PROJECT

Humpback Whale -

Predicted Sound Levels above Hearing Threshold
from Vessel Transit at Four Locations
and during Berthing Operations

FIGURE NUMBER:

10-15

DATE:

20100305

SCALE:

1:750,000

AUTHOR:

NP

APPROVED BY:

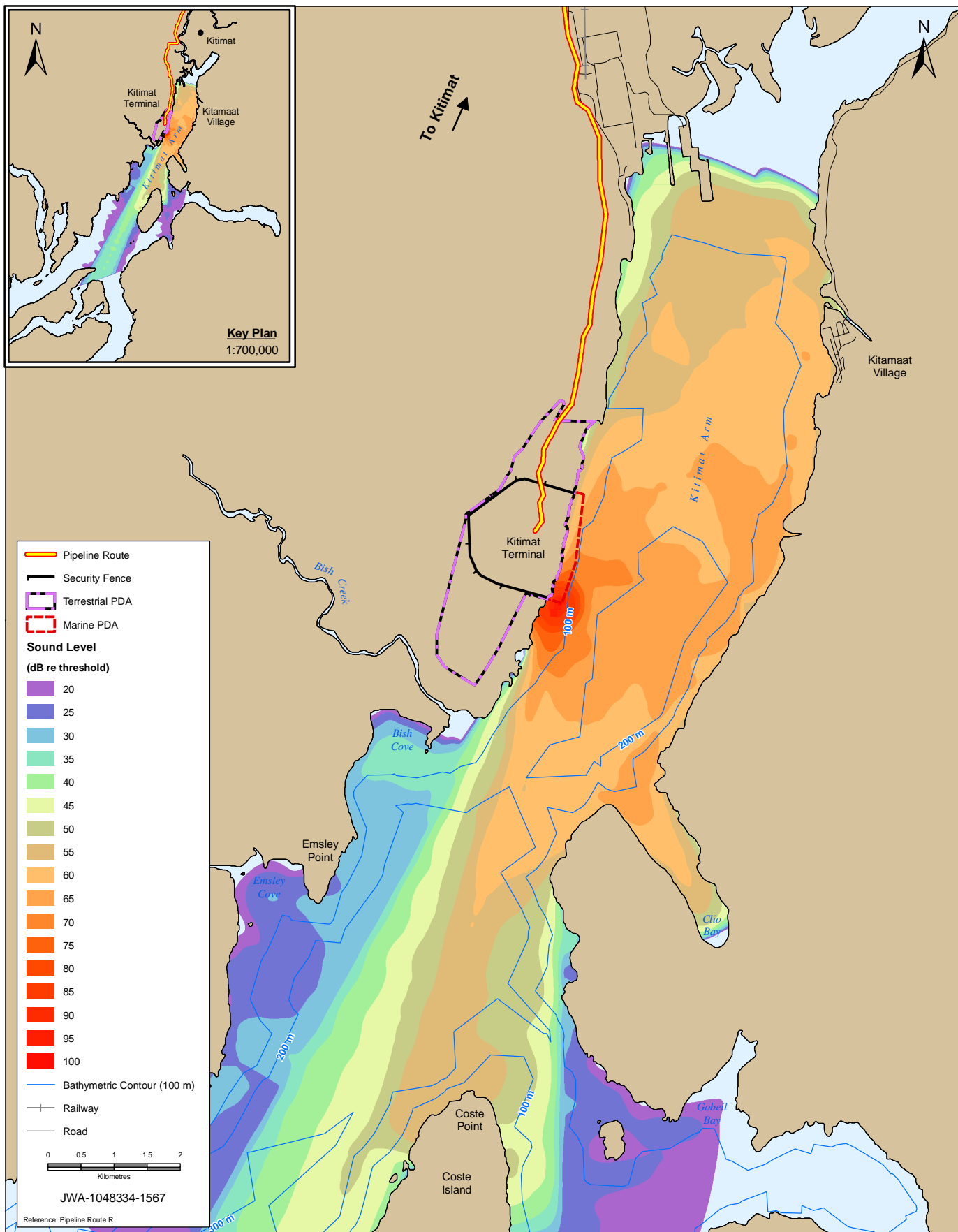
CM

PROJECTION:

UTM 9

DATUM:

NAD 83



REFERENCES: NTDB Topographic Mapsheets provided by the Majesty the Queen in Right of Canada, Department of Natural Resources. All rights reserved.

CONTRACTOR:

Jacques Whitford AXYS Ltd.

