Report

Alternatives Analysis
Environmental Restoration Program
East Syracuse Minoa Central School District ERP Site
East Syracuse, New York

ERP Site # E734105

October 2010
(Revised October 2011)

S&W
REDEVELOPMENT

ALTERNATIVES ANALYSIS

EAST SYRACUSE MINOA CENTRAL SCHOOL DISTRICT
ERP SITE No. E734105

KIRKVILLE ROAD

EAST SYRACUSE, NEW YORK

Prepared for

East Syracuse Minoa Central School District

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SECTION 1 – INTRODUCTION

The East Syracuse-Minoa Central School District ('School District' or ESM) has completed a Remedial Investigation (RI) at a 43-acre parcel of land (the 'Site') it owns along Kirkville Road in the Town of Manlius, New York (Figure 1). The Site currently consists of open fields mixed with wooded lands (Figure 2), and was formerly used for at least 40 years by previous owners as agricultural fields (western portion) and as an apple orchard (eastern portion). There are no existing structures at the site, nor is there any knowledge or evidence that previous structures ever existed.

The School District is interested in retaining the site for recreational uses, and, in the future, potentially developing the Site to accommodate a public recreational use. To address the potential environmental concerns associated with the previous use of the Site, the School District has entered into a State Assistance Contract (SAC) with the New York State Department of Environmental Conservation (NYSDEC) to admit the site into the NYSDEC Environmental Restoration Program (ERP). Under the ERP, a Remedial Investigation (RI) was completed by S&W Redevelopment of North America, LLC (SWRNA) in 2007 and 2008 in accordance with the NYSDEC's Department of Environmental Remediation (DER) Draft DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC, December 2002). An RI Report (SWRNA, October 2010, revised August 2011) was prepared that summarizes the findings of the RI. The RI Report provides a basis for the screening and selecting an appropriate remedial alternative to prepare the site for reuse. This Alternatives Analysis Report (AAR) identifies and evaluates remedial alternatives for the site, and recommends a remedy.

SECTION 2 – SITE DESCRIPTION AND HISTORY

The Site is located along Kirkville Road in the Town of Manlius and is made up of Tax Parcels 055.-01-03.0 (32.91 acres) and 055.-01-02.0. Properties adjacent to the Site boundaries include the Canterbury Woods residential subdivision along a portion of its southern boundary; wooded land along a portion of its eastern boundary between Kirkville Road and the Canterbury Woods subdivision; Kirkville Road along its northern and western boundaries, and an idle field belonging to the ESMCSD along the southernmost property line (Figure 2). Residences and a portion of the ESMCSD high school athletic fields are located across Kirkville Road from the Site.

The site is essentially flat, with a gradual elevation change from approximately 415-feet above mean sea level (amsl) in the southwest to approximately 405-feet amsl in the northeast (Figure 1). This elevation change provides a gentle downward slope towards the northeast, and a total relief of 10-feet across the site.

There are several shallow surface drainage features on site ("swales"), and man-made drainage ditches also exist along portions of the southern and along the eastern Site boundaries.

Past owners of the site are identified in the Environmental Restoration Program (ERP) Application. The East Syracuse-Minoa Central School District currently owns the Site, which was acquired from John and Norma Greiner in 1974. John Greiner received the property from Hannah Greiner in 1920. Historically, the entire property has been used for agricultural purposes, with apple orchards in the central and eastern portions and possibly potato fields or other agricultural operations in the western area (Figure 2).

There is no evidence that any petroleum or chemicals were stored historically onsite, but given the site's previous agricultural use, pesticides may have been used on the apple trees and fuel may have been transferred from portable containers (e.g. fuel storage tanks on the back of a pickup) to farming related equipment onsite.

SECTION 3 – SUMMARY OF RI AND EXPOSURE ASSESSMENT

The results of the RI were provided in the RI Report (SWRNA, October 2010), along with analytical data tables, laboratory analytical reports, and a human health exposure assessment. This section of the AAR provides a general summary of the results for each sampled medium.

3.1 - SOIL

RI analytical data indicated the primary site-related contaminants were metals and pesticides in surface soil, most notably arsenic (a metal) and dieldrin (a pesticide), which seem to be related to past site agricultural practices. The area of surface soils corresponding to the former orchard, in the north central portion and the southeast corner of the site, had the highest concentrations of these parameters. Metals and pesticides were also detected outside the former orchard area, but at lower concentrations. The RI Report compared the soil analytical data to Unrestricted Use, Restricted Residential and Groundwater Protection Soil Cleanup Objectives (SCOs). The data was further evaluated based on Restricted Residential use of the Site, based on the current actual and future anticipated site use patterns. Figures 3 and 4 show analytical data for arsenic and dieldrin, respectively, in terms of Restricted Residential SCOs.

Metals and pesticides were also detected in surface soil samples collected outside the orchard area, but they were below Restricted Residential SCOs. Several pesticides were detected in surface soil outside the orchard area above Unrestricted Use SCOs.

Laboratory analysis of subsurface soil samples collected below one-foot deep did not detect any parameters above Restricted Residential SCOs, and only one parameter in one of the subsurface soil samples (the pesticide endrin) was above Groundwater Protection SCOs.

Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs), and Polychlorinated Biphenyls (PCBs) were not detected in any of the soil samples above Unrestricted Use SCOs.

3.2 - GROUNDWATER

Groundwater monitoring wells were installed on site, as shown on Figure 5. One pesticide, dieldrin, was found slightly above groundwater quality standards in groundwater samples collected in July 2008 from downgradient wells MW-4 and MW-6. Dieldrin was not detected in any groundwater samples collected in November 2008. Monitoring wells MW-4 and MW-6 are located within the former orchard area (Figure 5). No VOCs were detected in any of the groundwater samples collected from the site. One SVOC (4-methylphenol) was detected, below standards, in one well during the July 2008 sampling event, but was not detected in any groundwater samples collected in November 2008.

