

Section 7

Project Implementation

7.1 Introduction

This section discusses potential construction and environmental impacts that need to be considered as part of the planning and design of the Cohas Brook Sewer Project. Measures to avoid or mitigate these impacts are also addressed.

The long-term impact of the project will be positive, resulting in the protection of Manchester's drinking water supply, Lake Massabesic, from contamination due to failing septic systems. Additionally Cohas Brook empties into Pine Island Pond; the pond is used for recreation and should be protected from contamination. There will be some short-term adverse impacts during construction, many of which are unavoidable, but some of which can be reduced by implementing various mitigation measures.

7.2 General Construction Impacts

The following sections discuss impacts and mitigation measures related to traffic management, wetlands and water bodies, hazardous waste, noise, blasting, fugitive dust, schools, historic, and archaeological resources. Also discussed are permitting, public relations activities, easements, and impact and use of private utilities.

7.2.1 Traffic Management

High priority traffic management issues that should be addressed in design include maintaining access for emergency vehicles at all times, minimizing disturbance to local businesses, ensuring safety of school children, and providing access to residences along the affected route. Some of these concerns can be addressed during project design by avoiding sensitive areas, if feasible. If avoidance is not feasible, then appropriate mitigation must be developed and implemented to ensure that access is maintained.

Typical traffic mitigation measures include the following:

- Advance signing;
- Parking restrictions;
- Relocating school bus stops;
- Shifting travel lanes;
- Lane reductions;
- Limited access and detours; and

- Restricting construction hours.

In addition, mitigation should consider the implications that work zones have for abutters in terms of construction time of day, driveway locations, detour suggestions, and noise. These measures should be addressed in a traffic management plan prepared by the engineer and contractor and subject to the review of and approval by the Manchester Police Department, Manchester Highway Department and in some cases, NHDOT. Additional coordination with the Manchester Fire Department and the Highway Department is also necessary for a successful plan. The plan should address road closings, signage, traffic patterns, bus routes, and lights and should incorporate the following elements:

- Provide access to all buildings, businesses, and parking areas. Provide specific signs to affected businesses when normal access is modified.
- Maintain one lane of traffic on all major routes at all times.
- Specifically address vehicular and pedestrian traffic patterns around schools, playgrounds, and any other “pedestrian sensitive” areas.
- Illustrate traffic detours as approved by the Police and Highway Departments and/or NHDOT.
- Use police details where required at all active work zone locations.
- Provide a schedule for traffic control in relation to construction.

Planning for and addressing traffic-related issues will minimize disturbances to affected businesses and residents.

7.2.2 Wetlands and Water Bodies

There are several brook crossings and multiple cross-country sewer routes that may impact wetlands upon implementation of the proposed Cohas Brook Sewer Project. Measures will be required to minimize construction impacts that these crossings may have on existing water bodies and/or wetland areas.

Coordination with Manchester’s Conservation Commission, NHDES Wetlands Bureau, and possibly the U.S. Army Corps of Engineers (the Corps) will be required for identifying permitting requirements for construction activities occurring in wetlands and near water bodies. Flagging of wetlands will be required during final design to determine if a wetlands permit will be required from NHDES. This activity should be undertaken as soon as pipe routes are finalized so that permit preparation, submission, and review are accomplished in a timely manner. Anticipated permitting for each of the contracts is discussed further below.

Measures to mitigate temporary impacts to wetland resource areas include sedimentation controls (e.g., silt fence and hay bales on land, silt curtains and sheeting in water) to prevent siltation of down gradient wetlands and water bodies, and restoration of disturbed areas to the extent feasible (restoring existing contours, re-seeding as necessary). Strict enforcement of these erosion and sedimentation control requirements will be required when excavating near Lake Massabesic and its tributaries to protect the City's drinking water supply.

7.2.3 Permits

Various environmental permits and approvals are required whenever proposed work may affect certain environmentally sensitive resources including waterways, wetland resources areas, habitats of rare or endangered species, and historic/archaeological sites. Permits and approvals that may be required during implementation of the Cohas Brook Sewer Project are summarized below:

EPA National Pollutant Discharge Elimination System (NPDES) Construction General Permit

Description

EPA currently regulates stormwater discharges from construction sites that are 1 acre or larger. In determining acreage, the cumulative area of disturbance should be used. Obtaining a NPDES permit involves the preparation of a Stormwater Pollution Prevention Plan (SWPPP) and submittal of a short form, Notice of Intent to Discharge, to EPA. This permit is commonly included in the General Contractor's scope of work during the construction phase. The City of Manchester, EPD must review and approve the SWPPP and the City must also submit a Notice of Intent to discharge before the work can begin.

Applicability to the Project

Each contract of the Cohas Brook Sewer Project will have disturbance of over 1 acre for construction of new sewers, and therefore a NPDES permit and SWPPP will be required for each contract.

U.S. Army Corps of Engineers (Section 10 and/or Section 404)

Description

Work in wetlands and waterways are regulated by the Corps pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. In New Hampshire, the Corps developed the State of New Hampshire Programmatic General Permit (PGP) to expedite its evaluation of permit applications and streamline the permitting process. The New Hampshire State PGP (NH SPGP) minimizes duplication between the New Hampshire's Regulatory Program governing work within inland waters and wetlands and the Corps regulatory program under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.

