Environmental Impact Assessment: Annexures

Project No. 48289-002
April 2017

PAK: Peshawar Sustainable Bus Rapid Transit Corridor Project

Annexures A – D

Rapid Environmental Assessment Checklist
NEQS Guidelines
Photographs of Public Consultations
Noise Levels at Key Receptors during Operation Phase

Prepared by Peshawar Development Authority (PDA), provincial Government of Khyber Pakhtunkhwa (GoKP) for the Asian Development Bank (ADB).

ANNEXURES

ANNEXURE A

Rapid Environmental Assessment Checklist

Rapid Environmental Assessment (REA) Checklist

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES), for endorsement by Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: TA-8795 PAK: Peshawar Sustainable Bus Rapid Transit Corridor Project

Sector Division: Development of Road transport infrastructure

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site	√		The project alignment is located in close proximity (passes at a distance of 83 meters) from Bala Hisar Fort, which has historical and cultural significance.
▪ Protected Area		√	Not Applicable
▪ Wetland		√	Not Applicable
▪ Mangrove		√	Not Applicable
▪ Estuarine		√	Not Applicable
▪ Buffer zone of protected area		√	Not Applicable
▪ Special area for protecting biodiversity		√	Not Applicable
B. Potential Environmental Impacts Will the Project cause…			
▪ encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?	√		No historical or cultural areas will be encroached. However, disfiguration of landscape to a certain extent will take place, even though it will be short term and limited to the construction phase.

Screening Questions	Yes	No	Remarks
▪ encroachment on precious ecology (e.g. sensitive or protected areas)?		√	Not Applicable
▪ alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?		√	Not Applicable
▪ deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	√		The setting up of worker camps could lead to issues relating to sanitation and solid waste disposal. Strict implementation of necessary measures in the EMP will ensure the impacts are short term and limited to construction phase. Although no chemicals are expected to be used during the construction activity, however standard protocols as per NEQS shall be followed for proper disposal of any chemicals in case such a situation arises.
▪ increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	√		Increased air pollution resulting from breaking of existing concrete structures and cutting and filling works is expected. However, any impacts will be short term and limited to the construction phase.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation during project construction and operation?	√		Keeping in view the highly urbanized and densely populated nature of the project corridor with a high proportion of sensitive receptors, the risks related to occupational health and safety during the construction phase do exist. However, any such impacts will be short term and limited to the construction phase with no long lasting impacts expected.
▪ noise due to blasting and other civil works?	√		No blasting is expected. However, other civil works during the construction phase will result in high noise levels. However, any resulting impacts will be short term and limited to the construction phase.
▪ dislocation or involuntary resettlement of people?	√		A limited number of houses and shops will be relocated and the affected persons will be offered houses and shops at alternative locations.
▪ dislocation and compulsory resettlement of people living in right-of-way?	√		A limited number of houses are located in the right-of-way of the proposed project and will be relocated and will be offered houses at alternative locations.

Screening Questions	Yes	No	Remarks
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	Not Applicable
▪ other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?	√		Increased air pollution is expected consisting of high dust levels along with increased emissions of SOx and NOx due to increase vehicular movement. However, through effective implementation of the measures to be provided in the EMP, any impacts will be short term and limited to the construction phase. Similarly, necessary mitigation measures will also be provided for the operational phase of the project.
▪ hazardous driving conditions where construction interferes with pre-existing roads?	√		Keeping in view the highly populated nature of the project corridor with a high proportion of sensitive receptors and the movement of heavy machinery and vehicles in the congested pre-existing roads could lead to possible hazardous driving conditions. However, implementation of a traffic management plan during the construction phase will mitigate any possible impacts.
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?	√		The setting up of worker camps could lead to issues relating to sanitation and solid waste disposal. Strict implementation of necessary measures in the EMP will ensure the impacts are short term and limited to construction phase.
▪ creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?	√		Temporary breeding habitats could be created from setting up of worker camps that could lead to issues relating to sanitation and solid waste disposal. Strict implementation of necessary measures in the EMP will ensure the impacts are short term and limited to construction phase.
▪ accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?	√		It is anticipated that during project operation stage the BRT system will have a positive impact on safety in proximity of the BRT area. Segregated bus lane is significantly safer than mixed lanes. The project design should take into consideration the safer passenger access to stations.

Screening Questions	Yes	No	Remarks
▪ increased noise and air pollution resulting from traffic volume?	√		It is anticipated that introduction of BRT system will result in decreased noise and air pollution levels due to substitution of noisier and more polluting cars by modern buses, improved flow of car lanes, and congestion relief benefits.
▪ increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?	√		The possible short-term impact of spills during the construction phase from vehicles and heavy machinery exists. However, the implementation of necessary measures in the EMP will ensure any impacts are controlled. Similarly, necessary mitigation measures for the operational phase of the project will be implemented.
▪ social conflicts if workers from other regions or countries are hired?		√	No conflicts are expected since majority of the work force to be hired will be local labor
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Majority of local work force is expected to be employed and thus large influx of people is not expected.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	√		Keeping in view the high concentration of sensitive receptors in the project area, necessary mitigation measures in the project area will need to be implemented to ensure no long-term impacts take place relating to community health and safety. An Occupational health and safety plan will be developed and implemented to mitigate any potential impacts.
▪ community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.	√		The installation of elevated structures as part of the infrastructure development in highly populated parts of the project corridor carries the risk of structure failure. Similarly, the risks of accidents will also exist keeping in view the highly populated nature of the project area. However, the strict implementation of mitigation measures in the EMP will ensure any long-term impacts are prevented.

ANNEXURE B

NEQS Guidelines

Selected NEQS for Waste Effluents

Parameter	Unit	Standards (maximum allowable limit)
Temperature increase	^{0}C	<3
pH value (acidity / basicity)	pH	6-9
5-day biochemical oxygen demand (BOD) AT 20 ^{O}C	mg/l	80
Chemical oxygen demand (COD)	mg/l	150
Total dissolved solids	mg/l	200
Total dissolved solids	mg/l	3,500
Grease and oil	mg/l	10
Phenolic compounds (as phenol)	mg/l	0.1
Chloride (as Cl)	mg/l	1.0
Fluoride (as F)	mg/l	10
Sulfate (SO_4)	mg/l	600
Ammonia (NH_3)	mg/l	40
Cadmium	mg/l	0.1
Chromium (trivalent and hexavalent)	mg/l	1.0
Copper	mg/l	1.0
Lead	mg/l	0.5
Mercury	mg/l	0.01
Selenium	mg/l	0.5
Nickel	mg/l	1.0
Silver	mg/l	1.0
Total toxic metals	mg/l	2.0
Zinc	mg/l	5
Arsenic	mg/l	1.0
Barium	mg/l	1.5
Iron	mg/l	8.0
Manganese	mg/l	1.5
Boron	mg/l	6.0
Chlorine	mg/l	1.0

Notes:

1. The standard assumes that dilution of 1:10 on discharge is available. That is, for each cubic meter of treated effluent, the recipient water body should have 10 m^3 of water for dilution of this effluent.

2. Toxic metals include cadmium, chromium, copper, lead, mercury, selenium, nickel and silver. The effluent should meet the individual standards for these metals as well as the standard for total toxic metal concentration.

Source: Government of Pakistan (2000) (SRO 549(I)/2000).

National Environmental Quality Standards for Ambient Air

Pollutants	Time-Weighted Average	Concentration in Ambient Air		Method of Measurement
		Effective from 1st July 2010	Effective from 1st January 2013	
Sulfur Dioxide (SO_2)	Annual Average *	80 µg/m3	80 µg/m3	Ultraviolet Fluorescence
	24 hours**	120 µg/m3	120 µg/m3	
Oxides of Nitrogen as (NO)	Annual Average*	40 µg/m3	40 µg/m3	Gas Phase Chemiluminescence
	24 hours**	80 µg/m3	80 µg/m3	
Ozone (O_3)	1 hour	180 µg/m3	130 µg/m3	Non dispersive UV absorption
Suspended Particulate Matter (SPM)	Annual Average*	400 µg/m3	360 µg/m3	High Volume Sampling, (Average flow rate not less than 1.1 m3/minute).
	1 hour	180 µg/m3	130 µg/m3	
Respirable Particulate Matter. PM_{10}	Annual Average*	200 µg/m3	120 µg/m3	β Ray absorption
	24 hours**	250 µg/m3	150 µg/m3	
Respirable Particulate Matter. $PM_{2.5}$	Annual Average*	25 µg/m3	15 µg/m3	β Ray absorption
	24 hours**	40 µg/m3	35 µg/m3	
	1 hour	25 µg/m3	15 µg/m3	
Lead (Pb)	Annual Average*	1.5 µg/m3	1.0 µg/m3	ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	2.0 µg/m3	1.5 µg/m3	
Carbon Monoxide (CO)	8 hours**	5 µg/m3	5 µg/m3	Non dispersive Infra-Red (NDIR)
	1 hour	10 µg/m3	10 µg/m3	

* Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.

24 hourly / 8 hourly values should be met 98% of the in a year. 20% of the time, it may exceed but not on two consecutive days.

Source: Government of Pakistan (2010) (SRO 1062 (I)/ 2010).

National Environmental Quality Standards for Noise[1]

S/No.	Category of Area/Zone	Limit in dB(A) Leq	
		Day Time	Night Time
1	Residential area (A)	55	45
2	Commercial area (B)	65	55
3	Industrial area (C)	75	65
4	Silence zone (D)	50	45

1:Effective from 1st July, 2012.

Note: 1. Day time hours: 6 am to 10 pm

2. Night time hours: 10 pm to 6 am

3. Silence zone: Zones that are declared as such by the competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts.

4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

National Environmental Quality Standards for Motor Vehicle Exhaust and Noise

(A) For In-use Vehicles

Sr. No.	Parameter	Standard (Maximum permissible Limit)	Measuring Method	Applicability
1	Smoke	40% or 2 on the Ringlemann Scale during engine acceleration mode	To be compared with Ringlemann Chart at a distance 6 or more.	Immediate effect
2	Carbon Monoxide	6%	Under idling conditions: Non-dispersive infrared detection through gas analyzer.	
3	Noise	85 db (A).	Sound meter at 7.5 meters from the source.	

(B) For New Vehicles

(i) Emission Standards for Diesel Vehicles

(a) For Passenger Cars and Light Commercial Vehicles (g/Km)

Type of Vehicle	Category/Class	Tiers	CO	HC+ NOX	PM	Measuring Method	Applicability
Passenger Cars	M 1: with reference mass (RW) upto 2500 kg. Cars with RW over 2500 kg to meets NI category standards.	Pak-II IDI	1.00	0.70	0.08	NEDC (ECE 15+ EUDCL)	All imported and local manufactured diesel vehicles with effect from 01-07-2012
		Pak-II DI	1.00	0.90	0.10		
Light Commercial Vehicles	NI-I (RW<1250 kg)	Pak-II IDI	1.00	0.70	0.08		
		Pak-II DI	1.00	0.90	0.10		
	NI-I (1250 kg< RW< 1700 kg0	Pak-II IDI	1.25	1.00	0.12		
		Pak-II DI	1.25	1.30	0.14		
	NI-III (RW>1700 kg)	Pak-II IDI	1.50	1.20	0.17		
		Pak-II DI	1.50	1.60	0.20		
Parameter	Standard **(maximum permissible limit**				Measuring **Method**		
Noise	85 db (A)				Sound meter at 7.5 meters from the source.		

(b) For Heavy Duty Diesel Engines and Large Goods Vehicles (g/Kwh)

Type of Vehicle	Category/Class	Tiers	CO	HC	NOX	**PM**	Measuring Method	Applicability
Heavy Duty Diesel Engines	Trucks and Buses		4.0	1.1	7.0	0.15	ECE-R-49	Pak-II
Large goods Vehicles	N2 (2000 and up	Pak-II	4.0	7.0	1.10	0.15	EDC	
Parameter	Standard (maximum permissible limit)					Measuring Method		
Noise	85 db (A)					Sound meter at 7.5 meters from the source.		

(ii) Emission Standards for Petrol Vehicles (g/km)

Type of Vehicle	Category/Class	Tiers	CO	HC+ NOX	Measuring Method	Applicability
Passenger	M 1: with reference mass (RW) upto 2500 kg. Cars with RW over 2500 kg to meets NI category standards.	Pak-II	2.20	0.50	NEDC (ECE 15+ EUDCL)	All imported and new models* locally manufactured petrol vehicles with effect from 1st July, 2009**
Light Commercial Vehicles	NI-I (RW<1250 kg)	Pak-II	2.20	0.50		
	NI-I (1250 kg> RW< 1700 kg0	Pak-II	4.00	0.65		
	NI-III (RW>1700 kg)	Pak-II	5.00	0.80		
Motor Rickshaws and motor Cycles	2.4 strokes < 150 cc	Pak-II	5.50	1.50	ECER 40	
	2.4 strokes < 150 cc	Pak-II	5.50	1.30		
Parameter	**Standard (maximum** permissible **limit**				Measuring Method	
Noise	85 db (A)				Sound meter at 7.5 meters from the source.	

Explantations:

DI: Direct Injection
IDI: Indirect Injection
EUDCL: Extra Urban Driving Cycle
NEDC: New Urban Driving Cycle
M: Vehicles designed and constructed for the carriage of passengers and comprising no more than eight seats in addition to the driver's seat.
N: Motor vehicles with at least four wheels designed and constructed for the carriages of goods.
* New model means both model and engine type change
** The existing models of petrol driven vehicles locally manufactured will immediately switch ever to Pak-II emission standards but not later than 30th June, 2012.

Source: Government of Pakistan (2009) (SRO 72 (KE)/ 2009).

National Standards for Drinking Water Quality

Properties/Parameters	Standard Values for Pakistan
Bacterial	
All water intended for drinking (E.Coli or Thermo tolerant Coliform bacteria)	Must not be detectable in any 100 ml samples
Treated water entering the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml samples
Treated water in the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml samples In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.
Physical	
Color	≤ 15 TCU
Taste	Non objectionable/ Accept able
Odor	Non objectionable/Accept able
Turbidity	< 5 NTU
Total hardness as $CaCO_3$	< 500 mg/l
TDS	< 1000
pH	6.5-8.5
Chemical	
Essential Inorganic	*mg/Litre*
Aluminum (Al)	≤ 0.005(P)
Antimony	≤ 0.05(P)
Arsenic (As)	≤ 0.05(P)
Barium (Ba)	0.7
Boron (B)	0.3
Cadmium (Cd)	0.01
Chloride (Cl)	<250
Chromium (Cr)	≤ 0.05
Copper (Cu)	2
Toxic Inorganic	**Mg/Litre**
Cyanide (Cn)	≤ 0.05
Fluoride (F)*	≤ 1.5
Lead (Pb)	≤ 0.05
Manganese (Mn)	≤ 0.5
Mercury (Hg)	≤ 0.001
Nickel (Ni)	≤ 0.02
Nitrate (NO_3)*	≤ 50
Nitrate (NO_2)*	≤ 3 (P)
Selenium (Se)	0.01 (P)
Residual chlorine	0.2-0.5 at consumer end; 0.5-1.5 at source
Zinc (Zn)	5.0
Organic	
Pesticides mg/l	PSQCA No. 4639-2004, Page No. 4 Table No. 3 Serial No. 20-58 may be consulted.**
Phenolic compound (as phenols) mg/l	WHO standards: ≤ 0.002
Polynuclear Aromatic hydrocarbon (as PAH) g/L	WHO standards: ≤ 0.01v (by GC/MS method)
Radioactive	
Alpha Emitters bq/L or pCi	0.1
Beta Emitters	1

* Indicates priority health related inorganic constituents which need regular monitoring.

** PSQCA: Pakistan Standards Quality Control Authority.

Source: Government of Pakistan (2010) (SRO 1063(I)/2010).