Several metals were detected above groundwater quality standards in all of the groundwater samples collected in July and November 2008, including upgradient monitoring wells (MW-1 and MW-5) and downgradient wells. Groundwater samples collected in June 2009 were analyzed for total (unfiltered) and dissolved (filtered) metals and the samples had lower turbidities than the previous 2008 samples. The majority of metals that were detected above standards in the 2008 samples were below standards or non-detect in the 2009 filtered and unfiltered samples. Based on the analytical data it appears that sample turbidity affected the metals analytical results for the July and November 2008 sampling events as discussed in the Remedial Investigation Report (SWRNA, March 2011). Only iron and thallium were detected above standards or guidance values in the 2009 groundwater samples (in all three samples analyzed), but neither of these metals appears to be associated with historic activities in the former orchard area. The detected concentrations of iron and thallium in the groundwater samples are likely due to naturally occurring conditions at the site.

Groundwater samples from monitoring well MW-6, which is located where the highest concentrations of lead and arsenic were found in surface soil during a previous investigation (Sear Brown, September 2001), did not contain arsenic above laboratory detection limits and contained lead below water quality standards.

3.3 - SEDIMENTS

Sediment samples were collected from two man made drainages ditches along the southern and eastern site boundaries, at locations shown on Figure 2. The Severe Effects Level (SEL) sediment criterion was exceeded only for zinc, in a sediment sample from the southern drainage ditch. The Lowest Effect Level (LEL) was exceeded for copper, iron, manganese, nickel, and zinc in the sediment sample from the southern ditch, and copper and zinc in sediment samples collected from the eastern ditch. One pesticide (4,4'-DDE) exceeded the Human Health Bioaccumulation criteria in sediment samples from the eastern ditch, but was below the ecological criteria (benthic and wildlife).

The SEL and LEL are ecological sediment criteria that translate to potential human exposure only to the extent that fishing and fish consumption take place. However, the drainage ditches do not support an aquatic habitat for fish, so site sediments do not represent a potential human exposure path by this scenario. Direct contact exposure to drainage ditch sediments by humans is minimized by the consistent presence of standing water in the ditches, which discourages pedestrian contact.

Aside from the artificial drainage ditches, there are no surface water features on the site. Two areas were mapped as freshwater wetlands by NYSDEC, but these areas typically do not contain standing water.

3.4 - HUMAN EXPOSURE ASSESSMENT

The potential for human receptors to be exposed to contaminants that exist in site surface soils is based on current and reasonably anticipated future land use. Restricted Residential SCOs are considered an appropriate guidance value to apply to the human health exposure assessment for this site based on current and future anticipated uses.

Under existing site conditions, a potential exposure path exists for on-site surface soils. The receptor population includes school personnel and students who use the site, and adolescent and adult trespassers who may come into contact with surface soil at the site. This route of exposure is generally minimized by vegetation that covers most of the site, but discrete areas lacking vegetation cover exist along the foot trails.

The same potential exposure path may apply to future recreational users of or construction workers at the site. Arsenic and dieldrin are considered contaminants of potential concern (COPCs) in surface soil in the north-central portion of the site. This portion of the site, corresponding to the former orchard, is considered the only area in which a complete or potentially complete exposure path exists with respect to the COPCs in surface soil when the current and reasonably anticipated future use of the site is taken into consideration. Although dieldrin and arsenic, as well as other pesticides and metals, were also detected in surface soil outside this area, the concentrations were lower, and below Restricted Residential Use SCOs. There are no known complete or potentially complete exposure pathways relative to other site media (i.e. groundwater, soil vapor, surface water or sediment) based on the current and reasonably anticipated future use.

It is noted that without any site use restrictions in place, potential exposure paths exist in relation to surface soils across the majority of the site, based on a comparison with Unrestricted Use SCOs. However, Unrestricted Use exposure scenarios do not currently or in the reasonably anticipated future occur at the site. Because Restricted Residential SCOs apply to the current and reasonably anticipated future use of the site, this use criteria will be included in the remedial alternatives analysis and remedy selection.

SECTION 4 – REMEDIAL GOALS AND REMEDIAL ACTION OBJECTIVES

The overall remediation goal for the site is to protect human health and the environment from site-related contamination in a manner that is consistent with current, intended and reasonably anticipated future use of the site. The appropriate remedial action to meet these goals depends on the nature and extent of contamination, the planned future use of the site, and the existence of exposure pathways to contamination relative to the planned use. As previously stated, the future contemplated use for the site is for public recreational use, which falls into the category of Restricted Residential.

In order to achieve site remediation goals, the following Remedial Action Objectives (RAOs) have been identified.

- Eliminate, or reduce to the extent practicable, on-site soil contamination;
- Eliminate, or reduce to the extent practicable, current human exposure to site soil;
- Eliminate, or reduce to the extent practicable, potential future exposure to soil that contains residual contamination above Restricted Residential SCOs.
- Eliminate, or reduce to the extent practicable, future exposure to site groundwater;

Remedial alternatives are evaluated in this AAR to review if they achieve these RAOs. Because the site remedial objectives are related to contaminants in surface soils the alternatives evaluated consider achieving 1.Unrestricted Use SCOs and 2. Restricted Residential Use SCOs (the current and reasonably anticipated future use). In addition, accordance with DER-10, the No Action alternative is also included in the alternatives analysis.

Unrestricted Uses allow all potential uses to occur at the Site.

DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC, May 2010) identifies the following criteria for Restricted Residential uses allowed at the Site:

> The restricted residential use category allows a site to be used for residential use but only when there is common ownership or control by a single owner/managing

entity of the site. Restricted residential use is the land use category intended for apartments, condominium, co- operative or other multi-family/common property control residential development. The restricted residential use category:

i. allows only two restrictions on the use of the site:
(1) a groundwater use restriction; and/or
(2) a prohibition against producing animal products for human consumption; and

ii. requires at a minimum the following additional restrictions on the use of the site:
(1) a prohibition on vegetable gardens on the site, unless planted in gardens where the soil achieves the residential use soil cleanup objectives; and
(2) a prohibition of single-family housing;

iii. requires a SMP to manage remaining contamination and institutional/ engineering controls at the site;

iv. is the appropriate use category for the following site uses:
(1) day care or other child care facilities;
(2) elementary or secondary schools; or
(3) college or boarding school residential buildings; and

v. allows for active recreational uses, which includes recreational activities with a reasonable potential for soil contact, such as:
(1) designated picnic areas;
(2) playgrounds; or
(3) natural grass sports playing fields, including surrounding unpaved spectator areas.

SECTION 5 – ALTERNATIVES ANALYSIS

The goal of the remedy selection process in the ERP is to select a remedy for a site that is overall protective of public health and the environment, taking into account the current, intended, and reasonably anticipated future land use of the site.

As identified in the RAOs, the remedial approach is focused on soil contaminants and the potential exposures to humans and the environment through contact and ingest.

No specific remedial actions are proposed relative to groundwater for this site, because RI data indicate that historic site activities have not had a significant impact on groundwater. Groundwater from the site does not appear to negatively impact off site areas. In addition, on-site contact with groundwater is effectively preempted by the fact that the surrounding area is supplied by a municipal water source.

No specific remedial actions are proposed for soil vapor because the RI data indicated that volatile organic compounds (VOCs) were not a contaminant of concern in soil or groundwater.

The Alternatives Analysis identifies and compares potential site remedies. In accordance with DER-10 the alternatives to be evaluated are: a No Action, a Unrestricted Use, and an alternative that achieves the Restricted Residential Use of the Site.

The proposed alternatives are each evaluated and compared in terms of nine (9) specific criteria identified in 6 NYCRR Part 375-1.8(f):

- Compliance with standards, criteria, and guidance (SCGs)
- Protection of human health and the environment
- Short-term impact and effectiveness
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume of contamination
- Implementability
- Cost effectiveness
- Land use
- Community Acceptance

The ninth criterion, community acceptance, will be further evaluated during public comment periods when feedback may be provided in relation to the proposed remedial alternative. The selected remedial action should produce a tangible benefit to the local community by achieving RAOs consistent with the current and reasonably anticipated future use for the site.

The following is an overview of each alternative, No Action, Unrestricted Use and Restricted Residential Use and a comparative evaluation of the three (3) alternatives for the site, with respect to the nine evaluation criteria.

5.1 NO ACTION ALTERNATIVE

The No Action alternative would leave the site in its current state. The No Action alternative assumes that if future development of the site were to occur that no specific remedial actions would be taken.

The No Action alternative is the readily implemented and the least costly alternative. This alternative would provide no control over potential exposure to contaminants identified at the site, so the risk of exposure to site contaminants would remain similar to current conditions.

This alternative would not rely on any additional measures to meet chemical specific SCGs, or actively reduce the toxicity, mobility, or volume of contamination.

Potential for wildlife contact with site contaminants would also remain the same as current conditions.

The No Action alternative would avoid short term risks to the public that can be associated with implementing a more aggressive remedy, such as soil removal or constructing a soil cover, as particulates (dust) are emitted into the atmosphere during soil excavation and construction work.

Under the No Action alternative, use restrictions, engineering controls, and institutional controls would not be placed on the site to mitigate the risk of human exposure to soil.

Even if the planned redevelopment of the site was carried out in a manner that provided a barrier that precludes exposure to contaminated soil, without the institutional controls there would not be a requirement to maintain that barrier. Without institutional controls, the use of untreated site groundwater could potentially occur.

The No Action alternative is not consistent with the remedial action objectives and is generally not consistent with applicable SCGs.

5.2 UNRESTRICTED USE ALTERNATIVE

An Unrestricted Use remedy would maximize the range of potential land use scenarios for the site. This alternative would require a remedial approach that would result in no future restrictions to site use (i.e. the level of cleanup should permit all types of future reuse scenarios), and no institutional/engineering controls to address exposure and achieve the remedial action objectives (RAOs). However, it would allow for groundwater use restrictions to be placed on the site.

An Unrestricted Use alternative requires that site remediation be completed to meet Unrestricted Use SCOs, thereby meeting SCGs for soils. This would permanently remove the volume of contaminated soil that exists at the site by requiring excavation of soil across the majority of the site, to achieve Unrestricted Use SCOs. To accomplish this, soil would have to be removed, until Unrestricted Use SCOs are met or bedrock is encountered. This would require removal and grubbing of trees, removal of soil across the majority of the site to a depth of approximately two (2) foot, in an area as shown on Figure 7. Off-site soil would need to be imported to the site to reestablish site grades and promote drainage. It is assumed that the backfilled soil would include four (4) inches of topsoil overlying twenty (20) inches of general soil fill. The site would then need to be stabilized with vegetative growth to preclude erosion. In general, approximately 96,800 cubic yards (cy) of soil would be excavated from the site and transported to a facility permitted to receive and manage the soil. This would equate to approximately 5,000 truck-trailer loads of soil. A corresponding amount of off-site soil would need to be hauled to the site to achieve grades and drainage consistent with the existing site topography.

Once the remedial action is completed a Final Engineering Report would need to be prepared that certifies that the remedial action was completed in accordance with an approved Remedial Work Plan. The FER would summarize the remedial activities, include data and would be certified by a Professional Engineer licensed in NYS.

An Unrestricted Use remedy would eliminate the potential on-site risk associated with direct human contact with contaminated soil and would provide a benefit in relation to potential fish and wildlife exposure by removing contaminated soil from the site.

An Unrestricted Use remedy would create a short-term risk associated with soil excavation and construction activity, and off site transport and disposal of contaminated soil.

5.3- RESTRICTED RESIDENTIAL USE ALTERNATIVE

This section reviews the Restricted Residential Use remedial action alternative for the site. The Restricted Residential Use alternative for this site would include the following elements:

1. Engineering controls. Engineering controls for the site could include soil covers to protect against potential human contact with a minimum of two (2) feet of soil across the site that meets the Restricted Residential SCOs.