There are three categories associated with the NH SPGP using the state defined criteria: non-reporting projects (minimum impact projects) and two types of projects

that will be screened (minor and major impact projects). The Corps reviews projects according to the State of New Hampshire classification of minimum, minor, and major projects per part WT 303, 400, 600. Projects with impacts up to 3 acres may be approved via the NH SPGP.

A Minimum Impact Project is non-reporting for projects that impact less than 3,000 square feet of inland wetlands or waterways and disturb less than 50 linear feet of a seasonal stream or dry river channel. Minor and Major Impact Project applications are reviewed by the Corps, NHDES and Federal resource agencies (U.S Fish and Wildlife, U.S Environmental Protection Agency, National Marine Fisheries Service) after approval from the NH Wetlands Bureau and a determination made that either: 1) the project meets the criteria of the PGP and can proceed with no changes and no additional Corps review is needed; 2) additional information is needed before making a permitting decision; or 3) the project does not meet the PGP criteria and an Individual Permit is required.

A project is classified as a Minor Impact Project when there is 3,000 to 20,000 square feet of impacts to inland wetlands and waterways, disturbance of up to 200 linear feet of perennial stream or flowing river, and dredging of 20 cubic yards or less from public waters. Any project in or adjacent to prime wetlands, in tidal wetlands, tidal buffer zone, sand dunes, bogs, or in a wetland that is an exemplary natural community or has endangered or threatened species is classified as a Major Impact Project, regardless of the amount of impact. If impacts to inland wetlands or waterways are greater than 20,000 square feet, disturb 200 or more linear feet of a stream or river, or requires dredging of more than 20 cubic yards in public waters, a project is classified as a Major Impact Project.

Additionally, the Corps may require an environmental assessment, or require an environmental impact statement (EIS) for projects deemed by the Corps as having a significant impact to the environment. In accordance with the NH SPGP, the Corps reserves the right to take discretionary authority on any project, regardless of impact category, which the Corps determines will have more than minimal environmental impact.

Applicability to the Project

The Cohas Brook Sewer Project will require installation of new sewers within cross-country areas altering wetlands and perennial streams.

Contract 1: The proposed cross country sewer between Carron Avenue and Medwick Street will require installing the new sewer within an emergent marsh and perennial stream, resulting in less than 20,000 square feet of impact. Therefore, it is anticipated that a Minor Permit will be required for Contract 1.

Once wetland delineations have been completed, Contracts 2, 3, and 4 will be classified as Minimum Impact, Minor Impact, or Major Impact. See further discussion provided below under NHDES Wetland Bureau Permit.

New Hampshire Department of Environmental Services, Wetlands Bureau Permit

Description

The NHDES Wetlands Bureau is responsible for enforcing and regulating activities within coastal and inland wetlands and waterways through the rules and regulations set forth in RSA 482-A. The majority of projects that impact wetlands will require the use of one of two applications, the Standard Dredge and Fill Application or the Minimum Impact Expedited Application. Based on the Federal NH SPGP and DES rules, each project that requires a wetlands permit is classified in one of three categories according to the potential impact of the project (minimum, minor, major). The classification scheme is briefly described above and in the NHDES Rules (Part Wt302). In addition, any project that proposes to impact an area in or adjacent to prime wetlands, in tidal wetlands, tidal buffer zone, sand dunes, bogs, or in a wetland that is an exemplary natural community or has endangered or threatened species, is classified as a Major Project regardless of the amount of impact requested.

Note, in the Standard Dredge and Fill Application, the applicant will need to explain why the proposal has less environmental impact on wetlands than other reasonable alternatives. The application will need to illustrate why the proposal is the least impact alternative by showing a reason or need for the project and by showing that wetland impacts have been avoided or minimized wherever possible.

Minor and Major Impact Project applications are reviewed by the Corps, NHDES, and may require input from federal resource agencies (U.S Fish and Wildlife, U.S Environmental Protection Agency, National Marine Fisheries Service) and State agencies (NH Division of Historic Resources, NH Fish & Game Department, and NH Natural Heritage Bureau).

Applicability to the Project

It is anticipated that a Minor Permit will be required for Contract 1. Once wetland delineations have been completed, Contracts 2, 3, and 4 will be classified as Minimum Impact, Minor Impact, or Major Impact. Agencies should be contacted at the beginning of the design phase to determine if endangered or threatened species or significant cultural resources are present.

Alteration of Terrain Permit (Site Specific)

Description

NH DES Water Division issues these permits per NH Administrative Rules Env-Ws 415. Alteration-of-Terrain permits (a.k.a. Site Specific Permit-RSA 485-A:17) are designed to protect New Hampshire surface waters by minimizing soil erosion and controlling stormwater runoff. A permit needs to be obtained from the division prior to commencing any construction, earth moving or other significant alteration of the characteristics of the terrain when a contiguous area of 100,000 square feet (2.30 acres) or more will be disturbed. (Developments and earth removal operations, a contiguous earth disturbance of 100,000 square feet including building area, parking, driveways,

roadways, utility construction, landscaping, and borrow areas require a Site Specific permit.)

In addition to the above, RSA 483-B, the "Comprehensive Shoreland Protection Act," requires that any applicant intending to conduct an activity within the protected shoreland resulting in a contiguous disturbed area exceeding 50,000 square feet (1.15 acres) to first obtain a permit pursuant to RSA 485-A:17. The protected shoreland is defined by the act as all land located within 250 feet of the reference line of public waters.