ANNEXURE C

Photographs of Public Consultations

Public Consultations with key Stakeholders in Project Area

Photograph 11-1: Consultation with local trader Mr Abdullah

Photograph 11-2: Consultation with local trader Mr Zawar

Photograph 11-3: Consultation with local trader Mr Afnan Khattak

Photograph 11-4: Discussion with Registrar of Islamia College - Peshawar

Photograph 11-5: Consultation with local trader Mr Ghulam Sabir Butt

Photograph 11-6: Consultation with local trader Mr Haji Rehman

Photograph 11-7: Consultation with MD, Hayatabad Medical Complex (HMC)

Photograph 11-8: Consultation with local trader Mr Amir Gul

Photograph 11-9: Consultation with HMC Admin and Senior medical staff

Photograph 11-10: Consultation with HMC Admin and Senior medical staff

Photograph 11-11: Consultation with Brig (Retd) Fazle Akbar, director of KTH

Photograph 11-12: Consultation with Mr Tahir Shah from Khyber Teaching Hospital (KTH)

Photograph 11-13: Consultation with local trader Mr Mohammad Zubair on University Road

Photograph 11-14: Consultation with local trader Mr Waleed Riaz Sader

Photograph 11-15: Consultation with Mr Sabir Jagra, administration at Lady Reading Hospital (LRH)

Photograph 11-16: Consultation with local trader Mr Zahid Shah Sader

Photograph 11-17: Consultation with ICMS school administration Mr Zahid-ur-Rehman

Photograph 11-18: Consultation with local trader Mr Shabir Ahmed

Photograph 11-19: Consultation with local trader Mr Niaz Mohammad

Photograph 11-20: Consultation with Mr Adnan from health care center along project corridor

Photograph 11-21: Consultation with administration of Agha Khal hospital

Photograph 11-22: Consultation with local trader Mr Naveed Ahmad

Photograph 11-23: Consultation with local trader Mr Noor Ahmad

Photograph 11-24: Consultation with local trader Mr Majid Khan

Photograph 11-25: Meeting with PDA project focal staff

Photograph 11-26: Consultation meeting with representatives from project Affected Persons

Photograph 11-27: Consultation meeting with representatives from project Affected Persons

Photograph 11-28: Consultation meeting with representatives from project Affected Persons

Photograph 11-29: Resettlement Specialist conducting consultations with APs of Western depot site

Photograph 11-30: Consultations with officials of Government Food Department

Photograph 11-31: Consultations with PDA staff at Eastern depot site

Photograph 11-32: Consultations with Patwaris at Eastern depot site

Photograph 11-33: Consultations with APs of western depot site non-title holders

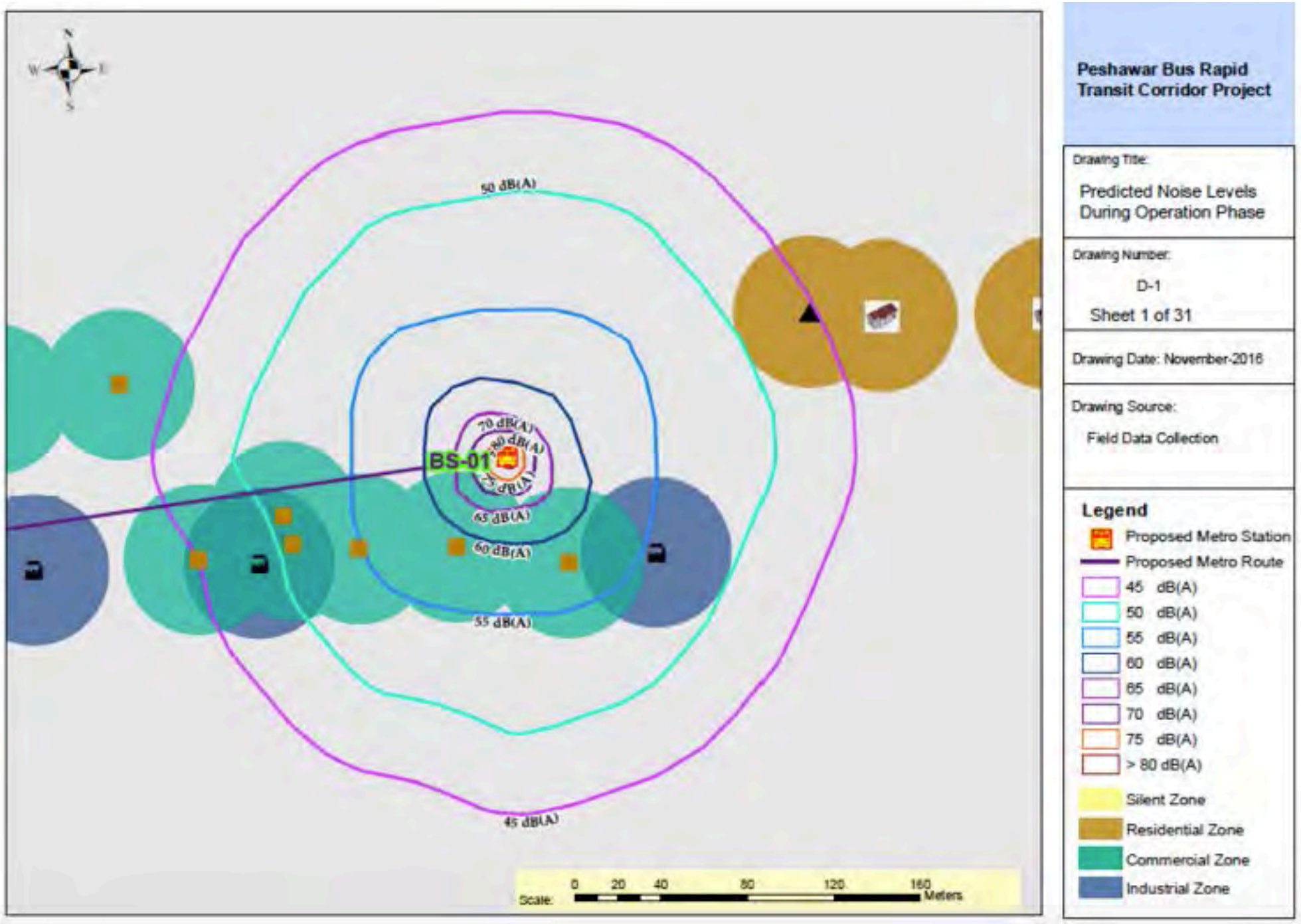
Photograph 11-34: Consultations with local communities in project area

Photograph 11-35: Consultations with local communities in project area

Photograph 11-36: Consultation with local watch vendor in project area

ANNEXURE D

Noise Levels at Key Receptors during Operation Phase


Peshawar Bus Rapid Transit Corridor Project
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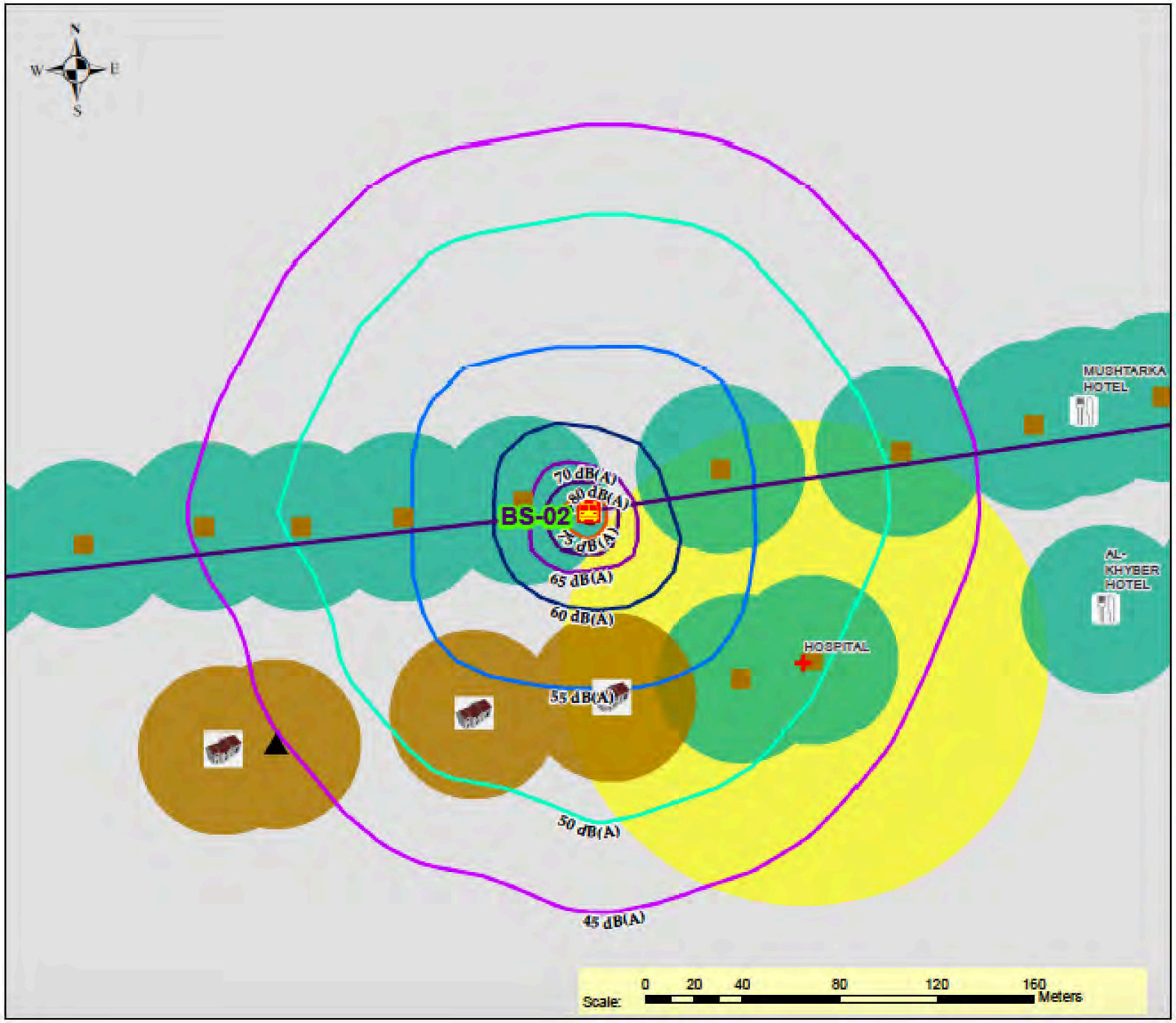
Predicted Noise Levels During Operation Phase
Drawing Number:
D-1
Sheet 1 of 31
Drawing Date: November-2016
Drawing Source:
Field Data Collection
Legend
Proposed Metro Station
Proposed Metro Route
45 dB(A)
50 dB(A)
55 dB(A)
60 dB(A)
65 dB(A)
70 dB(A)
75 dB(A)
> 80 dB(A)
Silent Zone
Residential Zone
Commercial Zone
Industrial Zone
BS-01
70 dB(A)
65 dB(A)
60 dB(A)
55 dB(A)
50 dB(A)
45 dB(A)
Scale:
0 20 40 80 120 160
Meters



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-2

Sheet 2 of 31

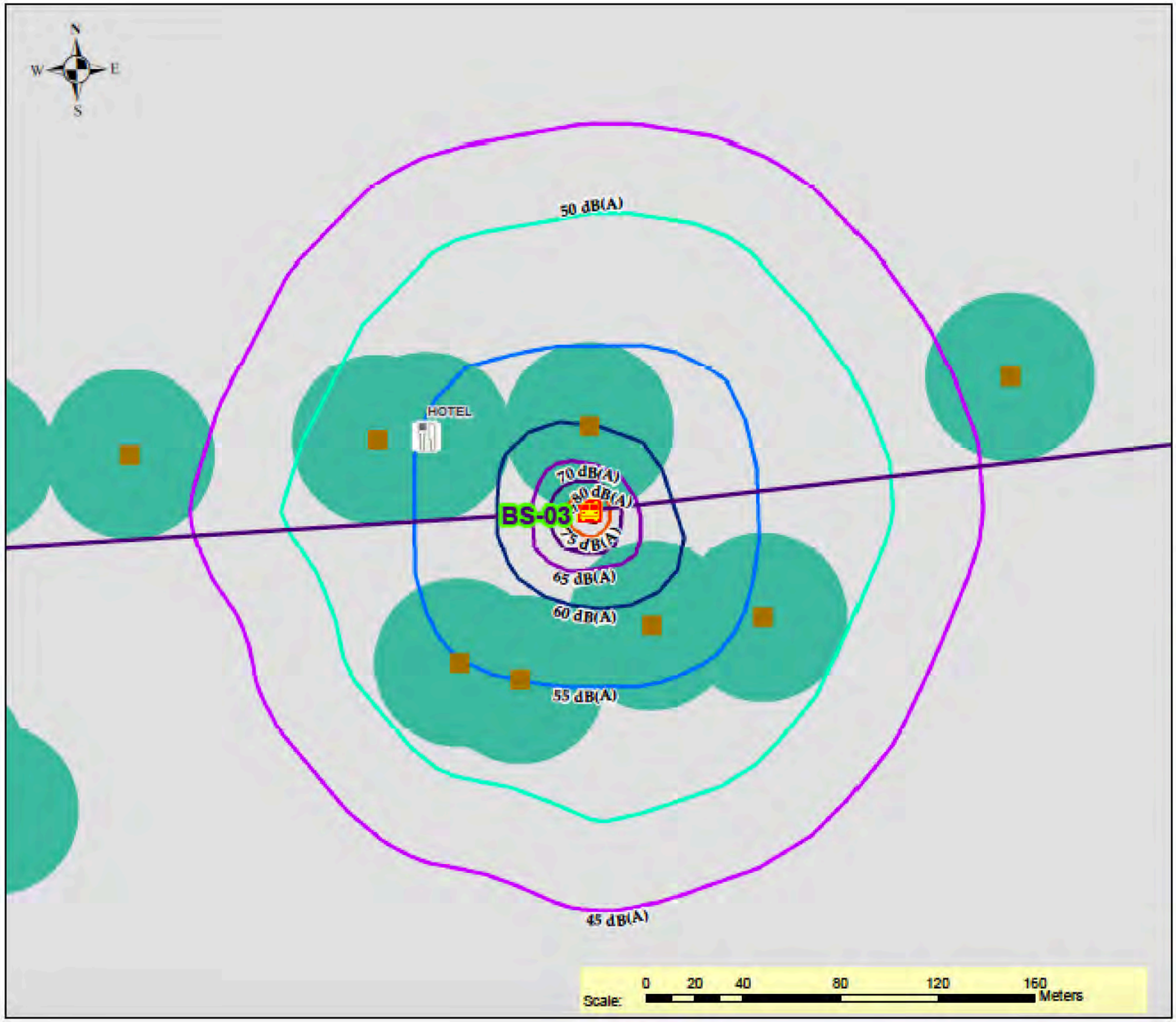
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-3