2. Institutional Controls. Institutional controls to restrict the use of the site, and use of groundwater at the site, would be put in place to further limit the potential for human or environmental exposure. The institutional controls for this site would be recorded in an Environmental Easement, filed with the Onondaga County Clerk's office, and would inform all future owners of these controls. As part of the Environmental Easement, a Site Management Plan (SMP) would be prepared to address how site soils would be characterized and handled for any future construction work that takes place at the site after the remedial action is complete. The SMP would also specify how the soil cover engineering controls are to be periodically inspected and maintained to preclude exposure to soils.

Engineering controls and institutional controls would meet the stated remedial action objectives for this site and support the current, intended and reasonably anticipated future use of the site. A detailed discussion of each element follows.

5.3.1 - ENGINEERING CONTROLS

The engineering controls under the Restricted Residential approach would include a soil barrier (which can include 6-inches of asphalt pavement, 6-inches of concrete slab, or two feet of soil/aggregate material) to preclude potential exposure to soils that exceed restricted residential SCOs. It is estimated that approximately 7 to 10 acres of the site associated with the former orchard area potentially has soil that exceeds Restricted Residential Use SCOs (Figure 6). The remainder of the site would meet the Restricted Residential SCOs and therefore would not require any remedial action.

Any on-site soil that is used to create two feet of cover will meet the Restricted Residential Use SCOs identified in 6NYCRR Part 375-6.8(b) for protection of human health. If off-site soil is used for cover, the soil will meet the lower of the SCOs for Restricted Residential Use or the protection of groundwater as identified in 6NYCRR Part 375-6.8(b). Based on the analytical data, it is anticipated that the top one (1) foot of existing soil within the former orchard area is where the majority of the soils with contamination greater than Restricted Residential Use SCOs exists. Based on removing one (1) foot of soil across an area of approximately 10 acres the volume of soil removed would be approximately 16,200 cubic yards (cy). The surface of the soil excavation area would need to be sampled to confirm that the Restricted Residential SCOs were achieved. Areas that did not achieve the SCOs would need to be further excavated. Off-site soil would need to be imported to the site to reestablish site grades and promote drainage. It is assumed that the backfilled soil would include four (4) inches of topsoil overlying eight (8) inches of general soil fill. The site would then need to be stabilized with vegetative growth to preclude erosion. The soil excavated from the site would then be transported to a facility permitted to receive and manage the soil. This would equate to approximately 810 truck-trailer loads of soil. A corresponding quantity of off-site soil would need to be

hauled to the site to achieve grades and drainage consistent with the existing site topography.

Once the remedial action is completed a Final Engineering Report would need to be prepared that certifies that the remedial action was completed in accordance with an approved Remedial Work Plan. The FER would summarize the remedial activities, include data and would be certified by a Professional Engineer licensed in NYS.

The requirements for maintaining the engineering controls would be described in a Site Management Plan (SMP), which will be referenced in the site Environmental Easement. The Environmental Easement and SMP will require on-going annual certification, unless otherwise provided in writing by the NYSDEC, of the engineering controls effectiveness. The annual certification will be signed by a professional engineer or by a qualified environmental professional as approved by the NYSDEC.

5.3.2 - INSTITUTIONAL CONTROLS

As required under the ERP, institutional controls will be implemented through recording of the Environmental Easement, in a form acceptable to NYSDEC, with the Onondaga County clerk's office and notify municipal officials in Onondaga County and the Town of Manlius.

Restricted Residential Use would impose the following institutional restrictions on the property include:

- Prohibition of the site from ever being used for purposes other than the contemplated use without the expressed written waiver of such prohibition by the Department, or if at such time the Department no longer exists, any New York State Department, Bureau, or other entity replacing the Department. Prohibited uses include vegetable gardens, single family housing, daycare facilities, elementary or secondary schools, or college or boarding school residential buildings;

- Prohibition of the use of the groundwater underlying the site without treatment rendering it safe for drinking water or industrial purposes, as appropriate, unless user first obtains permission to do so from the Department, or if at such time the Department no longer exists, any New York State Department, Bureau, or other entity replacing the Department.
- Development and implementation of a Site Management Plan specifying the use of soil covers and management of soils that may be excavated at the site during future development.
- The property owner will provide a periodic certification to the NYSDEC, prepared by a professional engineer or such other qualified environmental professional acceptable to the NYSDEC, until the NYSDEC notifies the property owner in writing this certification is no longer needed. This submittal will contain certification that the engineering and institutional controls are still in place, that the NYSDEC is allowed access to the site, and that nothing has occurred that will impair the ability of the control to protect the public health or the environment, or constitute a violation or failure to comply with the Site Management Plan (SMP).

These institutional controls will be identified in an Environmental Easement between the property owner and NYSDEC.

The Environmental Easement will be recorded within 30 days of the NYSDEC's execution of the Environmental Easement. The Environmental Easement will be recorded with the Onondaga County Clerk. A copy of that instrument will be provided to NYSDEC certified as recorded by the County Clerk.

5.4 - EVALUATION OF ALTERNATIVES

The evaluation of alternatives compares the No Action, Unrestricted Use and Restricted Residential Use alternatives.

In accordance with ERP guidance, the selected remedy will provide protection to public health and the environment, taking into account the current intended and reasonably anticipated future land use of the site.

An evaluation has been prepared to identify a suitable remedial action in accordance with 6NYCRR Part 375 1.10 (c) (1-6). In the specific context of the contemplated end use of the property, the selected remedy should be:

- Consistent with applicable standards, criteria, and guidance (SCGs).
- Protective of the public health and the environment.
- Effective for both short-term and long-term.
- Able to reduce toxicity, mobility, and volume of the hazardous constituents.
- Feasible from implementability and cost effective perspective.
- Reasonably anticipated to be acceptable to the local community.