PREPARED BY:



PREPARED FOR:



ENBRIDGE NORTHERN GATEWAY PROJECT

Humpback Whale -
Predicted Sound Levels above Hearing Threshold
from Vessel Transit during Berthing Operations

FIGURE NUMBER:

10-16

DATE:

20090914

SCALE:

1:80,000

AUTHOR:

NP

APPROVED BY:

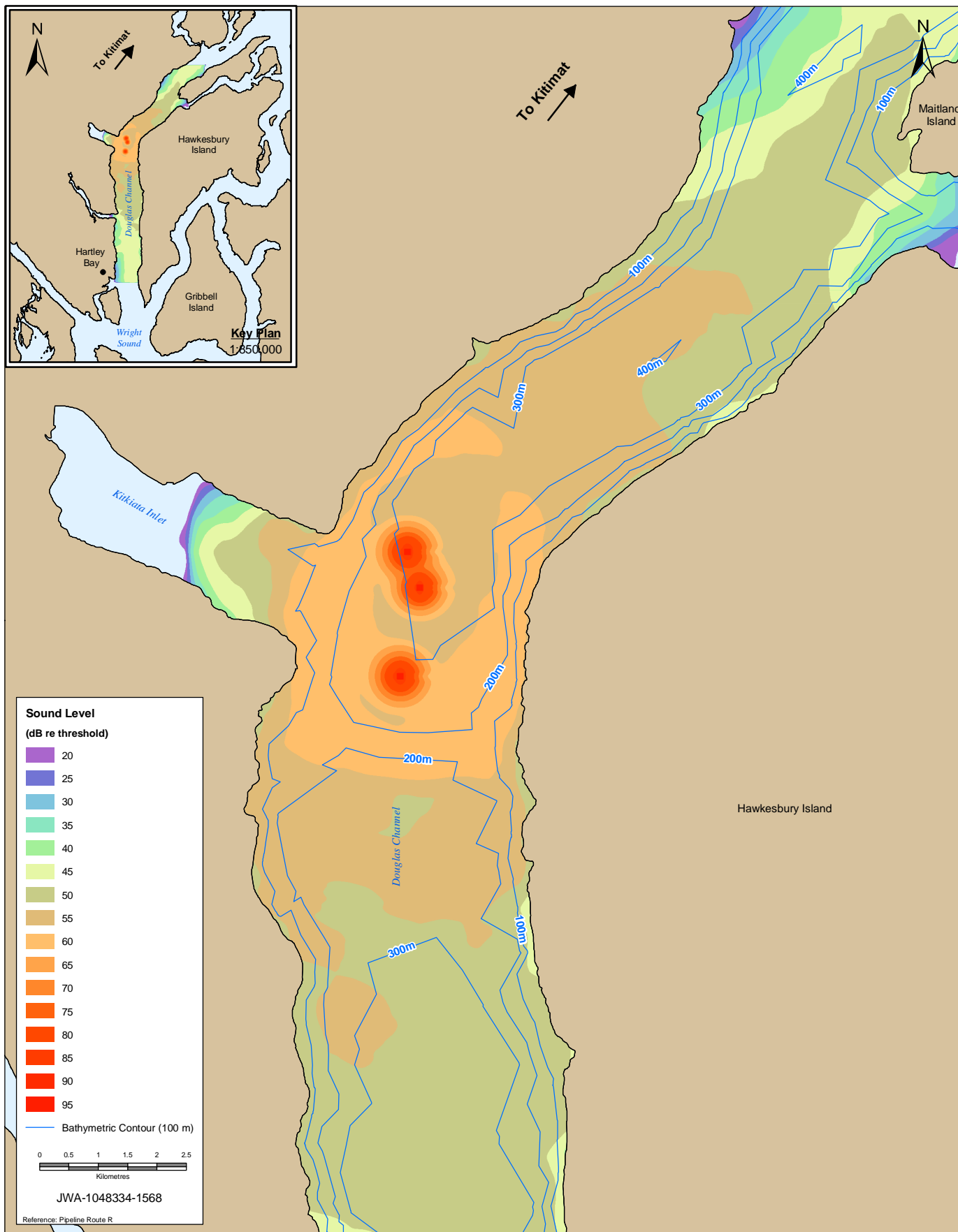
CM

PROJECTION:

UTM 9

DATUM:

NAD 83



REFERENCES: NTDB Topographic Mapsheets provided by the Majesty the Queen in Right of Canada, Department of Natural Resources. All rights reserved.

CONTRACTOR:

Jacques Whitford AXYS Ltd.

PREPARED BY:



PREPARED FOR:



ENBRIDGE NORTHERN GATEWAY PROJECT

Humpback Whale -
Predicted Sound Levels above Hearing Threshold
from Vessel Transit near Kitkiata Inlet

FIGURE NUMBER:

10-17

DATE:

20090902

SCALE:

1:90,000

AUTHOR:

NP

APPROVED BY:

CM

PROJECTION:

UTM 9

DATUM:

NAD 83