Sheet 3 of 31

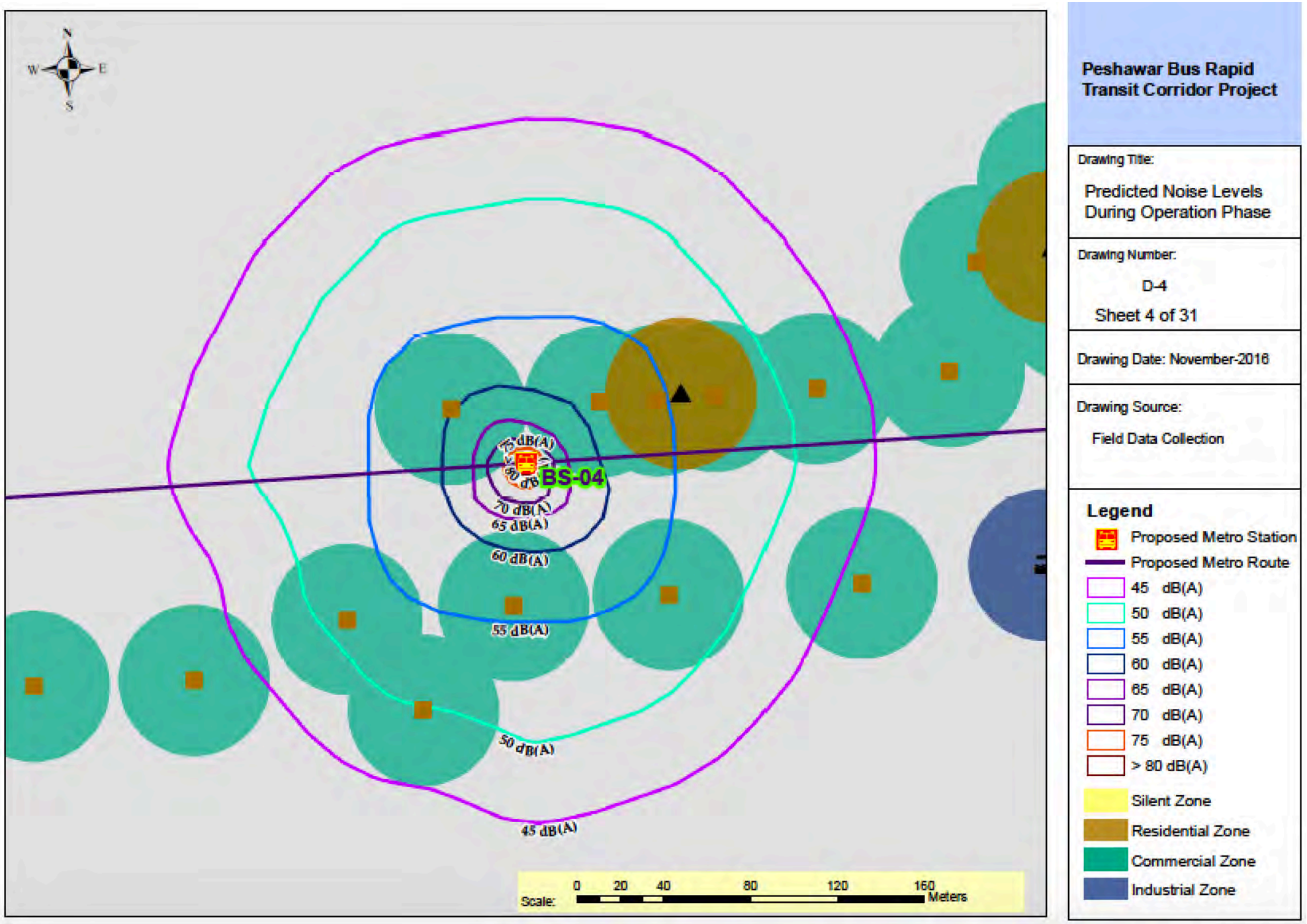
Drawing Date: November-2016

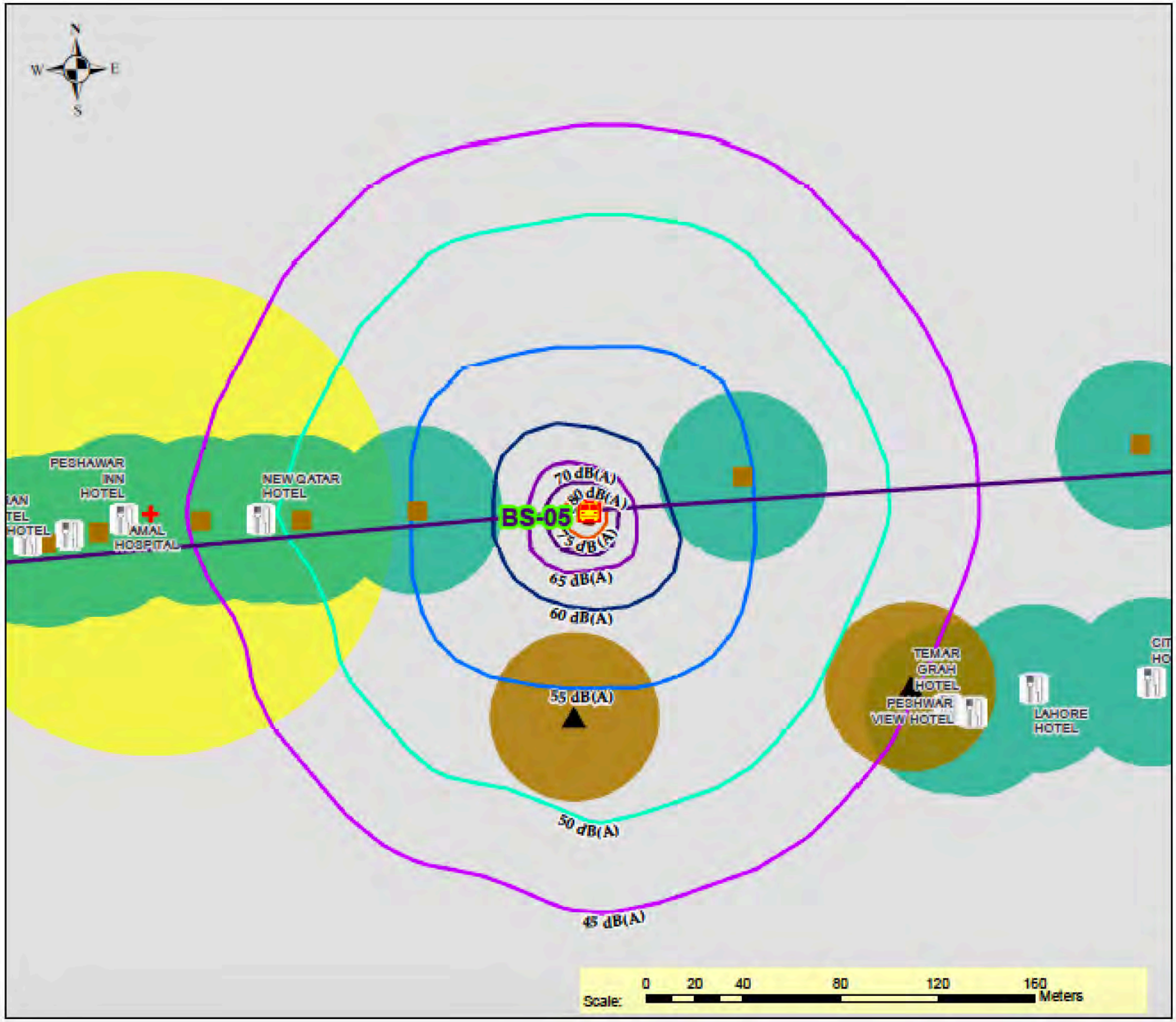
Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone


N
W
E
S
BS-04
75 dB(A)
70 dB(A)
65 dB(A)
60 dB(A)
55 dB(A)
50 dB(A)
45 dB(A)
Scale:
0 20 40 80 120 160
Meters
Peshawar Bus Rapid Transit Corridor Project
Drawing Title:
Predicted Noise Levels During Operation Phase
Drawing Number:
D-4
Sheet 4 of 31
Drawing Date: November-2016
Drawing Source:
Field Data Collection
Legend
Proposed Metro Station
Proposed Metro Route
45 dB(A)
50 dB(A)
55 dB(A)
60 dB(A)
65 dB(A)
70 dB(A)
75 dB(A)
> 80 dB(A)
Silent Zone
Residential Zone
Commercial Zone
Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:
Predicted Noise Levels During Operation Phase

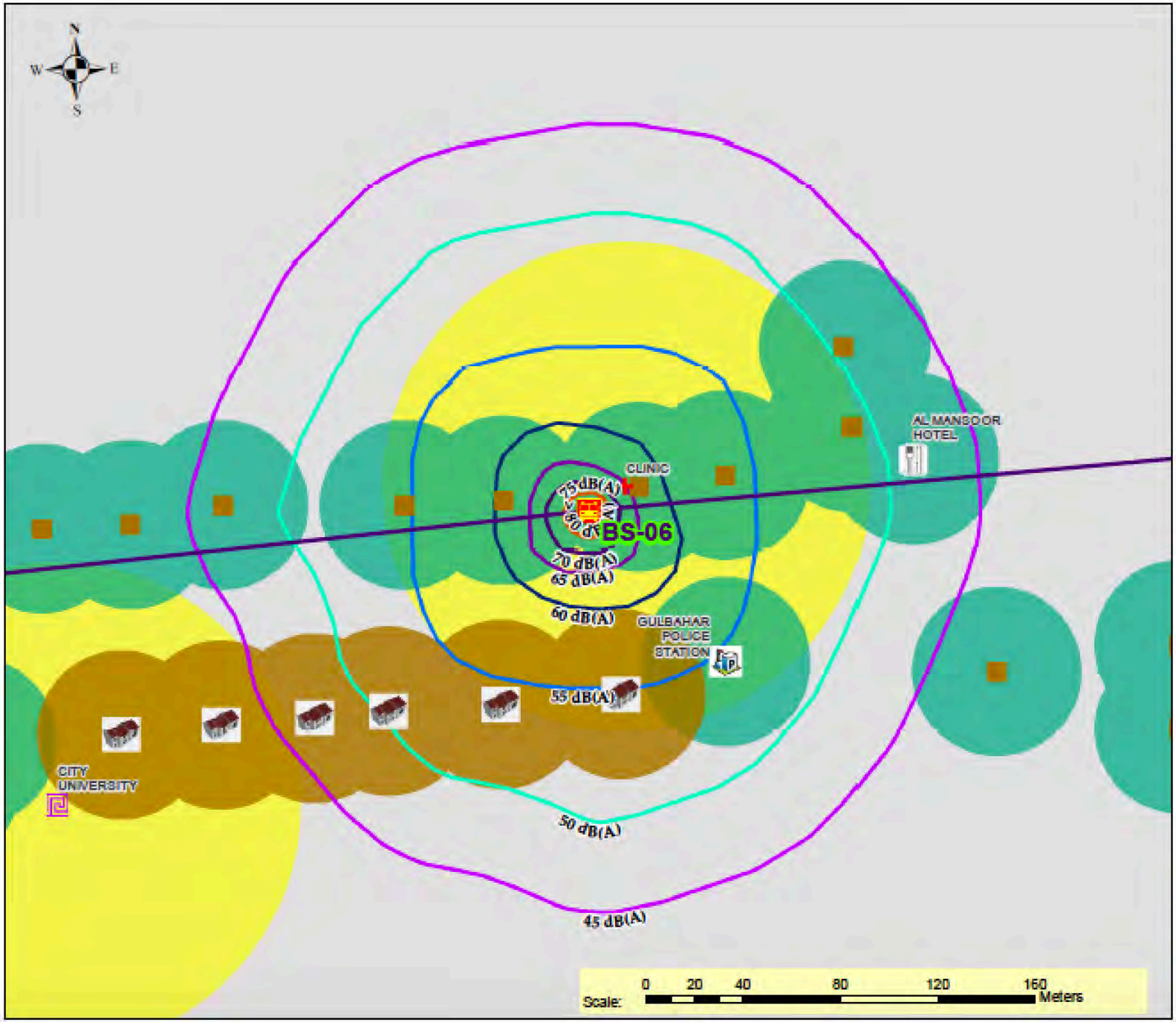
Drawing Number:
D-5
Sheet 5 of 31

Drawing Date: November-2016

Drawing Source:
Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-6

Sheet 6 of 31

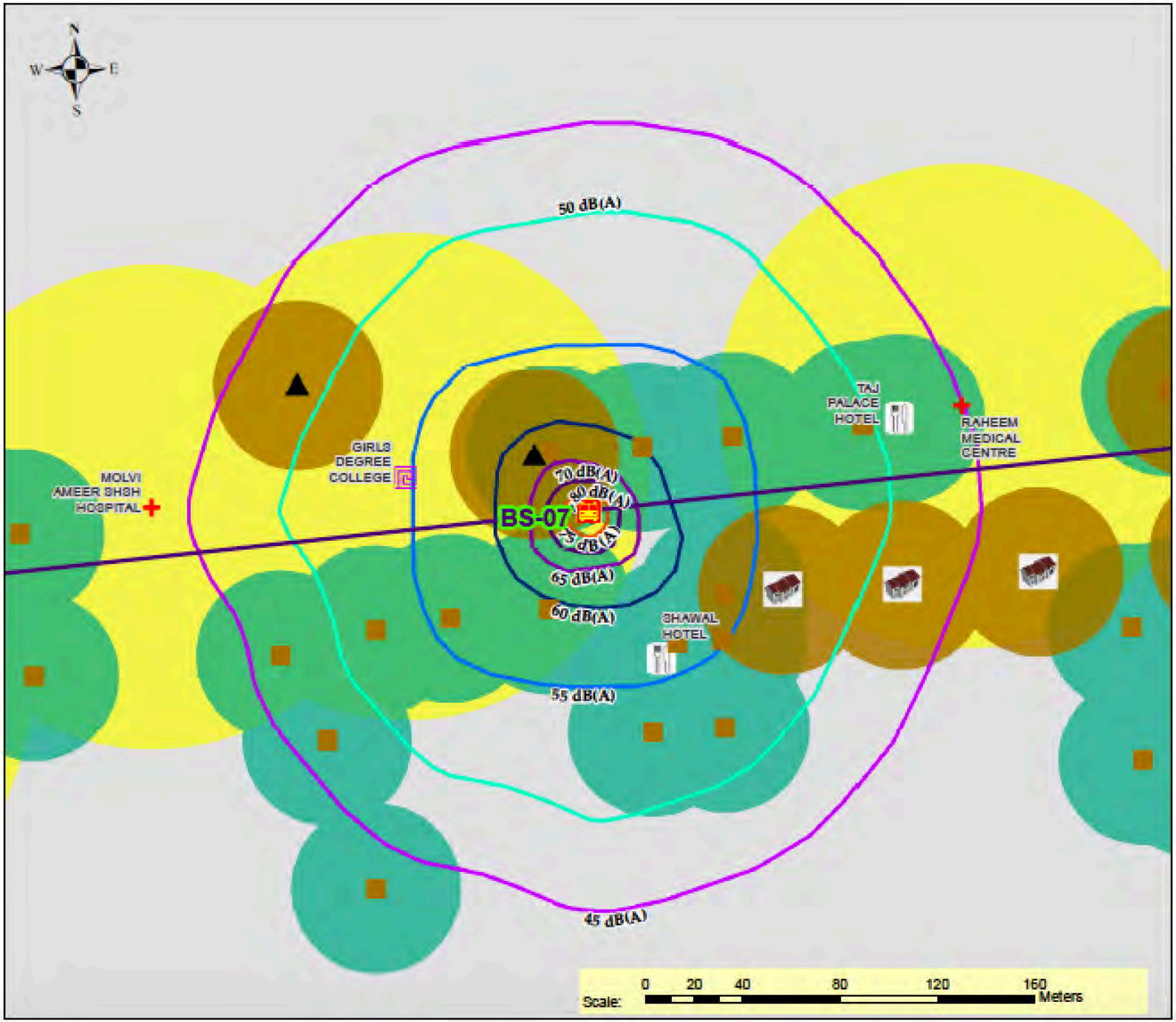
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:
Predicted Noise Levels During Operation Phase