Applicability to the Project

Construction work for each of the proposed four contracts will require earth disturbing activities exceeding 100,000 square feet; therefore, a Site Specific Permit will be required for each contract.

New Hampshire Department of Environmental Services, Section 401 Water Quality Certification

Description

The NHDES Watershed Management Bureau issues the Water Quality Certification in accordance with the rules set forth in Env-Ws451 through Env-Ws455 pursuant to Section 401 of the Federal Clean Water Act (CWA). When large projects are located in surface waters (*i.e.* river, lake) or wetlands, state agencies require that a Section 401 Water Quality Certificate be issued (401 Certificate) to assure that the State's water quality will not be adversely affected. The 401 Certificate contains specific conditions intended to prevent degradation of surface water quality as a consequence of the project's activities (*e.g.* soil erosion and sedimentation). The Corps is a federal agency that will not issue a federal permit or license for any activity that would result in a discharge to surface waters until they are assured that the States' water quality will be protected. The 401 Certificate gives that assurance and applies to projects which affect these environments.

Pursuant to Section 401 of the CWA, a water quality certificate must be obtained by any applicant for a federal permit or license to conduct any activity which may result in any discharge to surface waters of the state. For any project that is authorized by the New Hampshire State programmatic general permit (NHSPGP) issued by the Corps, the Section 401 Certificate will be deemed to be part of the NHSPGP.

Applicability to the Project

Contract 1: It is anticipated that this contract will be reviewed through the NHSPGP program as a Minor Permit by the NHDES and the Corps. Once wetland delineations have been completed, Contracts 2, 3, and 4 will be classified as Minimum Impact, Minor Impact, or Major Impact project. Therefore, a separate water quality certification will not likely be required for any of the contracts.

Communication with Federal and State Agencies

Description

As part of the NH wetlands permitting process, communication will be required with the U.S. Fish & Wildlife Service; NH Fish & Game Department; and NH Department of Resources and Economic Development – Natural Heritage Inventory to assess potential project impacts to plants, fish, and wildlife that may be within the project area including: rare species of special concern; state and federally listed threatened and endangered species; migratory fish; and wildlife and exemplary natural communities.

Applicability to the Project

Correspondence including the project description and a USGS project location map should be sent to the agencies listed above prior to submitting the Standard Dredge and Fill Application to NHDES so that relevant correspondence from the agencies can be incorporated into the application.

Conservation Commission

Coordination with the Manchester Conservation Commission for compliance with the New Hampshire rules and regulations set forth in RSA 482-A is suggested during the planning phases for the project. Approval from the Conservation Commission is generally received through the NHDES Standard Dredge and Fill Application process. The Conservation Commission will provide written correspondence to the NHDES with their approval or to identify issues they may want addressed through the permitting process.

Other Potentially Required Permits

In addition to the anticipated permits/approvals described above, the following may be required.

Local District Designations

Coordination with local departments is needed to make certain the project complies with local ordinances and regulations (*e.g.*, Title V – Chapter 52). Exemptions would have to be sought if the proposed design was to infringe upon any local requirements.

New Hampshire Department of Transportation

Coordination with NHDOT is necessary to make certain the project complies with NHDOT standards and specifications. Specifically, during final design of Contract 2, coordination with NHDOT will be required to obtain a permit to cross under Route 101 with the proposed sewer. William O'Donnell from NHDOT (603-666-3336) was contacted during the development of this sewer master plan and provided the following comments/concerns that will need to be addressed during final design:

- A Long Form Excavation Permit will be required;

- There are sound walls on both sides of the road near the proposed location of the new sewer main;
- The sound wall on the south side of Route 101 is set on top of a retaining wall in one area;
- Provide NHDOT with draft drawings showing the proposed trenchless construction technique planned to be used and they will determine the amount of the required surety bond (will need to be sufficient enough to cover potential expenses due to damage of the pavement structure, roadway drainage, the noise wall on the north side, and the noise/sound wall on the south side);
- Submitted plan will need to consider traffic control in case the proposed trenchless construction technique causes damage to the roadway, noise walls, or retaining wall foundation;
- NHDOT would prefer that access the jacking and receiving pit sites are from the adjacent local roads;
- Suggested that it might make sense to do the proposed jacking from the south side of Route 101 to the north side for better control of the drill head position in relation to the foundation of the retaining wall on the south side of Route 101;
- The median at this location is very narrow, and therefore the trenchless installation of the proposed sewer would have to cross the entire four-lane highway, deceleration lane on the East Bound side, and acceleration lane on the west bound side (about 65-meters (200-feet) from the toe of slope on the north side to the south side); and
- Suggested performing a field review of the existing conditions with the final design engineer early in the design phase.

Blasting Permit

A blasting permit shall be required for all blasting within the City. A copy of the City's current Draft Blasting Permit is included in Appendix E. The permit requirements include a pre-blast survey, installation of carbon monoxide devices in properties within the blasting zone, a limit on trench blasting at one time and excavation down to the bottom of the bedrock immediately after detonation. Additional considerations for blasting are discussed further below.

Construction Related Permits/Approvals

Other permits that may be required for the project may include but are not limited to, the following: road openings, access roads, site development, easements, and hazardous waste, if any.