5.4.1 - Compliance with Standards, Criteria, and Guidance (SCGs)

A review of the standards, criteria and guidance documents pertinent to site specific conditions have been completed. Groundwater SCGs are based on 6NYCRR Part 703 and ambient water quality standards and guidance values. The SCG for soil is the 6 NYCRR Part 375-6.8(b) Restricted Residential Soil Cleanup Objectives (SCOs).

A No Action alternative will not meet SCGs for soil in the former orchard area. An Unrestricted Use alternative remedy will meet SCGs for all soil within the site boundary. A Restricted Residential Use alternative will comply with soil SCGs for the designated use. The removal of soil with contaminants that exceed Restricted Residential SCOs and placement of a soil cover will mitigate the potential human health and ecological exposure pathway given the current and anticipated future use.

Because RI analytical data indicate site soil is not causing significant groundwater contamination, it is unlikely that Unrestricted Use soil removal would provide a measurable improvement in groundwater quality compared to No Action or Restricted Residential Use alternatives. In addition, since both Unrestricted Use and Restricted

Residential Use alternatives can restrict groundwater use at the site to eliminate any potential human exposure to groundwater impacts, they are equally protective.

5.4.2 – Protection of Human Health and the Environment

The No Action alternative would not provide additional protection of human health or the environment. Both Unrestricted Use and Restricted Residential Use alternatives are protective of human health and the environment. The Unrestricted Use alternative would remove soil contamination to meet soil SCGs, whereas the Restricted Residential Use alternative would leave some subsurface soils in place above Unrestricted Use SCOs below engineering controls, where it will not be accessible to humans or wildlife. The Site Management Plan under Restricted Residential Use will provide further protection if soils are excavated during future development.

The No Action alternative would not limit future exposure to site groundwater. Unrestricted Use and Restricted Residential Use both permit groundwater use restrictions, so are equally protective to human health relative to groundwater exposure. As previously noted, site soil has not been identified as a source of groundwater contamination at the site, so the significant soil removal required for Unrestricted Use is not likely to produce a measurable improvement to groundwater quality compared to Restricted Residential Use.

VOCs are not a contaminant of concern for this site, so No Action, Unrestricted Use and Restricted Residential Use are equal in terms of reducing potential exposure to soil vapor.

5.4.3 – Short-Term Effectiveness

The No Action alternative would have no immediate effect on site contaminant levels or potential exposure, but there are potential short-term effects related to potential future construction. Under the No Action alternative, there would be no SMP to govern soil management and air monitoring during future construction work.

Unrestricted Use would require widespread excavation of soil to meet SCGs. Restricted Residential Use would include a lesser degree of soil excavation (~80% less) or movement of soil in specific areas to achieve grades required for current, intended or reasonably anticipated future uses. Future construction activities subsequent to the initial remedial actions at the site, if any, could potentially involve excavation and disturbance of subsurface soils or fill material that are left in place under Restricted Residential Use. The Restricted Residential Use approach has less potential for exposure to workers and the community than Unrestricted Use, due to the reduced volume of soil excavation during implementation of the remedy.

After remediation under the Unrestricted Use alternative, the risk of exposure to site construction workers would likely be lower than for Restricted Residential Use. However, this is offset by a relatively greater exposure risk during the implementation of an Unrestricted Use compared to a Restricted Residential Use, since more soil would be excavated and transported off-site for disposal at a solid waste permitted facility under the Unrestricted Use alternative. The proposed Restricted Residential Use and Unrestricted Use approach would include a Health and Safety Plan (HSP) and Community Air Monitoring Plan (CAMP) to identify requirements for action levels, personal protective equipment and emergency procedures to address potential short-term impacts. The SMP under Restricted Residential Use will ensure that soils excavated in the future from the site are properly characterized and managed, to address potential exposure issues to site soils and would include implementation of a HSP and CAMP.

The potential exists for airborne contamination to be released from the site under both Unrestricted Use and Restricted Residential Use scenarios. The potential for airborne release is greater under an Unrestricted Use remediation approach than the proposed Restricted Residential Use approach since the level of excavation would be more extensive and a longer duration.

Airborne release potentially includes dust and vapor-phase contaminants, although for this site, dust is a greater potential concern since there are no identified volatile organic COPCs associated with site soil or groundwater. During excavation and construction under either Unrestricted Use or Restricted Residential Use, potential airborne releases will be mitigated by dust control measures during site work. Dust control measures may include wetting of travel areas that are exposed to soil surfaces that are prone to produce airborne dust. Under both Unrestricted Use and Restricted Residential Use scenarios, the

implementation of a Community Air Monitoring Plan (CAMP) during construction activities would monitor airborne dust that could potentially migrate off-site and provide a means to identify what controls need to be implemented.

A short term impact would also include the truck traffic on local roads hauling excavated soil from the site and hauling clean back fill to the site. The No Action Alternative has no impact relative to truck traffic. The Unrestricted Use alternative would include significantly more truck traffic (estimated at 10,000 total truck loads) compared to the Restricted Residential Use alternative (estimated at 1,620 total truck loads). The local road access road for the site has a long curve with limited site distance that would potentially create the potential for increased traffic accidents during truck hauling operations.

5.4.4 – Long-Term Effectiveness and Performance

The No Action alternative does not provide a long-term solution to site contamination or potential exposure. Both the Unrestricted Use alternative and the proposed Restricted Residential Use alternative provide a long-term and effective solution. Both alternatives will reduce public and environmental exposure to site COPCs. An Unrestricted Use remedy would provide a permanent solution due to the removal of all soils that did not meet Unrestricted SCOs. A Restricted Residential Use remedial action will require engineering and institutional controls to be recorded with the deed to the property via the Environmental Easement. Restricted Residential Use is considered equally effective and permanent as Unrestricted Use for this site based on the current, intended and reasonably anticipated future use. The Restricted Residential Use Site Management Plan will be referenced in the Environmental Easement and will require annual certifications of all controls and plan implementation.