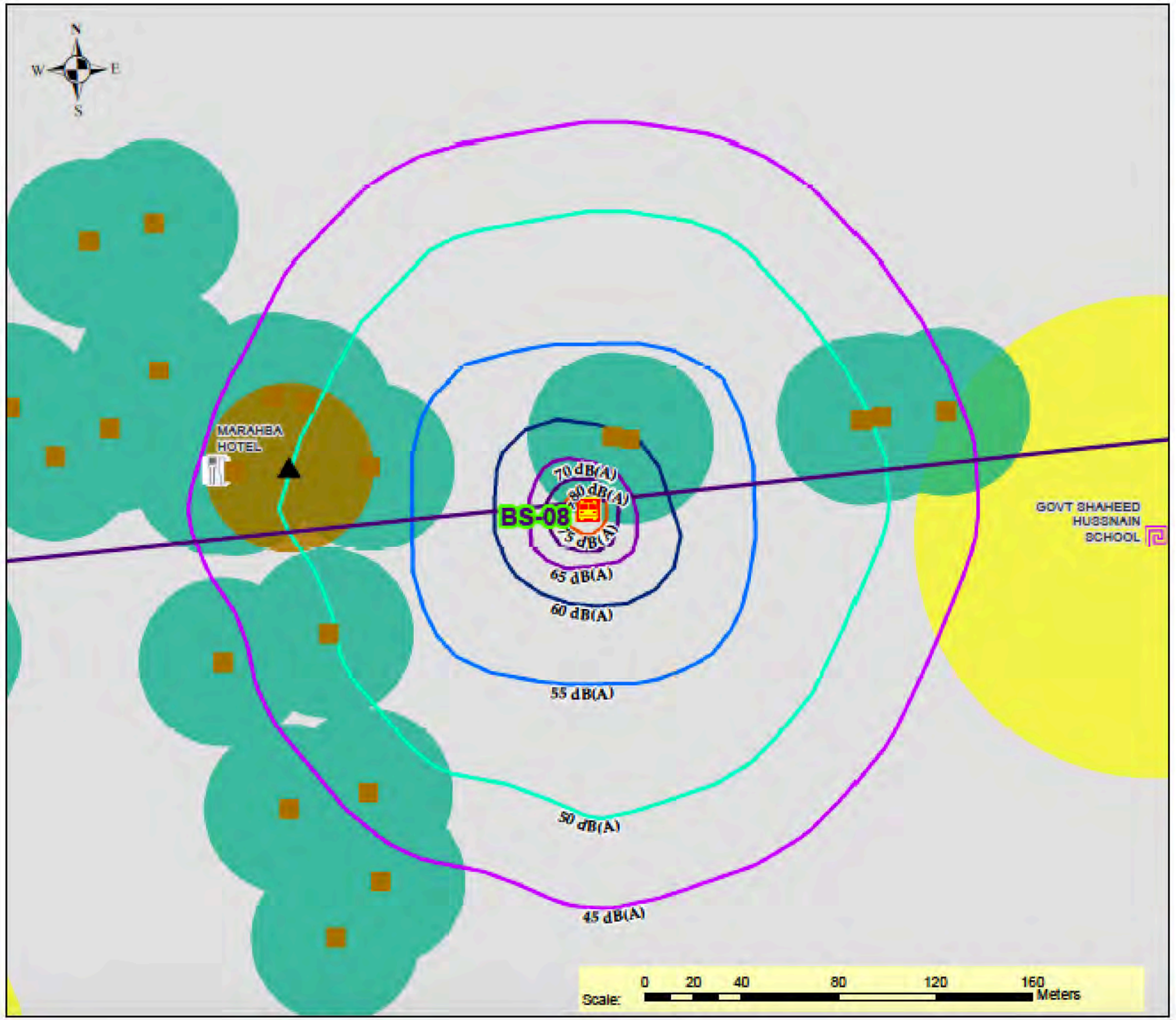
Drawing Number:
D-7
Sheet 7 of 31

Drawing Date: November-2016

Drawing Source:
Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-8

Sheet 8 of 31

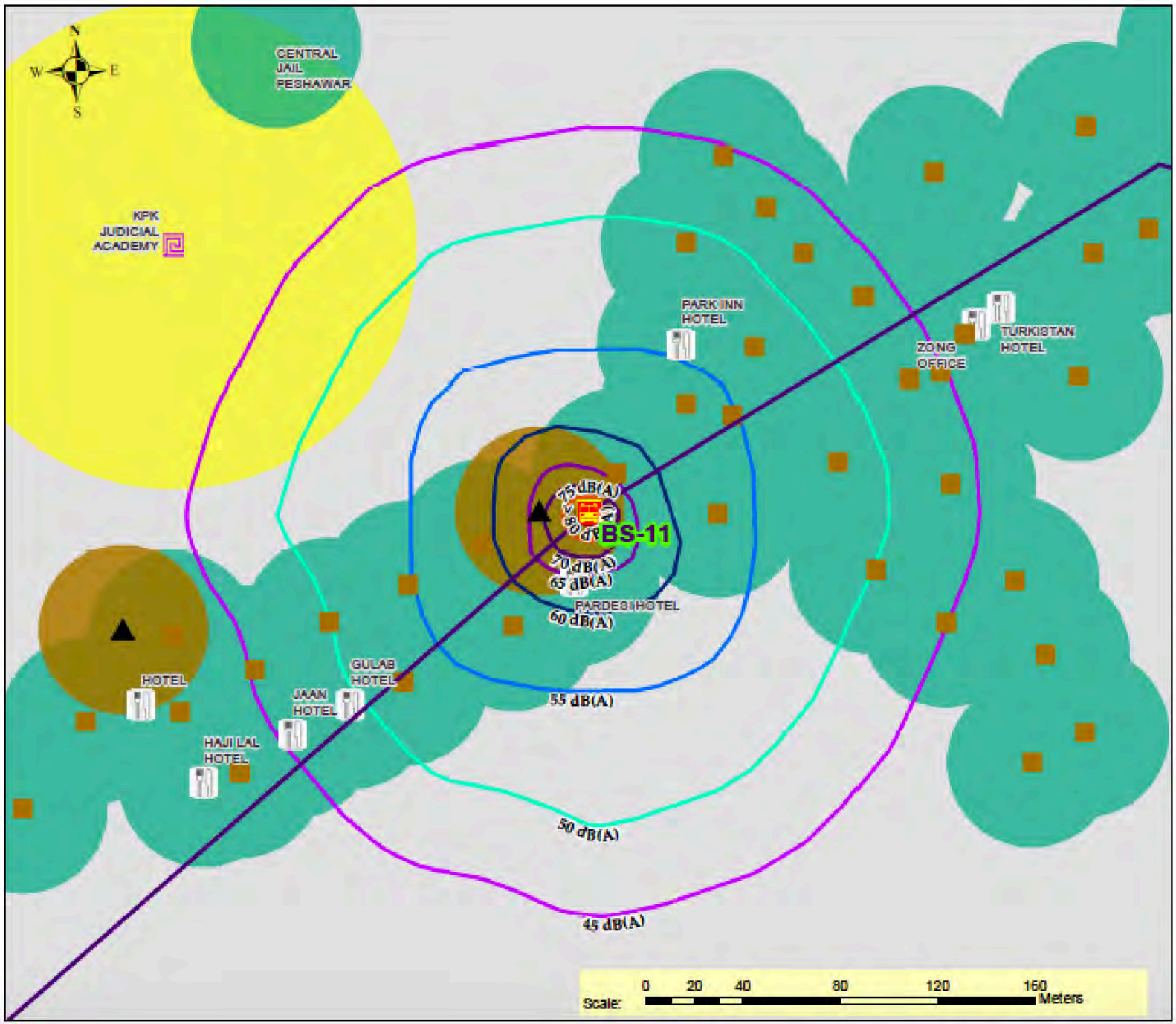
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:
Predicted Noise Levels During Operation Phase

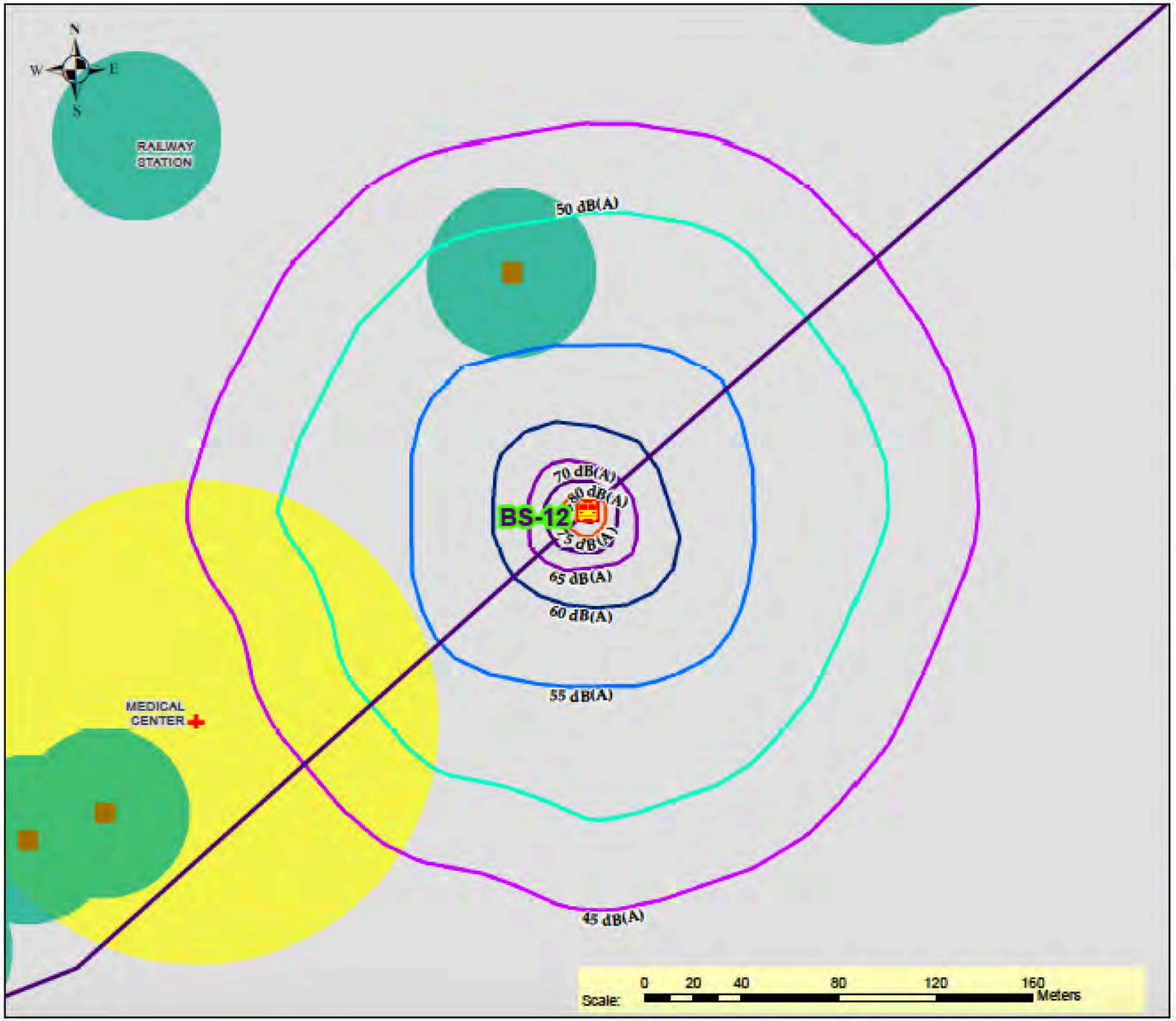
Drawing Number:
D-11
Sheet 11 of 31

Drawing Date: November-2016

Drawing Source:
Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-12

Sheet 12 of 31

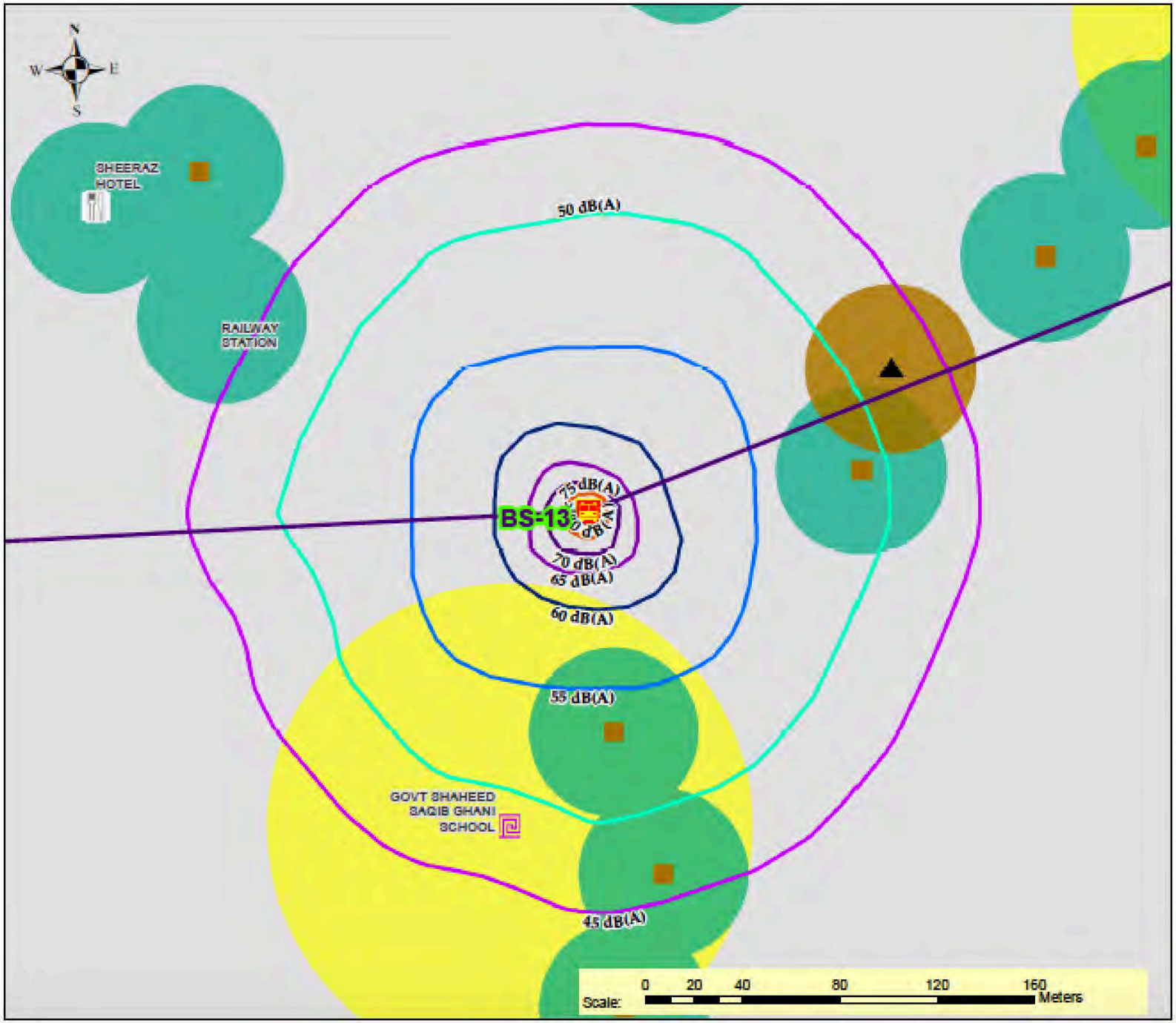
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:
Predicted Noise Levels During Operation Phase

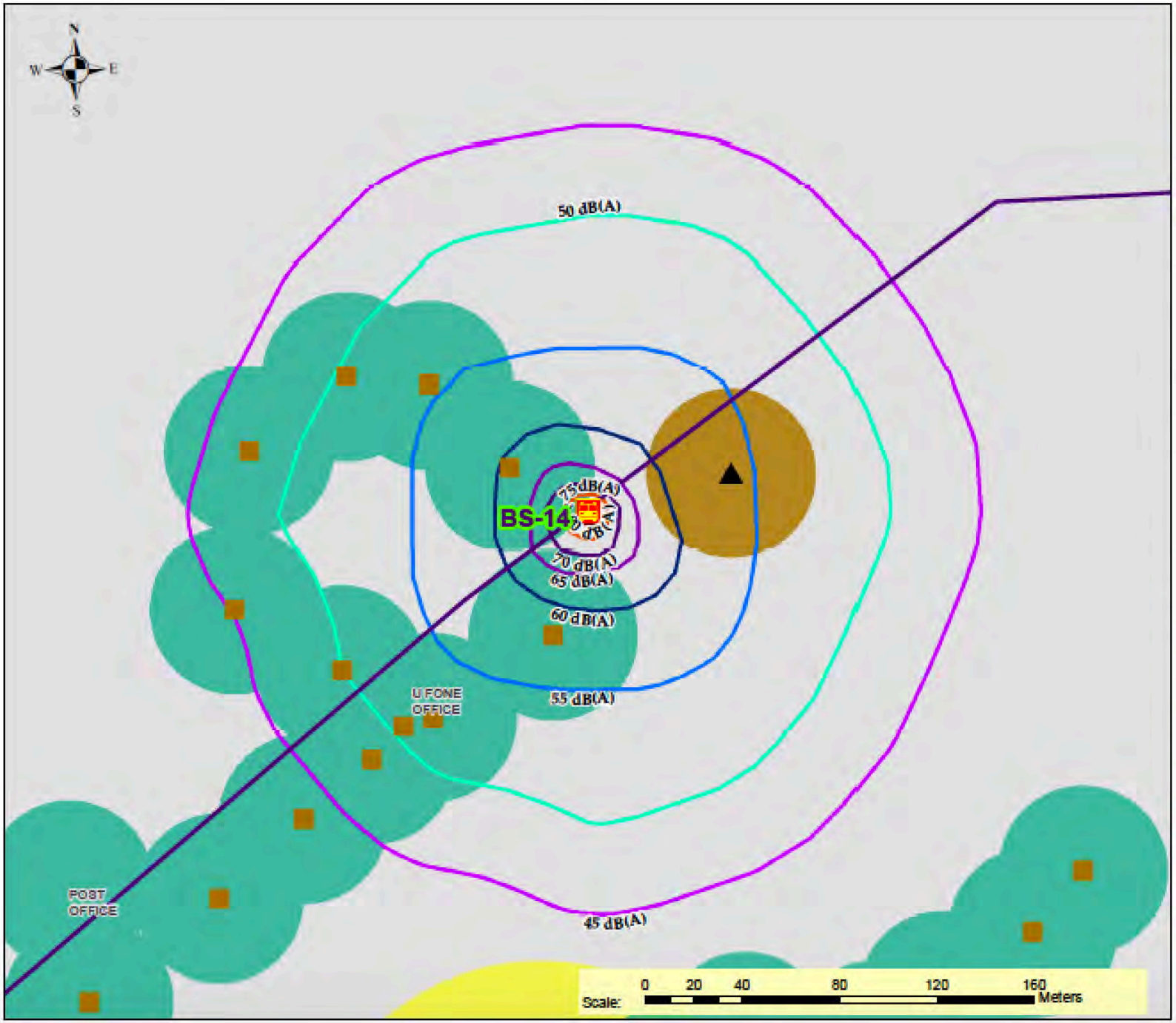
Drawing Number:
D-13
Sheet 13 of 31

Drawing Date: November-2016

Drawing Source:
Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:
Predicted Noise Levels During Operation Phase