7.2.4 Archaeological

Upon completing the Phase IA assessment, IAC identified areas sensitive for both Native American and Euroamerican archaeological resources. Project plans were sensitized using a color scheme. All areas of high sensitivity (where archaeological resources are very likely to be found) were highlighted as red. Areas of moderate sensitivity (somewhat less likely to contain archaeological resources) were highlighted as green. Areas of low sensitivity (where archaeological resources are not expected) are colored yellow. All sections within roadbeds were sensitized as having low sensitivity, except at water crossings. If construction of the sewer main involves culvert or bridge replacements, these operations can impact Native American archaeological resources, which tend to be found along waterways. All sections within 100 m (328 ft) of Cohas Brook were evaluated with high or moderate sensitivity, as archaeological research over the past 70 years have shown a high density of pre-Contact-period sites along almost all sections of the brook (e. g., Wheeler 1995; Wheeler et al. 2000). Areas sensitized as either moderate or high should be the subject of a Phase IB intensive archaeological investigation during final design, to confirm the presence or absence of archaeological resources.

The Cohas Brook Sewer Project was divided into five separate areas - Contracts 1 through 4 and other future sewer areas - and each area was considered individually.

Contract 1

For Contract 1, there are two potential cross-country segments (see Figure 1 in Appendix C). All other portions of Contract 1 are within existing roads and are of low sensitivity.

Contract 1-Segment 1

Segment 1 begins at the west end of Garvin Avenue and ends on Lake Shore Road. The entire length of Segment 1 is evaluated with low sensitivity, because of its distance from water, and its degree of slope (exceeds 8%). No further archaeological survey is recommended.

Contract 1-Segment 2

Segment 2 is a short section between Hartt Avenue and Carron Avenue that has been assessed with low sensitivity because of landscaping that has taken place in the yards of landholdings.

There are no further recommended archaeological survey for Contract 1.

Contract 2

Most of the proposed Contract 2 sewer is within existing roads with the exception of three cross-country segments (see Figure 2 in Appendix C):

Contract 2-Segment 1

Segment 1 begins at the south end of Linda Lane and heads southeast to the north side of Route 101. The area is steep and covered in bedrock, but has two small water crossings. There are two areas of Contract 2-Segment 1 that are **recommended for a Phase IB intensive archaeological investigation.**

Contract 2-Segment 2

Segment 2 is from near the west end of Lakeside Drive and heads south to Spring Valley Road. The proposed cross-country sewer appears to be within a right-of-way for city roads that have not yet been built. The area is forested with pine and has multiple stream crossings. In conducting her site inspection, Dr. Wheeler found a sprawling mill complex (27-HB-0396) to the southeast of the proposed sewer. This mill takes advantage of one of the small streams and includes the remains of a mill race, along with building foundations (see Figure 6 and Plates 1, 2, and 3 in Appendix C). Where Segment 2 veers to the southwest, Dr. Wheeler found stone memorials of two buried horses (see Figure 6 and Plates 4 and 5 in Appendix C). During final design, the exact location of the burials will need to be determined in relation to the proposed sewer. This cross-country segment is **recommended for a Phase IB intensive archaeological investigation.**

Contract 2-Segment 3

Segment 3 connects between a cul-de-sac on Highview Circle and heads southeast to a neighboring cul-de-sac. The short cross-country section is steeply sloping with much exposed ledge. The area is assessed with low sensitivity, and no further archaeological survey is proposed for this cross-country segment.

Contract 3

As with other contracts, most of the proposed Contract 3 sewer is within existing roadways. However, one short spur crosses Cohas Brook along I-93 Northbound (See Figure 3 in Appendix C). The cross-country portion of this spur is of high archaeological sensitivity and is **recommended for a Phase IB intensive archaeological investigation.**

Contract 4

The proposed Contract 4 sewer is all within the existing Bodwell Road (an early road dating to the 1700s), Pheasant Lane, and Quail Court. All road sections of Contract 4 were evaluated with low sensitivity for archaeological resources, with the exception of four water crossings along Bodwell Road. These have been marked as moderately sensitive for pre-Contact-period archaeological resources, as the first three small streams drain into Cohas Brook, while the fourth crosses Cohas Brook (See Figure 4 in Appendix C).

Contract 4-Water-crossing 1

Water-crossing 1 traverses an unnamed stream between a wetland and Cohas Brook. It has moderate sensitivity for pre-Contact-period archaeological resources.

Contract 4-Water-crossing 2

Water-crossing 2 is near the site of the C. W. Platts mill (27-HB-162), which was found during the original Phase IA walkover (Wheeler 1995). The precise location of the buried mill components will need to be confirmed with a Phase IB intensive archaeological investigation prior to construction of the sewer.

Contract 4-Water-crossing 3

Water-crossing 3 is an ephemeral drainage that crosses beneath Bodwell Road near its intersection with Stonington Drive. It has moderate sensitivity for pre-Contact-period archaeological resources.

Contract 4 water-crossing 4

Water-crossing 4 crosses Cohas Brook near the southern border of the City. This is an old bridge crossing (therefore has diminished integrity), but because it is directly along the Cohas Brook, it is considered of moderate sensitivity for pre-Contact-period archaeological resources.

All four water crossings along Bodwell Road are of moderate sensitivity and IAC recommends a Phase IB intensive archaeological investigation at each location to determine if archaeological resources are present. No other sections of Contract 4 require further archaeological survey.

Other Future Sewers

Most other future sewers (see Figure 5 in Appendix C) consist of several short connections or new sewer within existing roads. It also shows the distribution of known archaeological sites for the project vicinity, with a large grey polygon showing an “archaeological zone” for the purposes of illustration for this report. The graphic is meant to portray the density of sites along the Cohas Brook, which, as specified above, served as a major east-west travel corridor for ancient peoples.