5.4.5 – Reduction of Toxicity, Mobility, and Volume

The No Action alternative would not reduce toxicity, mobility, or volume of site contamination. Unrestricted Use would result in a greater reduction in the volume of soil COPCs on site than Restricted Residential Use, but it may not have a measurable effect on toxicity of soil COPCs compared to Restricted Residential Use, since Unrestricted Use

and Restricted Residential Use will both effectively mitigate exposure. During implementation of Unrestricted Use, the mobility of soil COPCs may be temporarily higher than that for Restricted Residential Use, since Unrestricted Use will require more extensive excavation than Restricted Residential Use. Following implementation, there is not likely to be any difference in toxicity and mobility of site contaminants between Unrestricted Use and the proposed Restricted Residential Use approach based on the current, intended and reasonably anticipated future use.

Based on RI data the soil COPCs have not significantly migrated into groundwater and there is no evidence of migration off site.

5.4.6 - IMPLEMENTABILITY

Technical and administrative feasibility of implementing the alternative remedial actions are all achievable. However, the implementation of the Unrestricted Use alternative would likely not be cost-effective for the planned end use of the property, due to costs and an extensive amount of time associated with handling, transporting, treatment, and disposal of large volumes of soil. Unrestricted Use is more difficult to implement than Restricted Residential Use owing to more extensive remedial activity that would likely be required to meet SCOs and potential impacts to the local community (truck traffic, noise, etc). More significant short term exposures are also created by the implementation of the Unrestricted Use remedy.

The No Action alternative is not consistent with the contemplated future use of the site. Unrestricted Use would support the widest range of future site uses. Under Restricted Residential Use, deed restrictions will apply, but will not prevent the productive end use of the property that is currently contemplated. Under Restricted Residential Use, installation and maintenance of the engineering controls/institutional controls are all readily implemented.

5.4.7 – COSTS

The No Action alternative would cost less than Unrestricted Use or Restricted Residential Use. The cost for implementing Unrestricted Use would significantly exceed the cost for Restricted Residential Use. Unrestricted Use would involve removing from the site a

much greater quantity of soil to meet unrestricted SCOs than the lesser extent of soil removal that may occur under Restricted Residential Use. Tables 6-1 and 6-2 present potential cost scenarios associated with conducting Unrestricted Use and Restricted Residential Use remedial actions, respectively. It is likely that the cost for implementing an Unrestricted Use remedy could be more than 10 times as much as the cost to implement a Restricted Residential Use remedy.

Because most of the engineering controls under Restricted Residential Use are associated with the contemplated end use of the site, these costs would not be avoided under Unrestricted Use. The significant cost of the Unrestricted Use alternative would likely make it cost prohibitive for the intended use of the site.

5.4.8 - Land Use

The No Action alternative, Unrestricted Use alternative, and the Restricted Residential Use remedy and end use are consistent with the current zoning. However, neighboring land uses are consistent with residential uses.

5.4.9 - Community Acceptance

The Restricted Residential Use remedy coupled with current, intended and reasonably anticipated future site use is aligned with community redevelopment interests. It is therefore anticipated that the planned site redevelopment, and a Restricted Residential Use remedy, will receive a favorable response from the local community. In order to obtain the necessary community acceptance, the selected remedy will be made available for public review and comment.

The Unrestricted Use remedy would provide a level of cleanup that exceeds what is necessary to support the site's intended use, such that the additional work required to achieve an Unrestricted Use cleanup may potentially reduce public acceptance. An Unrestricted Use remedy would increase the duration of construction work on site to excavate soils, cause an increase in construction traffic and noise, and create additional truckloads of soil to be hauled off site and on-site. These potential nuisances would be to a significantly lesser degree and have a shorter duration for a Restricted Residential Use remedy.

SECTION 6 – RECOMMENDED REMEDY

Based on the current, intended and reasonably anticipated future use of the site, the Restricted Residential Use remedial alternative would achieve the identified RAOs and conforms to the evaluation criteria. This remedy would include engineering controls to maintain soil barrier protection against potential exposure to contaminants that may exist in surface soils, and institutional controls relative to allowable site uses, site management and groundwater use. A Site Management Plan will require that engineering controls be properly maintained for that purpose during any future site activities and will provide guidance for any future site soil excavation and development.

6.3- FUTURE SITE DEVELOPMENT

The ESM Central School District may, in the future, redevelop the site for school and community recreational use. No specific site plans have been developed, but in concept the site's redevelopment could consist of a building or building complex that is open to the public, paved areas for parking and walkways, landscaped areas and recreational activities areas. The proposed build out is likely to require that certain areas be regraded to accommodate buildings, parking areas, and/or recreational areas. Fill material from off-site sources that is placed on site will meet the lower of the SCOs for restricted residential use or the protection of groundwater as identified in 6NYCRR Part 375-6.8(b). The future construction of paved areas or buildings could replace the soil cover as the engineering control. During site redevelopment and any future construction activities, specific actions will need to be implemented to mitigate potential exposure to humans and the environment to potentially contaminated soil. These actions will be described in a Remedial Design Document, a Site Management Plan (SMP) and a Community Air Monitoring Plan (CAMP).