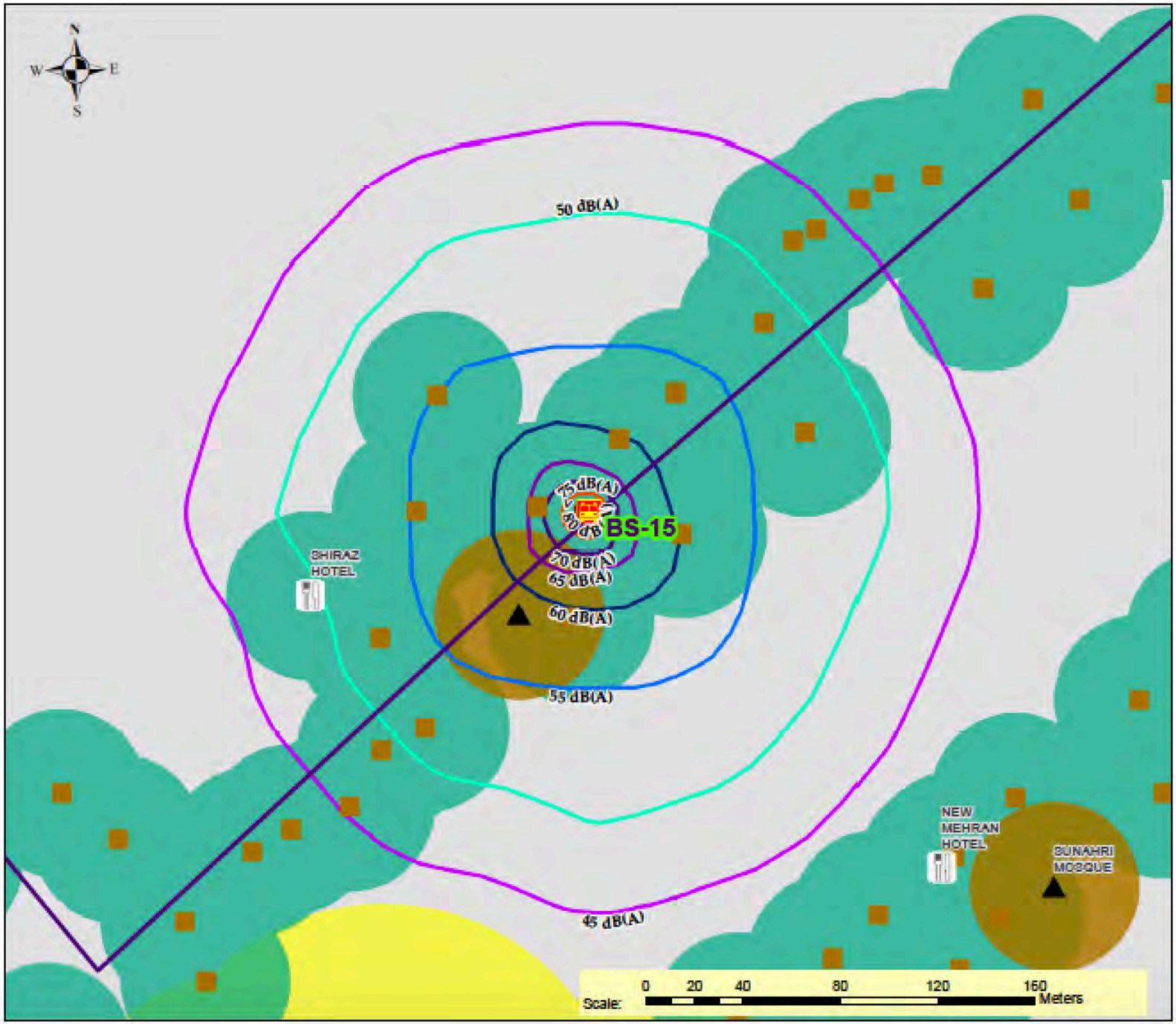
Drawing Number:
D-14
Sheet 14 of 31

Drawing Date: November-2016

Drawing Source:
Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:
Predicted Noise Levels During Operation Phase

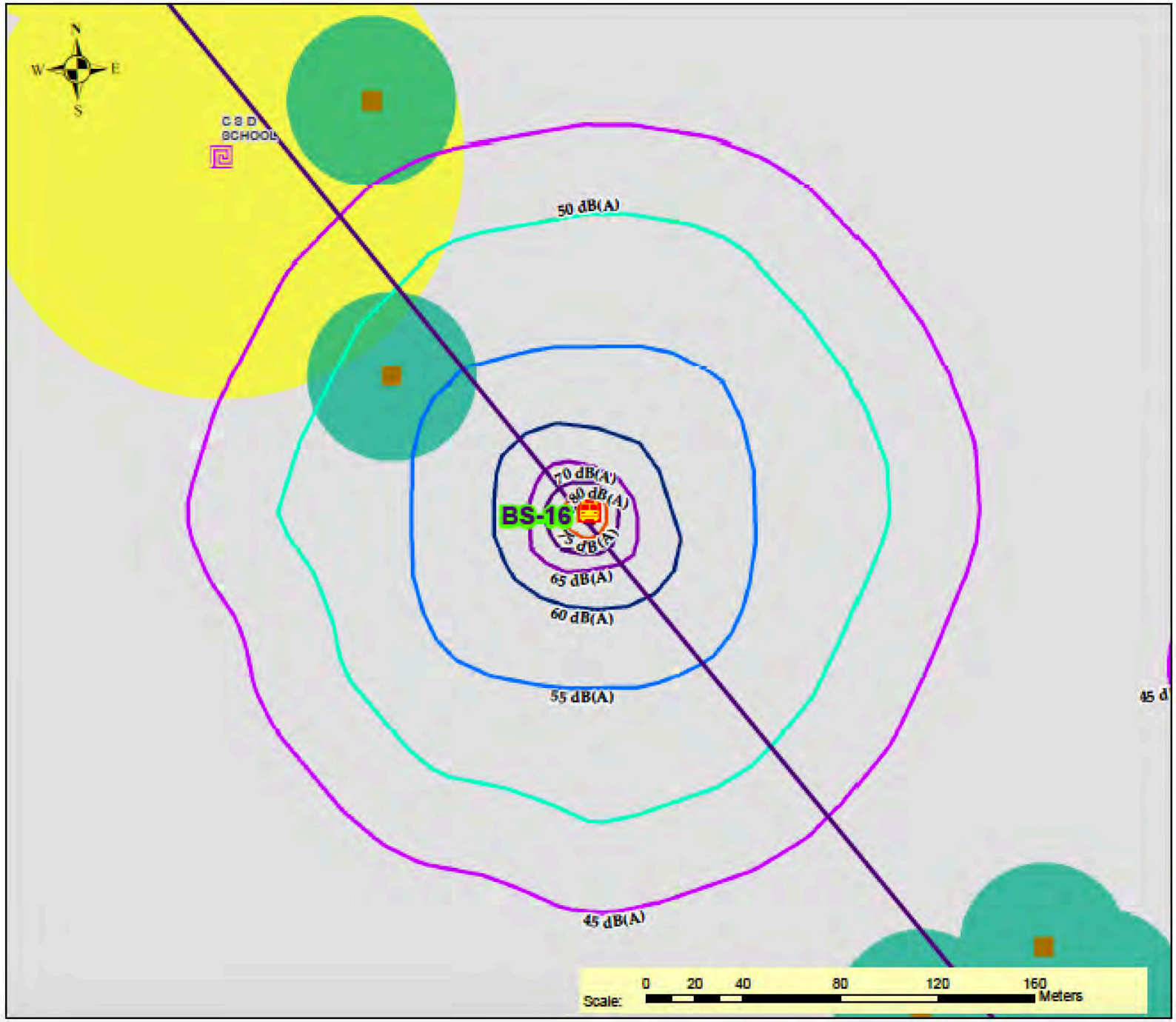
Drawing Number:
D-15
Sheet 15 of 31

Drawing Date: November-2016

Drawing Source:
Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-16

Sheet 16 of 31

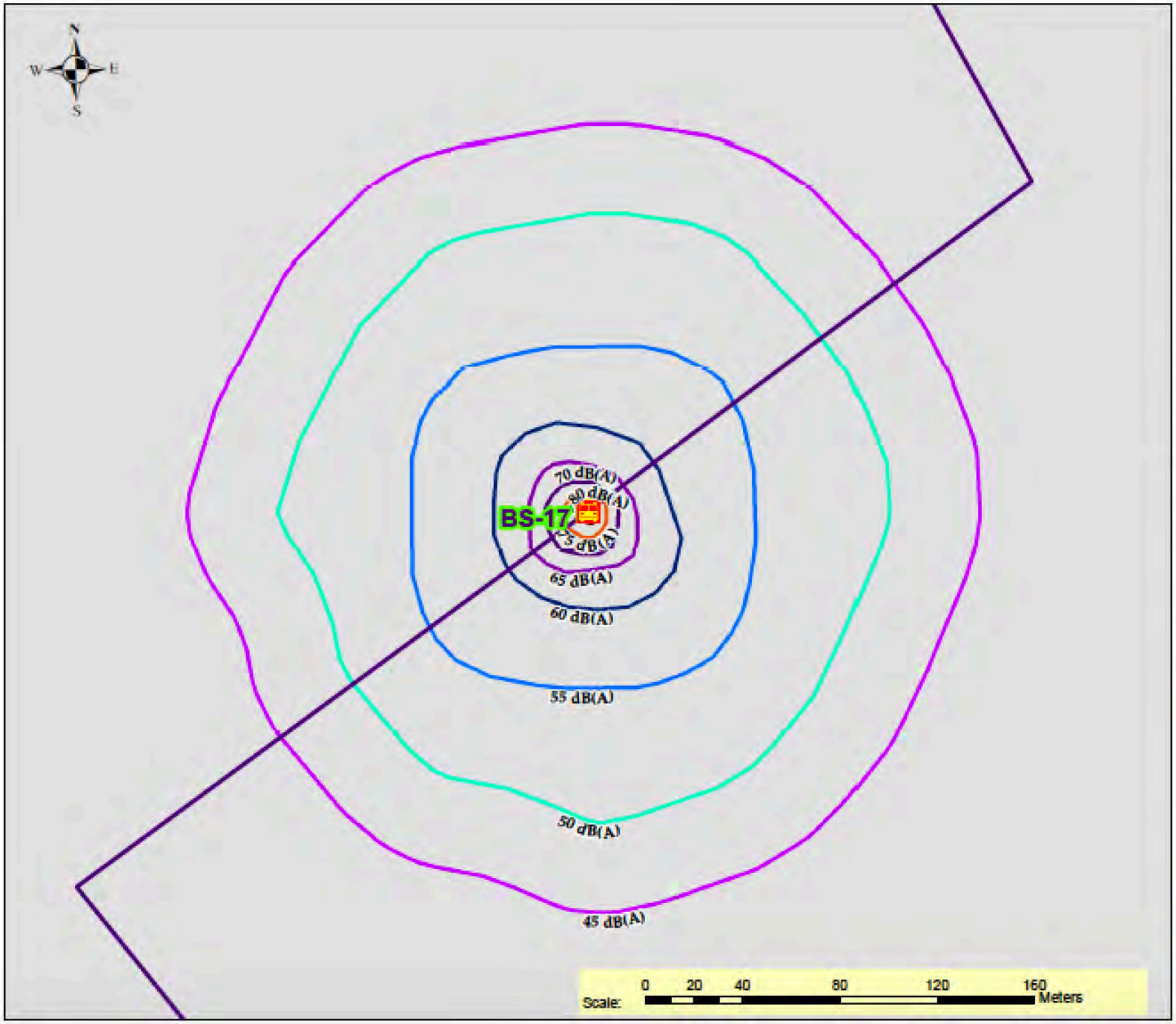
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-17

Sheet 17 of 31

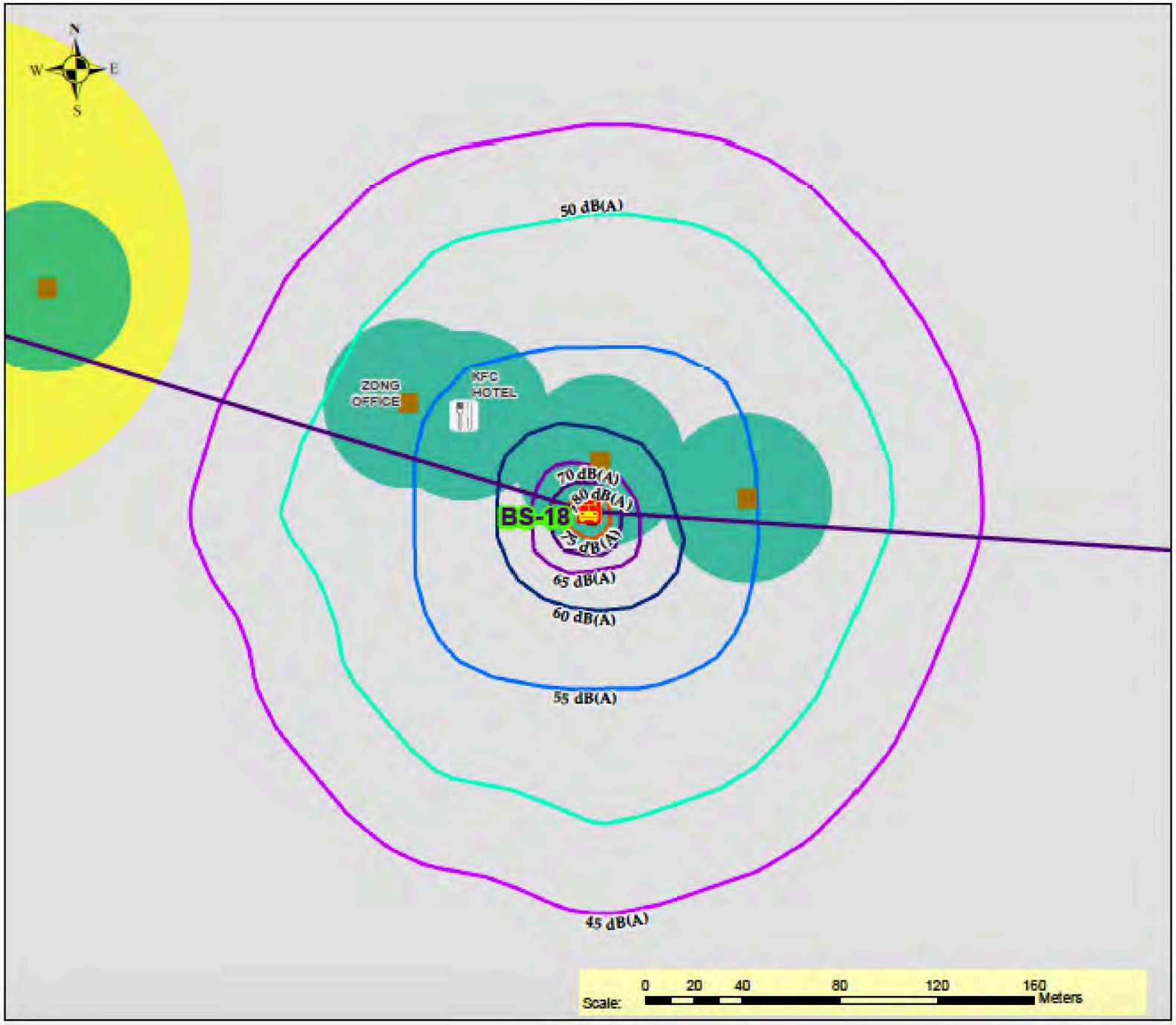
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:
Predicted Noise Levels During Operation Phase