One other future sewer consists of a short cross-country route beginning at Cohas Avenue and heading east to Island Pond Road. The entire cross-country segment is parallel to an ephemeral stream with well-drained soils (Canton fine sand loam with 0-8% slopes; Scituate stony fine sand loam with 0-3% slopes; and Pipestone loamy sand with 0-3% slopes). Because of its proximity to a stream feeding Cohas Brook and its well-drained substrate, the entire length is evaluated with high sensitivity for pre-Contact-period archaeological resources and will require a Phase IB intensive archaeological investigation.

All other future sewers proposed are located within the existing road and have a low sensitivity for archaeological resources and do not require further archaeological survey.

7.2.5 Hazardous Waste

Areas with hazardous waste or contaminated soils may be encountered during construction of the new facilities. Identification of these issues in advance of construction (during preliminary and final design) will assist in identifying cleanup costs and impacts to scheduling, and will facilitate the proper handling and disposal of hazardous wastes. Generally, an allowance is included in each contract to address unforeseen hazardous waste/contaminated soils.

The NHDES maintains a regularly updated database (OneStop Data Retrieval) of all the potential and confirmed hazardous waste sites in New Hampshire communities. Consulting this list revealed eighteen known potential or confirmed hazardous waste site located within the project area, see Table 7-1.

7.2.6 Noise

Potential noise impact is evaluated based on the proximity of construction activities to sensitive land uses. A majority of the proposed Cohas Brook Sewer Project is residential, which is more sensitive to noise than an industrial or commercial area. There will be a noticeable increase in noise during construction; blasting of ledge or rock will also have a significant impact on noise levels. To mitigate noise impacts, the following measures are recommended:

- Use new or well-maintained equipment with standard intake/exhaust mufflers and engine jackets. (The best available noise-reducing technology, such as specialized mufflers and shields, could be necessary to reduce impacts at some locations.)
- Use the most quiet and practical construction techniques, such as replacing standard pile drivers, if needed, with vibratory or sonic drivers, to eliminate noise from the hammer hitting the pile.
- Restrict construction activities to daytime hours and/or schedule noisier activities to take place during less sensitive times of day.

7.2.7 Recommended Geotechnical Program

Geotechnical field explorations and evaluations will be required for each contract area as part of the final design. A subsurface exploration program consisting of probes, test borings, rock coring, and temporary monitoring wells should be conducted as part of the final design. Test borings and probes should be drilled at about 300 ft intervals and at every intersection along the proposed alignments. The mix between probes and test borings generally should not include more than about 1/3 probes. In addition, test borings should be drilled at the starting and ending points of all planned trenchless installations (i.e., micro tunneling, pipe jacking or horizontal directional drilling) and at least one boring drilled at each siphon location. Additional borings may be needed between the starting and ending points for long (i.e., over about 300 ft) trenchless locations so as to obtain sufficient subsurface information

Insert Table 7-1

along the pipe alignment. Borings drilled along the alignment of trenchless installations should be backfilled with grout; the remainder of the explorations can be backfilled with drill cuttings.

Borings and probes should be advanced to about 50% deeper than the planned pipe invert. At locations of planned trenchless installations test borings should extend to not less than 10 ft below the planned pipe invert. In areas of possible horizontal directional drilling (HDD), deeper test borings may be required since HDD generally extend to not less than 20 ft below lowest grade. Rock coring should be conducted in some of the borings which encountered refusal above the planned boring depth. It is particularly important that rock cores be collected in areas of high bedrock so as to gain an understanding of the type, weathering, and strength of the bedrock to be removed.

Soil samples should be collected and Standard Penetration Tests (SPT) typically conducted at 5 ft intervals in the test borings, however, in areas of planned trenchless applications, continuous soils sampling should be conducted from about 5 ft above to about 5 ft below the pipe interval. No borings or probes should be terminated in organic soils. Test borings should not be terminated in soils with an SPT N-value of less than 10 bl/ft. Based on existing subsurface information, including borings drilled by CDM as part of the master plan, a limited amount of clay and silt soils are expected to be encountered along the pipe alignment thus undisturbed tube sampling is not expected to be required, however, if a thick or predominant clay layer is encountered in the test borings, tube samples should be collected and stored for later laboratory testing.

One temporary monitoring well should be installed at either the starting or ending point of all planned trenchless installations (i.e., pipes under Route 101, Cohas Brook, and wetlands). Additional temporary monitoring wells should be installed along the alignment in areas of high groundwater and/or deep trenches. Water levels should be recorded over a period of time so as to collect information on groundwater level variability.

Geotechnical laboratory testing should be conducted on soil and rock samples collected as part of the subsurface exploration program. Soil index testing consisting of grain size analysis, water content, and organic content should be conducted on a sufficient number of samples so as to properly classify the soils and assess the potential for trench excavate to be reused as trench backfill. In addition, it is important that samples collected above/at/below the pipe interval at all trenchless installation locations be evaluated so as to obtain a clear understanding of the subsurface conditions to be encountered. In addition, a limited number compressive strength testing should be conducted on rock cores collected from areas of expected rock excavations.

The information gathered as part of the subsurface and geotechnical laboratory testing programs should be presented in a geotechnical design report (or technical memorandum) which include recommendations for pipe subgrade and bedding, trench excavation and backfill, trench support, construction dewatering, rock removal/blasting requirements, pre-construction surveys and vibration control, trenchless installations (i.e., pipes under Route 101, Cohas Brook, and wetlands), protection of adjacent structures, and structure foundation recommendations.