Tables

Table 6-1. UNRESTRICTED USE ALTERNATIVE Preliminary Cost Estimate. Alternatives Analysis Report
ESM Greiner Orchards Site
ERP Site No E734105
April 2011

Elements of Cost	Units	Quantity	Unit Cost	Sub Cost	Total
Area Of Concern (~1,306,800 sq ft - 30 acres*)					
Remedial Design	LS	1	60,000	60,000	
Contract Documents/Contractor Selection	LS	1	45,000	45,000	
Sediment/Erosion Control					
Plan	LS	1	20,000	20,000	
Perimeter Controls	lf	12,000	2	27,600	
Contractor Mobilization	LS	1	30,000	30,000	
Grading/Clearing/Grubbing	sf	1,306,800	0.1	130,680	
Soil Removal					
Excavate	cy	96,800	8	774,400	
Haul/Disposal	tons	145,200	55	7,986,000	
Sampling/Analysis	ls	484	1,000	484,000	
Backfill					
** Off-site Topsoil	cy	16,117	25	402,930	
** Off-site Gen Fill	cy	80,828	15	1,212,420	
Sampling/Analysis	ls	194	800	155,200	
Seeding/Fertilizer-Hydroseed	acre	30	800	24,000	
Site Representative/Contract Admin	day	90	1,500	135,000	
Documentation	ls	1	55,000	55,000	
					$11,542,000
				Contingency (15%)	$1,731,000
				Total Estimated Cost	**$13,273,000**

Notes:

The estimate of cost is preliminary and based on preliminary concepts based on available information
A Remedial Work Plan has not been prepared.
Therefore the preliminary estimate of cost has significant uncertainty until a Remedial Work Plan is completed.
The estimate of cost does not include any remedial action associated with groundwater.
Future maintenance of soil cover including repairs and mowing are part of site operations costs and not included

* **Assumes that 70 percent of the site (30 acres) would require soil excavation to two feet deep to meet Unrestricted SCOs.**

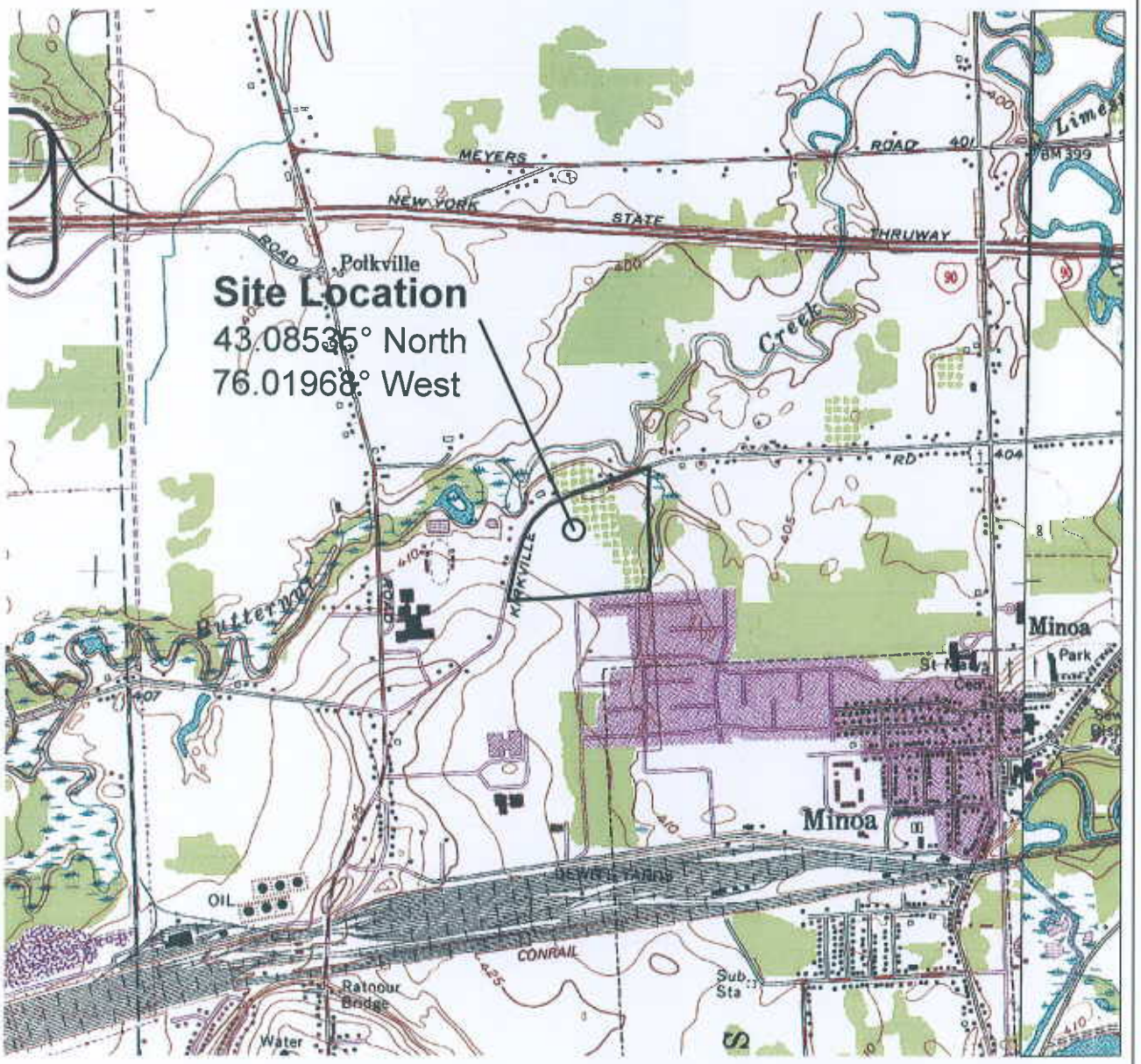
** **Assumes 1.67 feet of general fill and 4 inches of topsoil across the excavated area.**

Table 6-2. RESTRICTED RESIDENTIAL USE ALTERNATIVE Preliminary Cost Estimate. Alternatives Analysis Report
ESM Greiner Orchards Site
ERP Site No E734105
April 2010