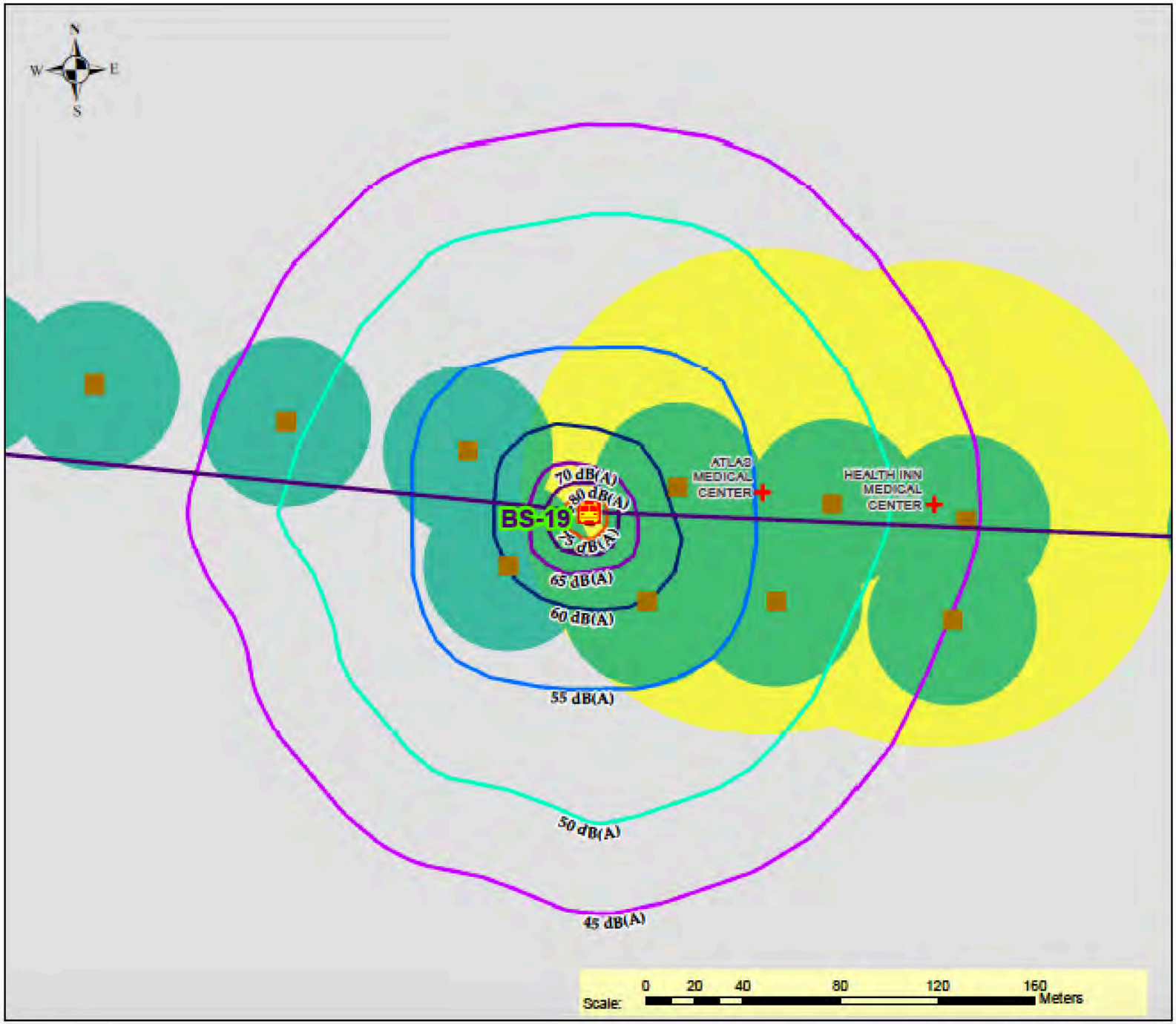
Drawing Number:
D-18
Sheet 18 of 31

Drawing Date: November-2016

Drawing Source:
Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-19

Sheet 19 of 31

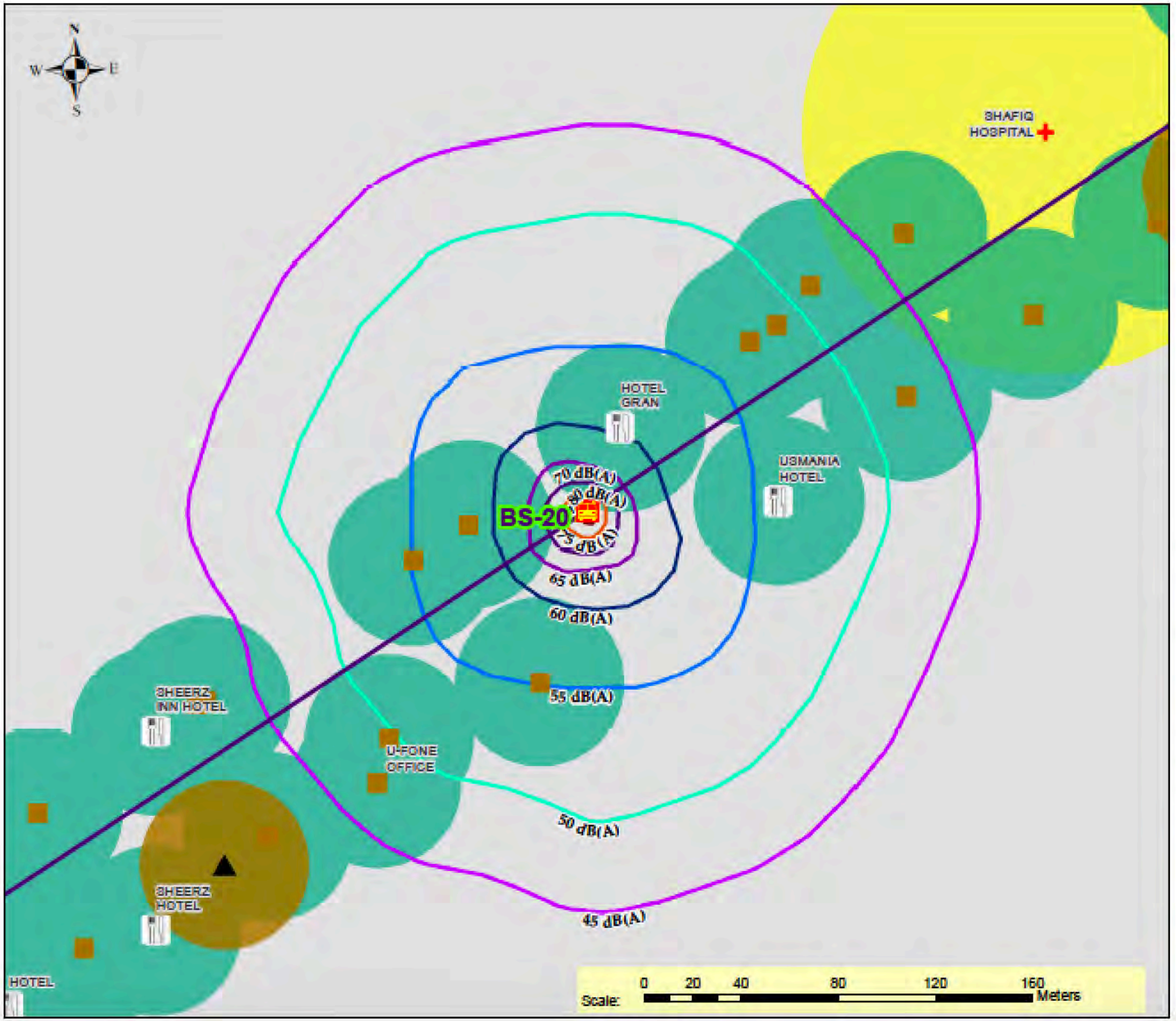
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:
Predicted Noise Levels During Operation Phase

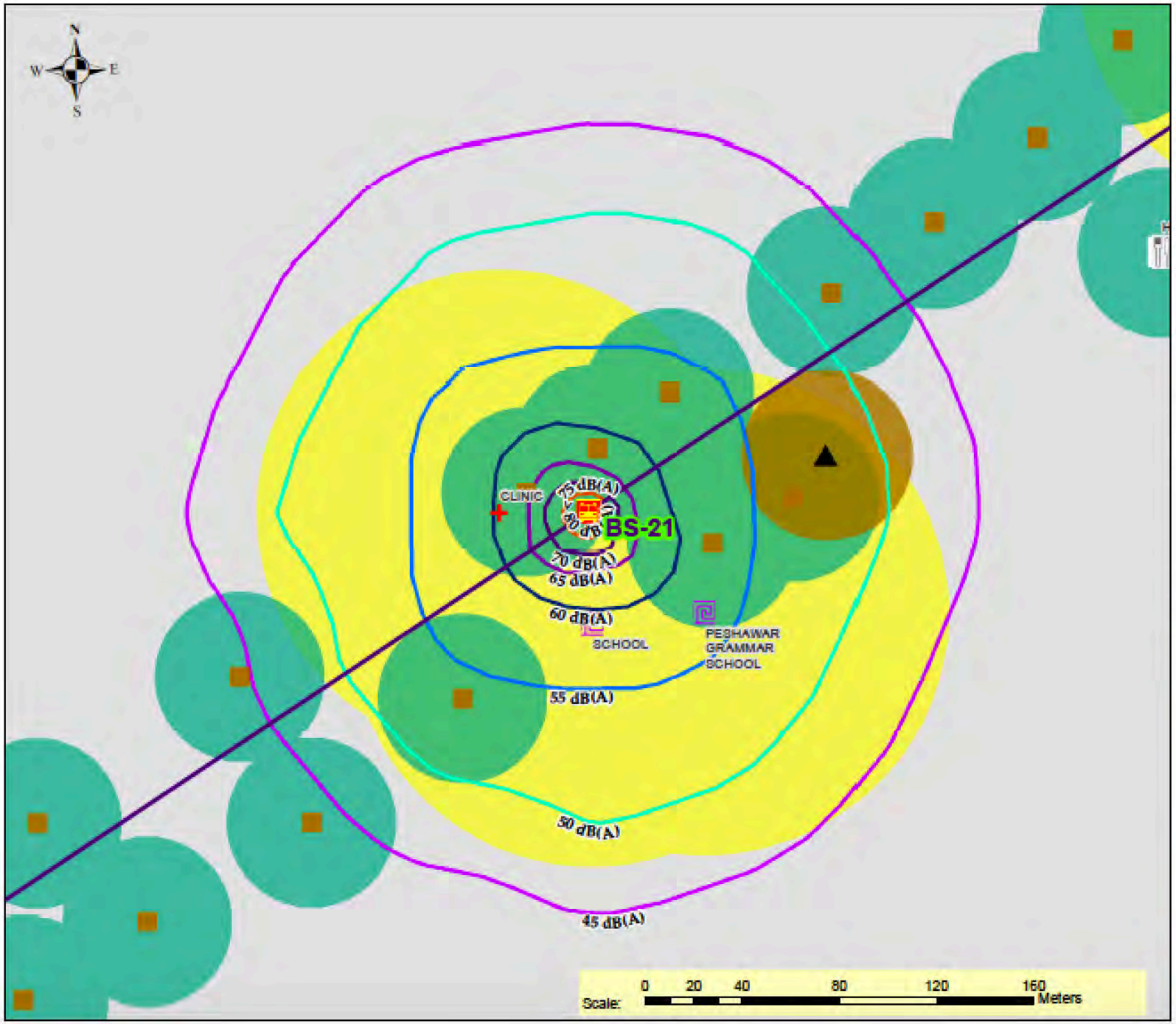
Drawing Number:
D-20
Sheet 20 of 31

Drawing Date: November-2016

Drawing Source:
Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-21

Sheet 21 of 31

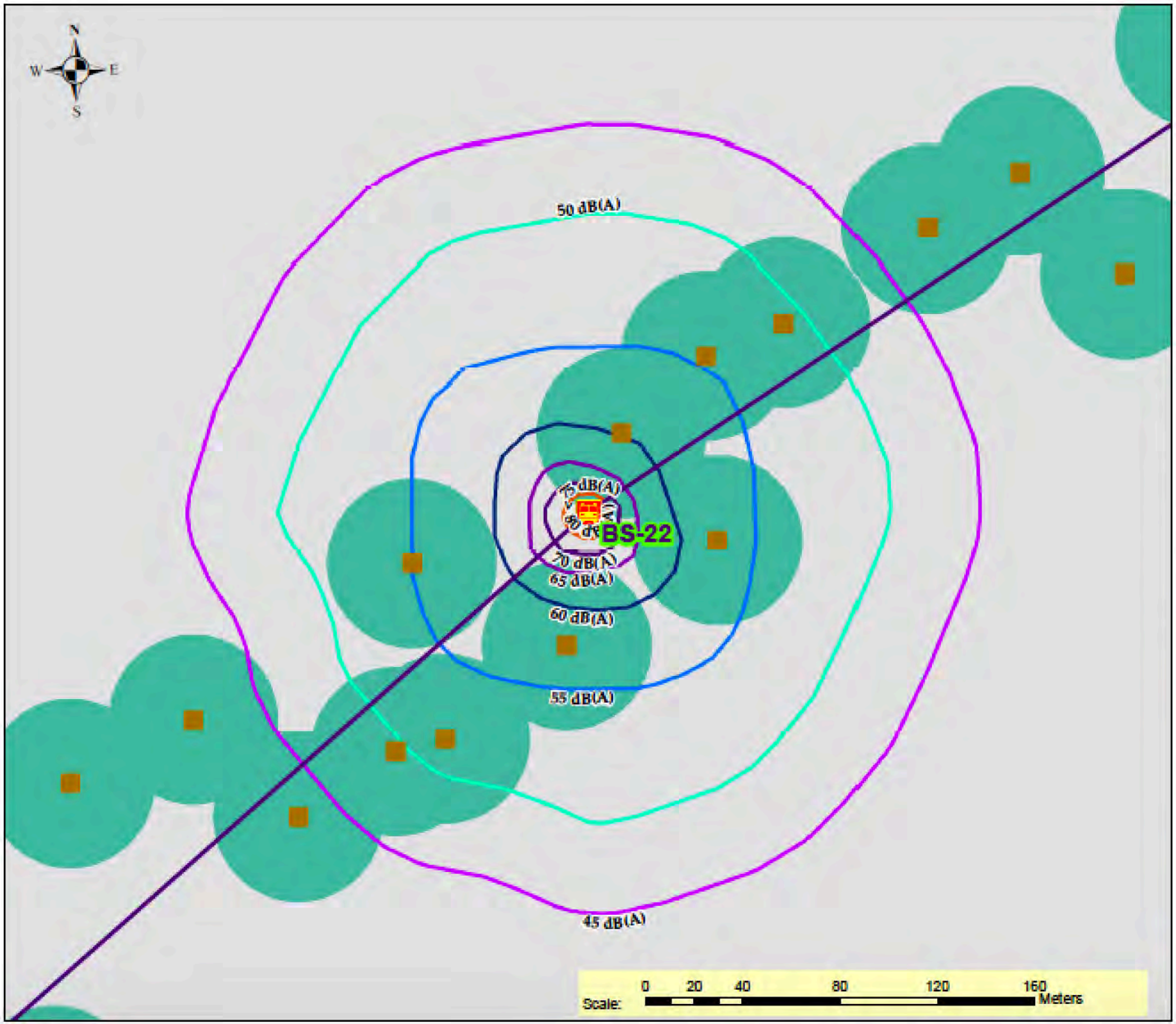
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-22

Sheet 22 of 31

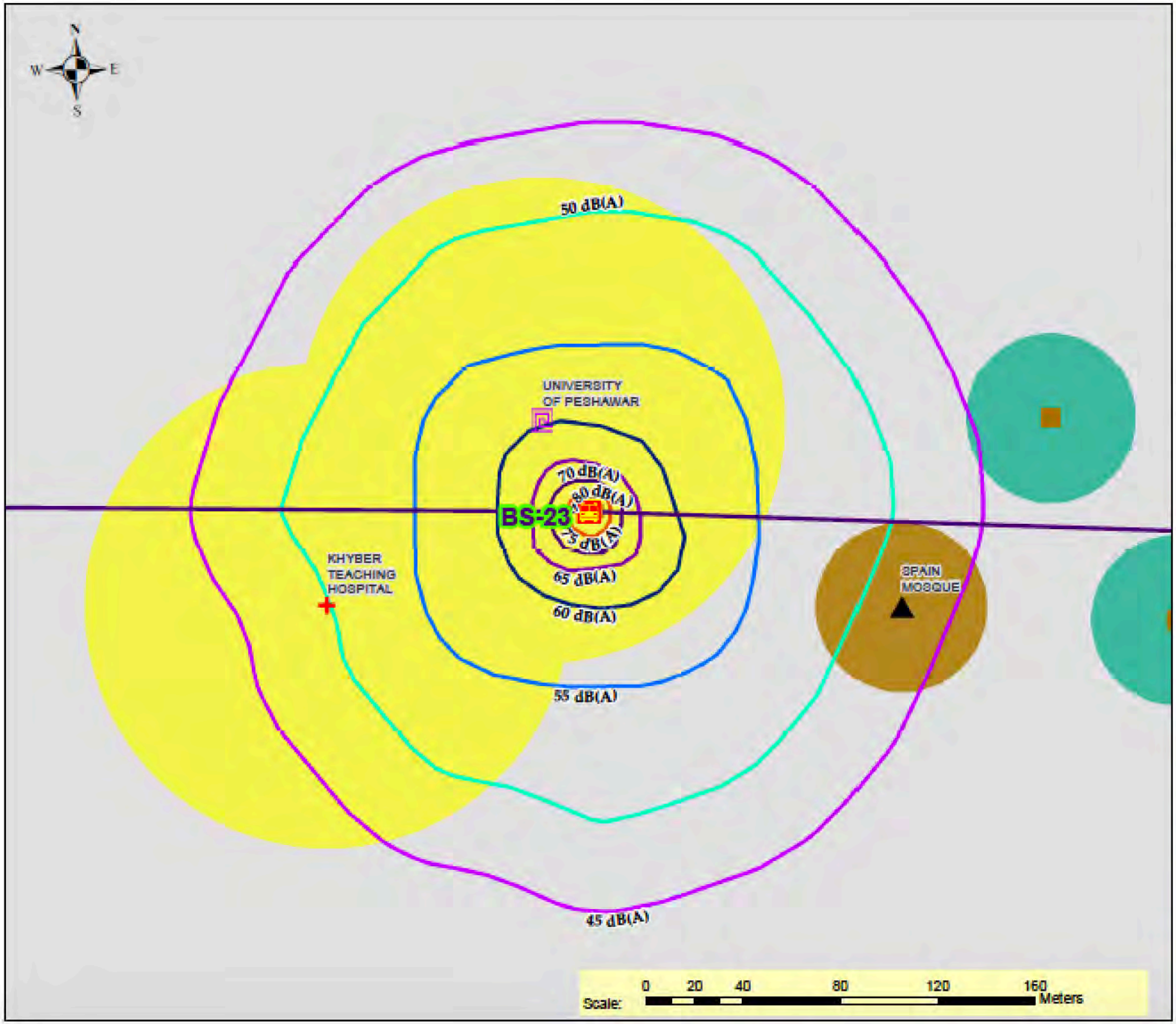
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:
Predicted Noise Levels During Operation Phase