7.2.8 Blasting

A subsurface investigation program, including borings and probes, was implemented as part of the preliminary design program. Some of the borings and probes indicated refusal, which indicates the possibility of large boulders or ledge. Rock excavation, which requires drilling, blasting, wedging, sledging, or barring will be required where ledge impedes the construction. Prior to the start of rock excavation or blasting, a pre-blast survey of all existing structures and conditions in the vicinity of the work area should be conducted by the contractor. This survey should include videotaping each building's interior and exterior to establish preconstruction conditions. Manchester's blasting permit requires that the pre-blast survey be completed for all buildings within 100-feet of the blast. CDM recommends that the pre-blast survey be conducted on all building within a minimum of 500-feet of the blast.

Vibration monitoring should be required during all blasting activities. Survey monitoring points are required on structures and CO2 meters are required in homes in the blasting area. A blasting plan, describing proposed methods and sequence of excavation, including blasting procedures, should be compiled. Blasting should be limited to business hours, Monday through Friday, unless prior permission is received from the Manchester Fire Department. An adequate warning system should be provided to ensure that all persons are at a safe distance before a blast is detonated.

Blasting signals should be required to conform to 29 CRR 1926.909 (OSHA) and posted. All blasting should be in compliance with state, federal, and OSHA Health and Safety Standards for Construction. Persons responsible for blasting should be licensed blasters in the State of New Hampshire and should be required to have acceptable experience in similar excavations in rock and controlled blasting techniques. Prior to blasting, a blasting permit should be obtained from the Chief of the Fire Department.

All blasting will need to be performed in accordance with the City's blasting permit requirements, which was previously discussed Section 7.2.3 - Permits.

7.2.9 Fugitive Dust

Construction activities such as site clearing, excavation, grading, backfilling, and hauling can generate airborne dust (suspended particulate matter). Particulate matter less than 10 microns in diameter (PM10) have the potential to be a health hazard as

well as a nuisance. Tests conducted for the U.S. EPA concluded that the dominant source of construction PM10 emissions is not passive wind erosion, but movement of heavy vehicles over unpaved surfaces or construction excavation activities (U.S. EPA AP-42, Fourth Edition, Office of Air Quality Planning and Standards Research Triangle Park, NC, 1993). These emissions are a function of vehicle activity, weights, speeds, number of wheels, soil silt, and moisture content.

Construction activities such as excavation, scraping, and jack hammering also will generate airborne dust. Fugitive dust mitigation measures should be required since some residences and sensitive receptors will be within 50 feet of construction. However, impacts will be temporary and can be controlled with mitigation measures such as regular watering of active construction areas, street sweeping, and covering trucks carrying earth material. These mitigation measures should significantly reduce fugitive dust impacts to an acceptable level.

7.2.10 Schools and Parks/Playgrounds

No schools exist in the proposed construction area of the Cohas Brook Sewer Project, but construction is expected to impact school bus stops. Adjacent to the proposed construction area of the Cohas Brook Sewer Project are three existing parks: Lake Park off Londonderry Turnpike, Youngsville Park off Candia Road, and Crystal Lake Park off Bodwell Road. The safety of all people accessing the parks and buses should be a high priority during construction. In addition to the City owned parks, Camp Carpenter, a Cub Scout camp, is located in the Southeast corner of Manchester just off of Bodwell Road.

7.2.11 Public Relations

The development and implementation of a public relations program should be based on the philosophy that a well-informed public is critical to a successful construction project; conversely, an uninformed public can create significant project delays, public relations concerns for the City, and long-term negative impacts for all parties involved.

Strong onsite resident engineering services is also an important component of a successful public relations program aimed at accessibility to the public and a proactive response to questions and complaints received from the public. Such a program will help ensure that issues are addressed in a timely manner and that relatively minor issues do not escalate to become major problems.

Local residents and businesses are commonly kept informed about project activities through direct mailings, ads and articles in local papers, flyers, door hangers, notices, local radio, and meetings. These types of public information activities should be used during the design and construction phases of this project. Public information meetings should be held during the final design phase to incorporate public comments and concerns in the final contract documents, particularly related to property access, safety, traffic management, utility service, and construction schedule.

Press releases should be placed in the local paper to keep the public informed about construction activities. Notices may be provided to residents announcing special construction activities such as blasting, detours, parking restrictions, relocated bus stops, etc.

7.2.12 Utility Coordination

In the development of a sound construction project, it is important to identify any potential utility conflicts early in the process. Verification of existing utilities based on a detailed survey will be required during final design. Close coordination will be required with the utility owners (Manchester Water Works, National Grid, etc.) during final design, including a review by the utility owners of the contract documents. Utility owners may also evaluate whether this is an opportune time for them to upgrade their infrastructure before final pavement is installed.

In general, new sewer mains should be located on the opposite side of the street from the existing water main to maintain a 10-foot horizontal separation of the two pipes. If the new proposed sewer is required to be within 10-feet of the existing water main, an 18-inch vertical separation should be maintained, with the new sewer preferably installed below the existing water main. The trench between the water main and the stone bedding for the pipe is currently required by Manchester Water Works to be backfilled with excavatable controlled density fill.