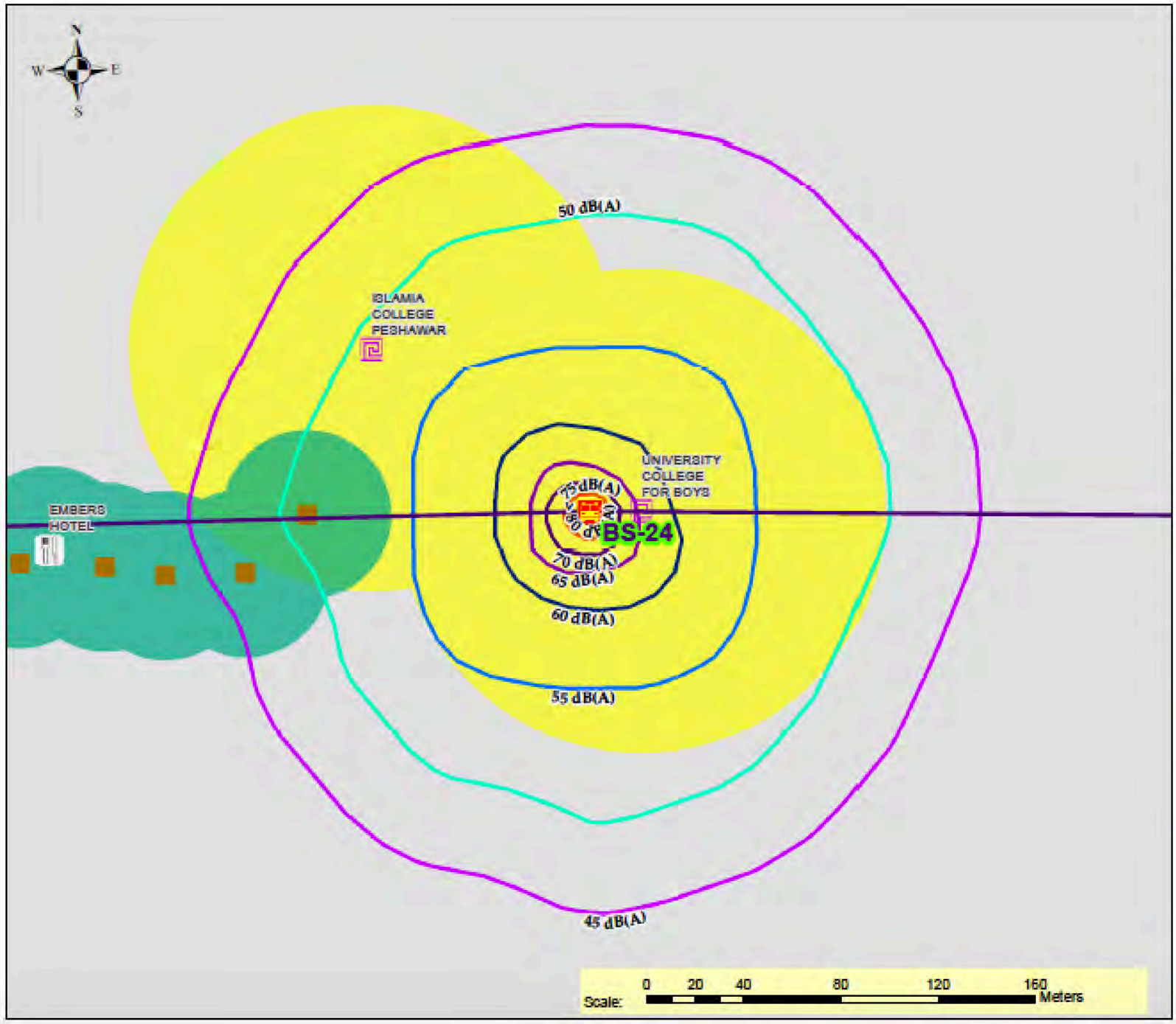
Drawing Number:
D-23
Sheet 23 of 31

Drawing Date: November-2016

Drawing Source:
Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-24

Sheet 24 of 31

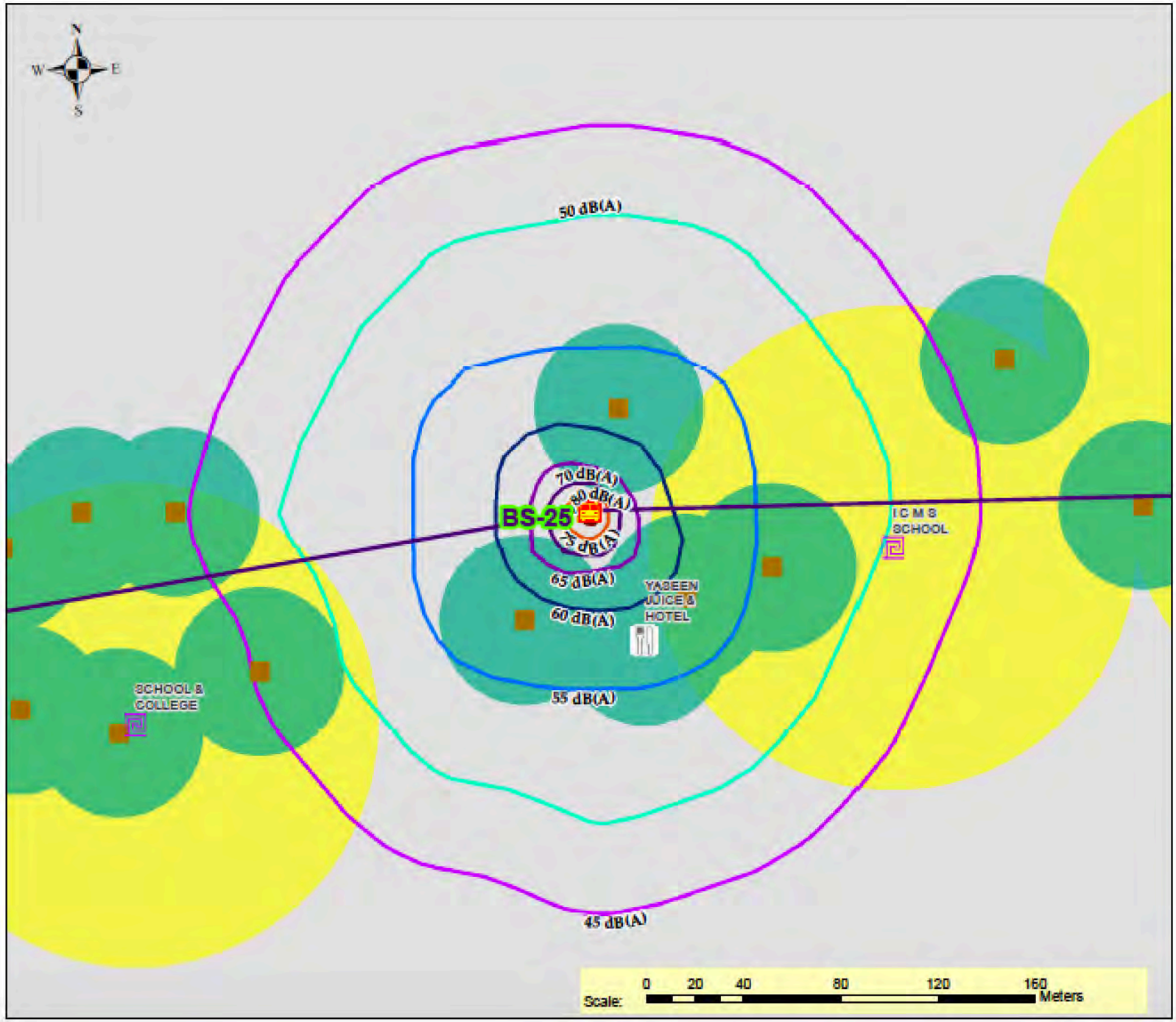
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-25

Sheet 25 of 31

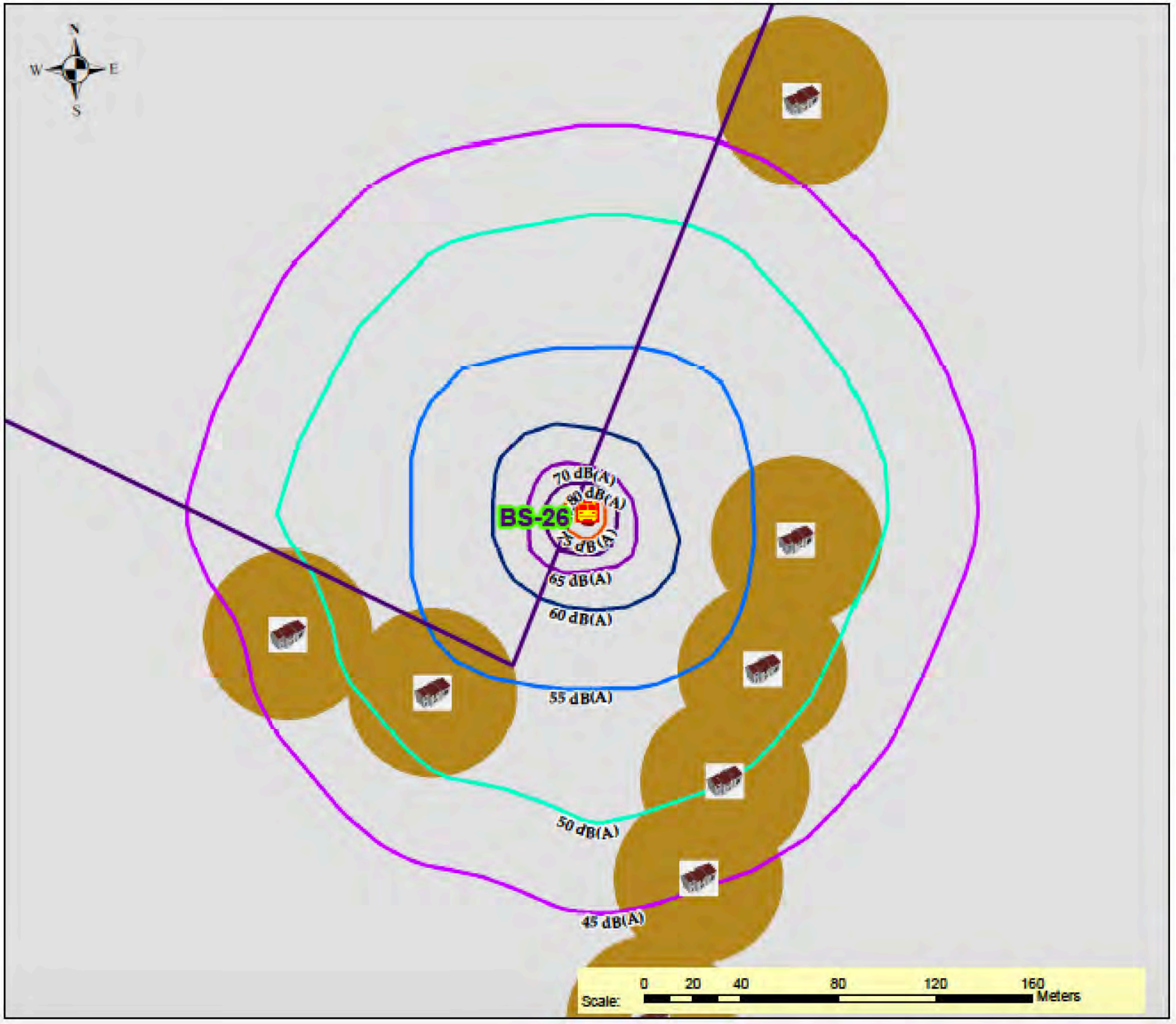
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-26

Sheet 26 of 31

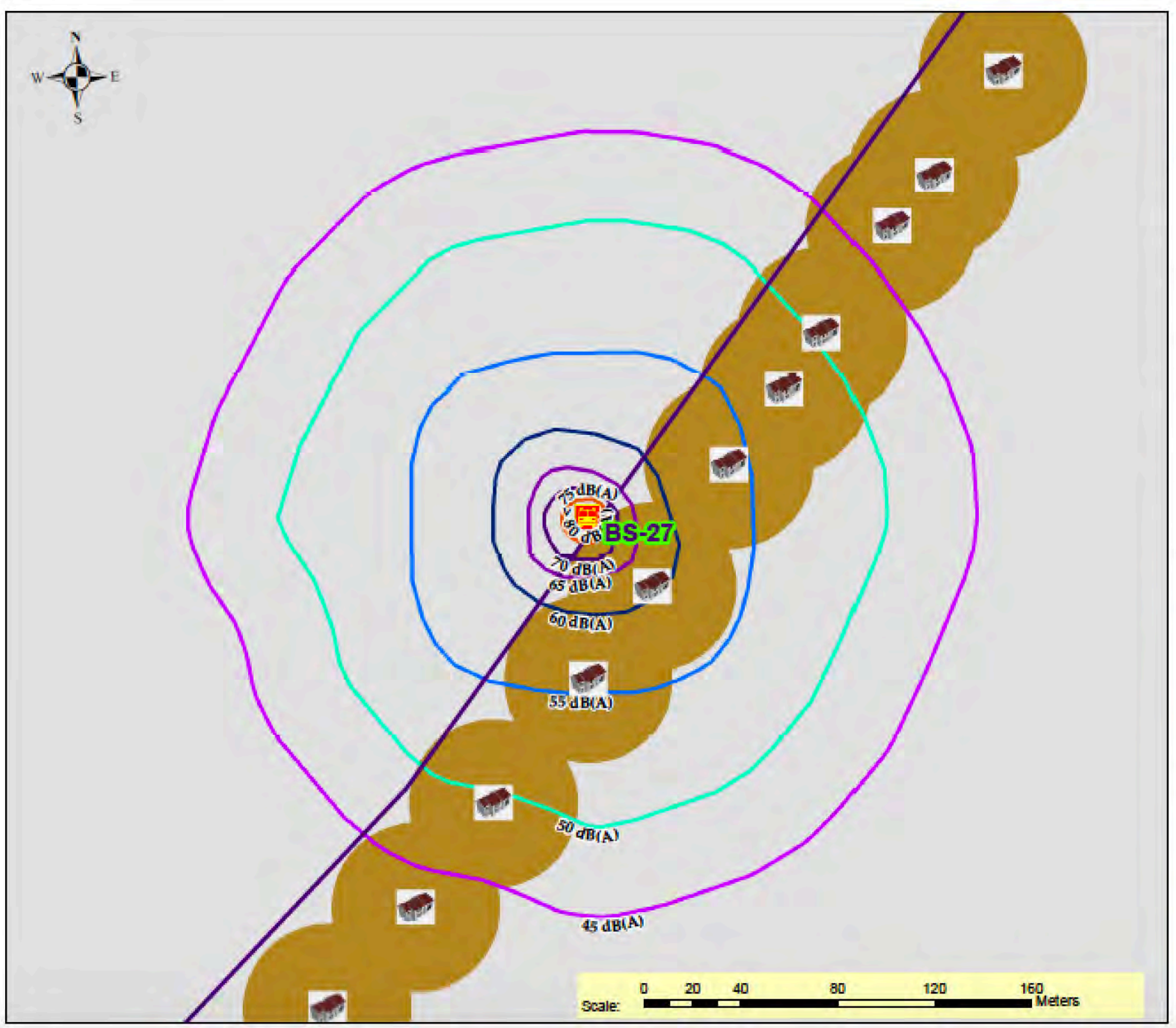
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-27