The design of the new sewer may require an existing gas main to be replaced and relocated if National Grid determines that the horizontal and vertical location of the proposed sewer is in the zone of influence of the existing gas main. Similarly, other utilities (i.e., fiber optics and telephone) may need to be relocated prior to installing the proposed sewer main. Should these replacements/relocations be required, close coordination with utility owner will be necessary to ensure the work is completed without interfering with or delaying the progress of the general contractor installing the sewer main. This coordination includes consideration of traffic detours during construction of pipes on potentially multiple streets. Lastly, the design and construction of this project should consider the location of existing overhead wires and utility poles. Caution should be taken during future phases to avoid disruption to these above ground utilities.

Construction of this sewer project, which consists of a majority of the streets in eastern Manchester, may also be an opportune time to improve local drainage problems. The City should evaluate the streets that are being sewerred in each contract and determine if there is a need to improve the existing drainage and whether the improvements should be included in the sewer construction contract so both pipes are constructed before final pavement is installed.

7.2.13 Winter Work

Some of the proposed sewers in this project may be conducive for the general contractor to continue working in the winter months without a “winter work shutdown”. For example, approximately 8,200 linear feet (13 percent of the total proposed sewers) are cross-country and located off of City streets. Construction of these sewers may be beneficial to the contractor to be done during the winter. Also, the City may consider allowing a contractor to work on less travelled City streets (i.e., dead end streets) during the winter months provided the contractor receives permission from the Manchester Highway Department and adheres to their requirements for winter construction, such as maintaining the surface of the road, including snow removal.

7.2.14 Anticipated Easements

Easements are proposed at several locations within the proposed Cohas Brook Sewer Project for mainline sewers that are proposed to be constructed cross-country (i.e., off the existing right-of-way) or in “paper” streets (i.e., streets that are not accepted by the City) to allow for gravity sewer pipe installation. These anticipated easement locations are shown on Figures 5-1 through 5-5. In total, it is estimated that approximately 7,750 linear feet of cross-country sewers may be constructed that will impact/require easements from about 40 different parcels. There are also about 3,550 linear feet of sewers that are proposed to be constructed on unaccepted streets that will impact/require easements from approximately 48 additional parcels. The estimated length and number of easements required are listed in Table 7-2.

	Cross-Country Sewers		Unaccepted Streets	
	Length	# of Parcels	Length	# of Parcels
Contract 1	1,230	6	1,666	29
Contract 2	4,172	19	1,888	19
Contract 3	877	9	0	0
Contract 4	0	0	0	0
Other Future Sewers	1,473	5	0	0
Total:	7,752	39	3,554	48

**Table 7-2
Anticipated Easements**

At this time, ownership of the properties where cross-country sewers are proposed has not been determined. Private parties may partially or wholly own these lands. During final design, ownership and acquisition of the properties should be further investigated. The two options typically evaluated for obtaining easements for similar projects are eminent domain and negotiation. In the past, the City has negotiated all easements with individual property owners. It is assumed that this approach will continue for this project. However, if the City is unsuccessful in negotiating some or

all of the easements required for the project consideration for using eminent domain may need to be considered.

Additionally, within the project area, there are several private communities and roadways. For the purpose of this report, it was assumed that a sewer service lateral will be provided from the mainline sewer to the edge of the right-of-way (i.e., property line) and that connection to this sewer service will be the responsibility of the property owner(s) and/or condominium associations. It is assumed that no sewer extensions will be built on private roads, but if they were, easements may be required.

7.2.15 Impact and Use of Private Utilities

Manchester has a number of private utilities that were created within the City. It appears that these were allowed to permit development to go forward without the City incurring the costs of developing the infrastructure to connect the new development to the City's wastewater system. These systems include sewers that were constructed according to City standards and policies and, in some cases, pumping stations developed under similar rules. Generally, customers of these private utilities receive two bills: a City bill where they are charged the current City rate given the amount of water consumed and then they also pay a separate charge to the private utilities responsible for developing, operating, and maintaining the sewer system serving them.

It may be beneficial to the residents served by these private utilities and to the City for the City were to acquire these utilities and subsume them into the City owned and operated system. CDM suggests that the City incorporate the following general policies or conditions into any such acquisitions:

- The City inspects the condition of the infrastructure and reviews appropriate maintenance records to minimize the potential of acquiring a system with significant problems and thus requiring a significant unexpected rehabilitation expense.
- If the City does not directly benefit from the acquisition, then the cost of any such acquisition should be borne by the area currently served by the utility. The City could benefit from such an acquisition if it reduces the costs to serve additional areas the City is seeking to serve and/or offsets the need for conveyance capacity that the City would otherwise need to develop.
- The City can finance its costs of acquisition through special charges to the private utility service area. In some cases, that might only involve the continuation of the current "private utility assessment" for some period of time to amortize acquisition costs (sales costs, legal fees, etc.).
- CDM sees no reason to impose a minimum size for such acquisition, provided the private utility's flows are going to the City's wastewater treatment plant. The

customers are already paying the City's retail rate and thus paying for the costs of conveying and treating such waste and there is capacity available to convey and treat such waste.

- If the private utility is not currently connected to the City's wastewater treatment plant, then the City will need to assess if it has sufficient capacity for both conveying and treating the flow. (The expectation is that the City does not want to acquire any remote treatment facilities and wants to minimize the number of additional pumping stations that it acquires.)