Sheet 27 of 31

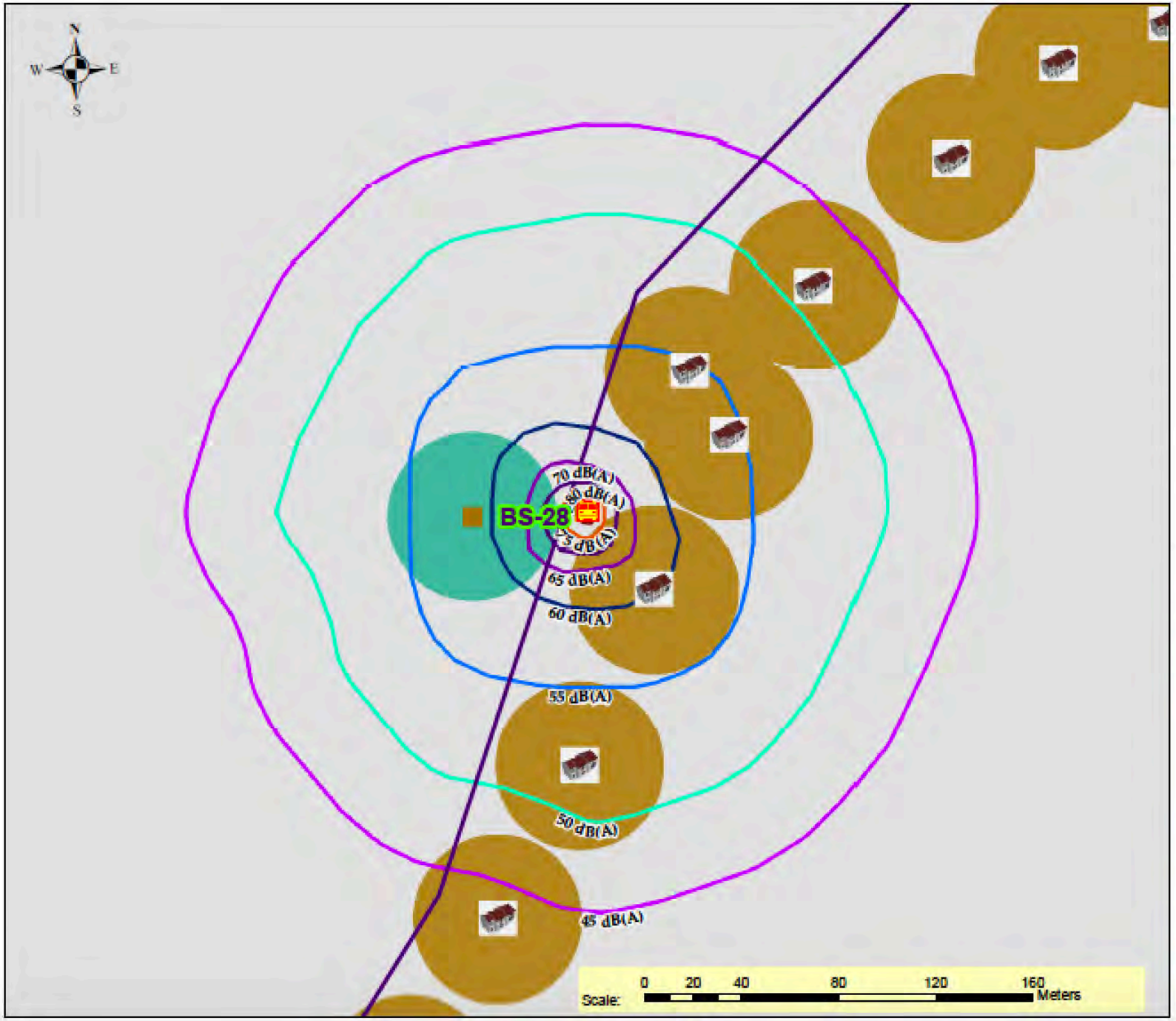
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-28

Sheet 28 of 31

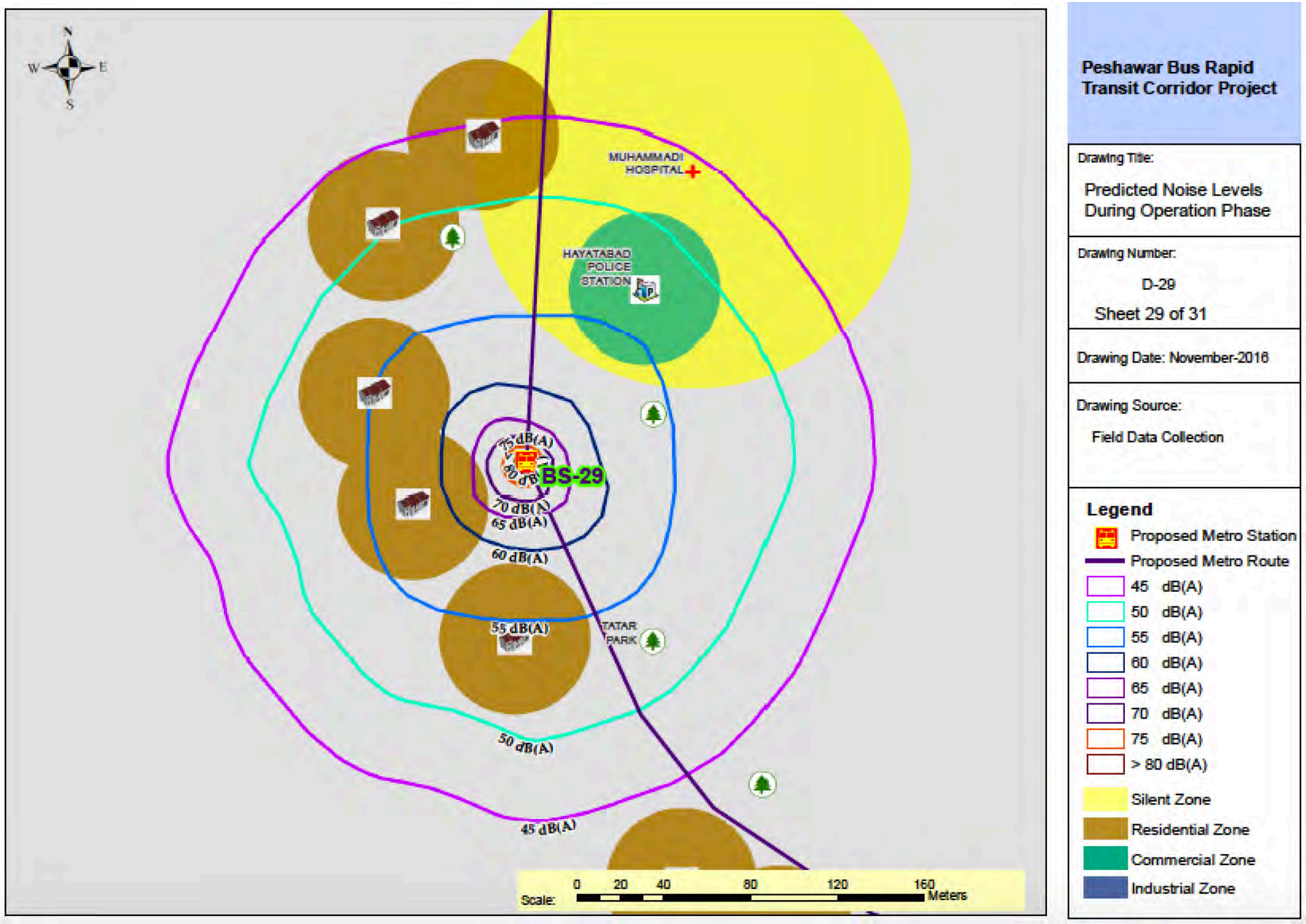
Drawing Date: November-2016

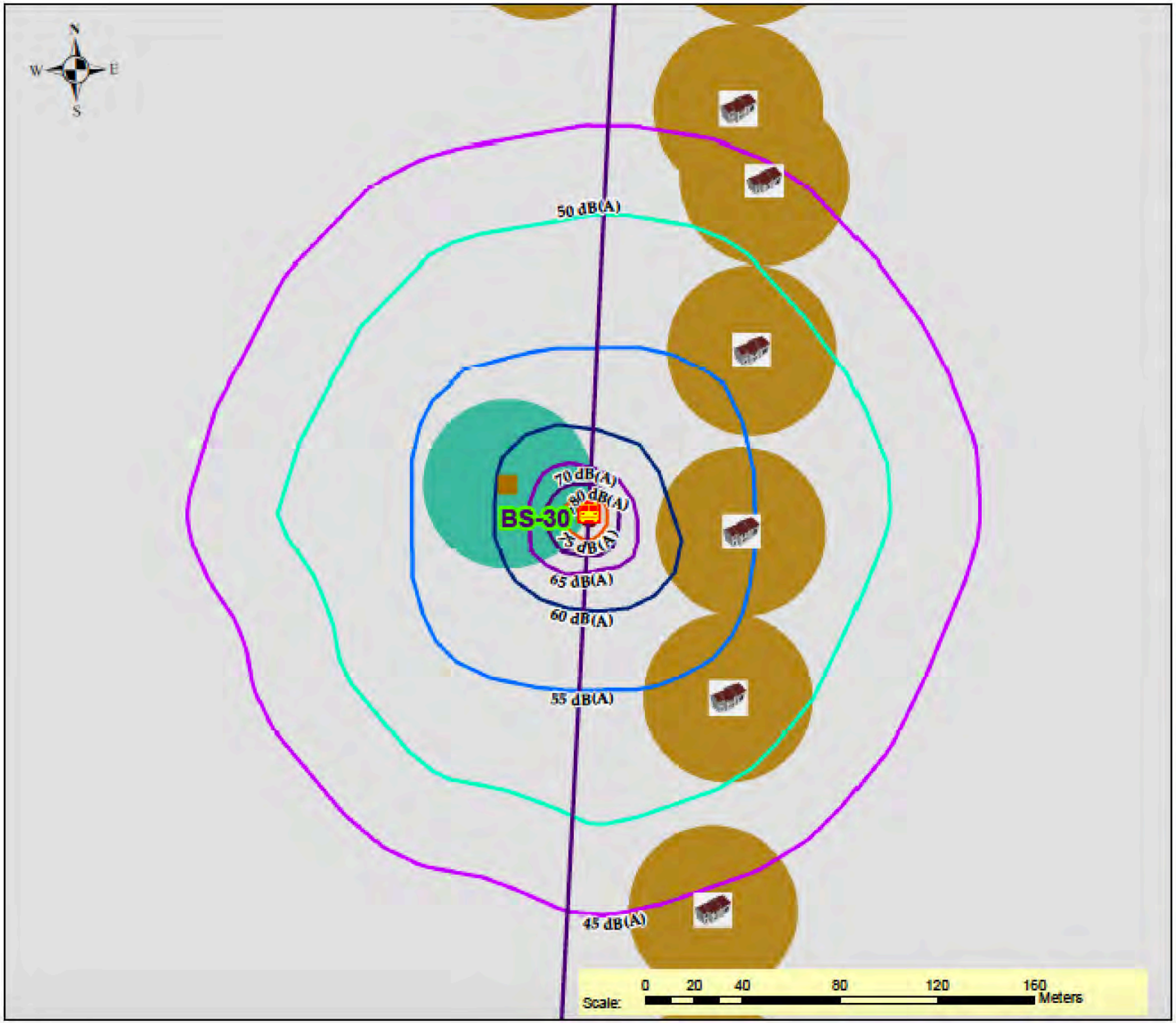
Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone


N
W
E
S
MUHAMMADI HOSPITAL
HAYATABAD POLICE STATION
TATAR PARK
BS-29
75 dB(A)
70 dB(A)
65 dB(A)
60 dB(A)
55 dB(A)
50 dB(A)
45 dB(A)
Scale: 0 20 40 80 120 160 Meters
Peshawar Bus Rapid Transit Corridor Project
Drawing Title:
Predicted Noise Levels During Operation Phase
Drawing Number:
D-29
Sheet 29 of 31
Drawing Date: November-2016
Drawing Source:
Field Data Collection
Legend
Proposed Metro Station
Proposed Metro Route
45 dB(A)
50 dB(A)
55 dB(A)
60 dB(A)
65 dB(A)
70 dB(A)
75 dB(A)
> 80 dB(A)
Silent Zone
Residential Zone
Commercial Zone
Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-30

Sheet 30 of 31

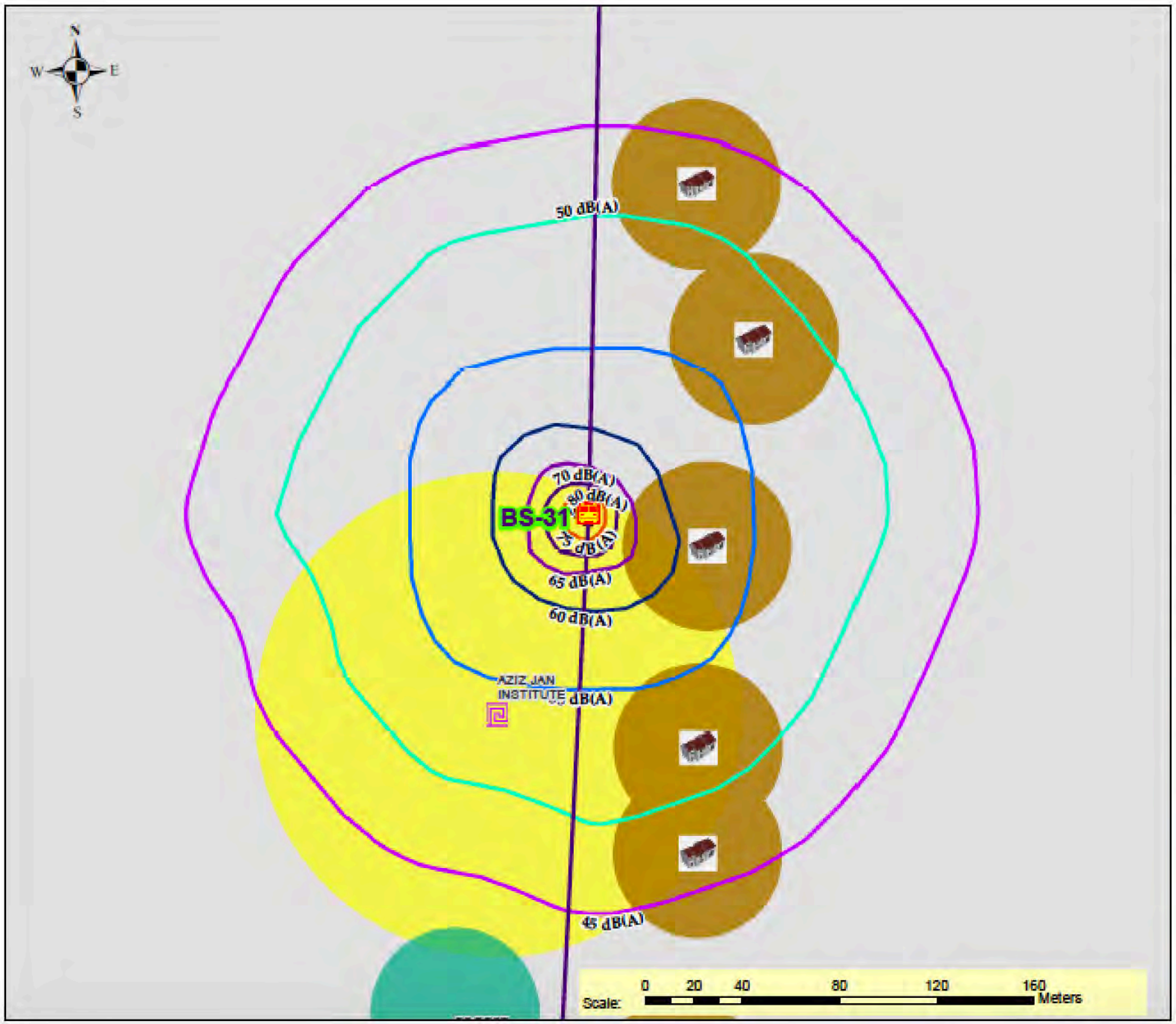
Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone



Peshawar Bus Rapid Transit Corridor Project

Drawing Title:

Predicted Noise Levels During Operation Phase

Drawing Number:

D-31

Sheet 31 of 31

Drawing Date: November-2016

Drawing Source:

Field Data Collection

Legend

- Proposed Metro Station
- Proposed Metro Route
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)
- > 80 dB(A)
- Silent Zone
- Residential Zone
- Commercial Zone
- Industrial Zone