Eastwind Estates

Eastwind Estates represents the first need and potential opportunity to test this policy and general approach. The private sewers in this neighborhood service 134 homes and includes approximately 9,500 linear feet of 8 through 12-inch gravity sewer, 4,900 linear feet of sewer force main and the Aladdin Street pump station.

The infrastructure in the Eastwind Estates neighborhood is currently owned through a homeowner's association. Individual homeowners pay an association fee to cover the current operation and maintenance costs for the association system and also pay the full City sewer rate for the transport and ultimate disposal. There do not appear to be any outstanding debt obligations for the infrastructure that are being amortized through the association fee. Based on the analysis in Section 4.2.1 of this report, the City's total costs for the project would fall by over \$700,000 (including 45 percent engineering and contingency) if the City acquires the Eastwind Estates system and uses it to support sewer development in the Cohas Brook area. It would also be advantageous to the property owners since it would reduce their sewer costs by the amount of the association fees as well as the unknown liability of emergency repairs and some future rehabilitation of the system. Thus, it does appear to be a "win-win" case for both parties and should be pursued.

Bodwell Waste Services Corporation

The area served by Bodwell Waste Services Corporation is adjacent to a planned interceptor extension and near where the City hopes to extend service to Londonderry and Auburn. Bodwell Waste Services Corporation provides sewer service to approximately 450 units in southeast Manchester area and consists of more than 18,000 linear feet of 8 through 12-inch gravity sewer, 9,400 linear feet of force main and 3 pump stations. The force main terminates on Bodwell Road north of Lone Pine Drive.

Unlike the Eastwind Estates private sewers, based on the current project configuration, the proposed infrastructure within that service area is not critical to the work that the City is currently undertaking. Also, Bodwell Waste Services Corporation has an equity investment in the system and some remaining outstanding debt and it is likely that Bodwell Waste Services Corporation would want to be made whole were the City to seek to acquire it. (Note: CDM has had no discussions with

Bodwell Waste Services Corporation specifically on this issue.) However, we believe that if the City were to seek to acquire Bodwell Waste, it could “finance the acquisition” by keeping in place the amount currently paid by Bodwell Waste customers for some period of time, probably 10 to 15 years.

If the City determines that it wants to acquire a private utility such as Bodwell Waste that is regulated by the Public Utilities Commission, it will need to follow a proscribed process. (The process is not significantly different than the one that would be followed for a “non-regulated” utility, but does involve some extra steps and the need to receive affirmative approval from the PUC.) The City must first seek to negotiate a purchase price with the utility. If it cannot reach agreement, the City may use the eminent domain process and acquire the utility through a taking. Once it has agreed to a purchase price or has established its taking price, it must apply to the PUC for approval to acquire the regulated entity and, in effect, disband it.

The PUC has to determine that the acquisition is in the public interest and that the purchase price is appropriate. Unlike water utilities, there does not be a statutory assumption that municipal operation of a wastewater utility is deemed to be in the public interest. The public interest determination focuses on 1.) the likely level of service that will be provided and 2.) the purchase price. The PUC precedents, which is primarily driven by one private utility acquiring another private utility, is that the appropriate purchase price is net cost less accumulated depreciation. (This establishes the rate base that the PUC would then allow to be included in the subsequent rates.) However, there are cases where PUCs (not in New Hampshire) have allowed replacement cost with or without depreciation. Assuming that the PUC rules in the City’s favor, the City could then complete the taking and acquiring the utility. At this point, the private utility or the City retains the right to appeal some or all of the PUC determination to the court system.

It is important to note that this process is likely in a state of flux currently given the recent New Hampshire Supreme Court ruling on Nashua’s attempt to take Pennichuck Water. This has muddied the process, which is unlikely to be clarified for some time.

Based on the 2007 annual report filed by Bodwell Waste Services, Corporation, the original cost for the system totaled approximately \$2.2 million. That includes approximately \$867,000 in contributions in aid of construction (CIAC). The current depreciated value of the total system is approximately \$1.7 million--\$672,000 representing CIAC.

General

There may be other similar private sewers in the Cohas Brook Sewer Project Area, and throughout the remainder of the city. A similar approach can be used for acquiring these private developments if desired to be in the City’s best interest in the future.

7.3 Public Participation

Given that the intent of this project is to continue to provide quality service to the residents of Manchester while keeping with the themes and goals of the City's "Draft Master Plan for the City of Manchester, New Hampshire", public participation is a critical component for the successful implementation. As part of the development of this Sewer Master Plan, a sewer questionnaire was distributed to each unsewered property within the study area. As discussed earlier in Section 2.4.4, 76 percent of the 700 properties in the project area responded to the questionnaire. Of those that responded, 73 percent indicated a desire for sewers in their neighborhood.

Additionally, a Public Meeting to discuss this project was held on August 4th, 2009. A copy of the notification and list of attendees to the Public Meeting is provided in Appendix G. Lastly, a Sewer Connection Fact Sheet (See Appendix G) was prepared by the City for issuance to property owners to provide guidance on connecting to the City's sewer system and the current sewer rates and charges.

Similar public participation should be continued throughout the future design and construction phases of the project. This continued public outreach should include:

- Public Meetings for each individual contract during the design and/or construction phase;
- Continued issuance of the Sewer Connection Fact Sheet to residents inquiring about the project; and
- Meeting with each individual property owners early on during the construction phase of each contract to inform them of the future construction in the area, determine the most appropriate location and elevation of the sewer service for the property, and establish a phone number for the property owner to call with questions and concerns implementation of the contract.