Elements of Cost	Units	Quantity	Unit Cost	Sub Cost	Total
Area Of Concern (~ 310,000 sq ft - 7 acres)					
Remedial Design	LS	1	60,000	60,000	
Contract Documents/Contractor Selection	LS	1	25,000	25,000	
Sediment/Erosion Control					
Plan	LS	1	15,000	15,000	
Perimeter Controls	lf	5,000	2	11,500	
Contractor Mobilization	LS	1	30,000	30,000	
Grading	sf	310,000	0.10	31,000	
Soil Removal					
* Excavate	cy	11,481	8	92,000	
Haul/Disposal	tons	17,222	45	775,000	
Sampling/Analysis	ls	57	1,800	102,600	
Drainage Geotextile Installed	sy	34,444	2	72,000	
Backfill					
** Off-site Topsoil	cy	3,823	25	95,583	
** Off-site Gen Fill	cy	7,693	15	115,389	
Sampling/Analysis	ls	23	800	18,400	
Seeding/Fertilizer-Hydroseed	acre	7	800	5,693	
Site Representative/Contract Admin	day	60	1,500	90,000	
Documentation	ls	1	40,000	40,000	
					$1,579,000
				Contingency (15%)	$237,000
				Total Estimated Cost	$1,816,000

Notes:
The estimate of cost is preliminary and based on preliminary concepts based on available information
A Remedial Work Plan has not been prepared.
Therefore the preliminary estimate of cost has significant uncertainty until a Remedial Work Plan is completed.
The estimate of cost does not include any remedial action associated with groundwater.
Future maintenance of soil cover including repairs and mowing are part of site operations costs and not included
* **Assumes one (1) foot of soil needs to be removed from approx.** 7 acres of the Former Orchard area to achieve Restricted Residential SCOs
** **Assumes 8 inches of general fill and 4 inches of topsoil over approximately 7 acres;**

Figures



SCALE: 1" = 2,000'

1,000 0 1,000 3,000 5,000

Contour Intervals 5 & 10 Feet

Map Taken From: USGS 7.5 Minute Series Topographic
Syracuse East (1957 Photorevised 1978) &
Manlius (1973 Revised 1993)
(www.nysgis.state.ny.us/quads/usgsdrg.htm)

QUADRANGLE LOCATION

S&W Redevelopment of North America, LLC Syracuse, New York DATE: 11/2011 JOB No.:N6005	East Syracuse–Minoa Central School District Greiner Orchards, Kirkville Road East Syracuse, NY 13057
	FIGURE 1 Site Location Map

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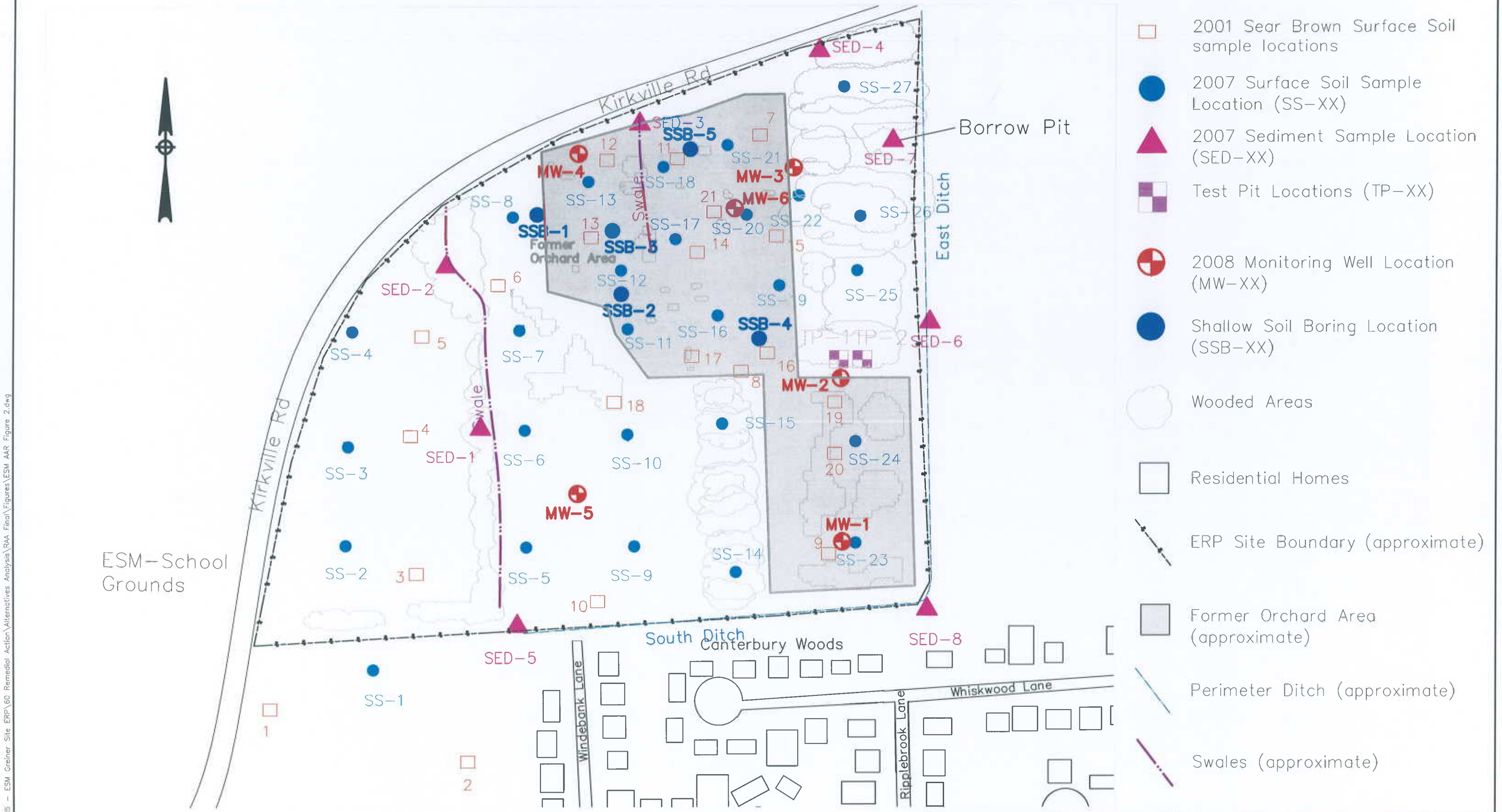

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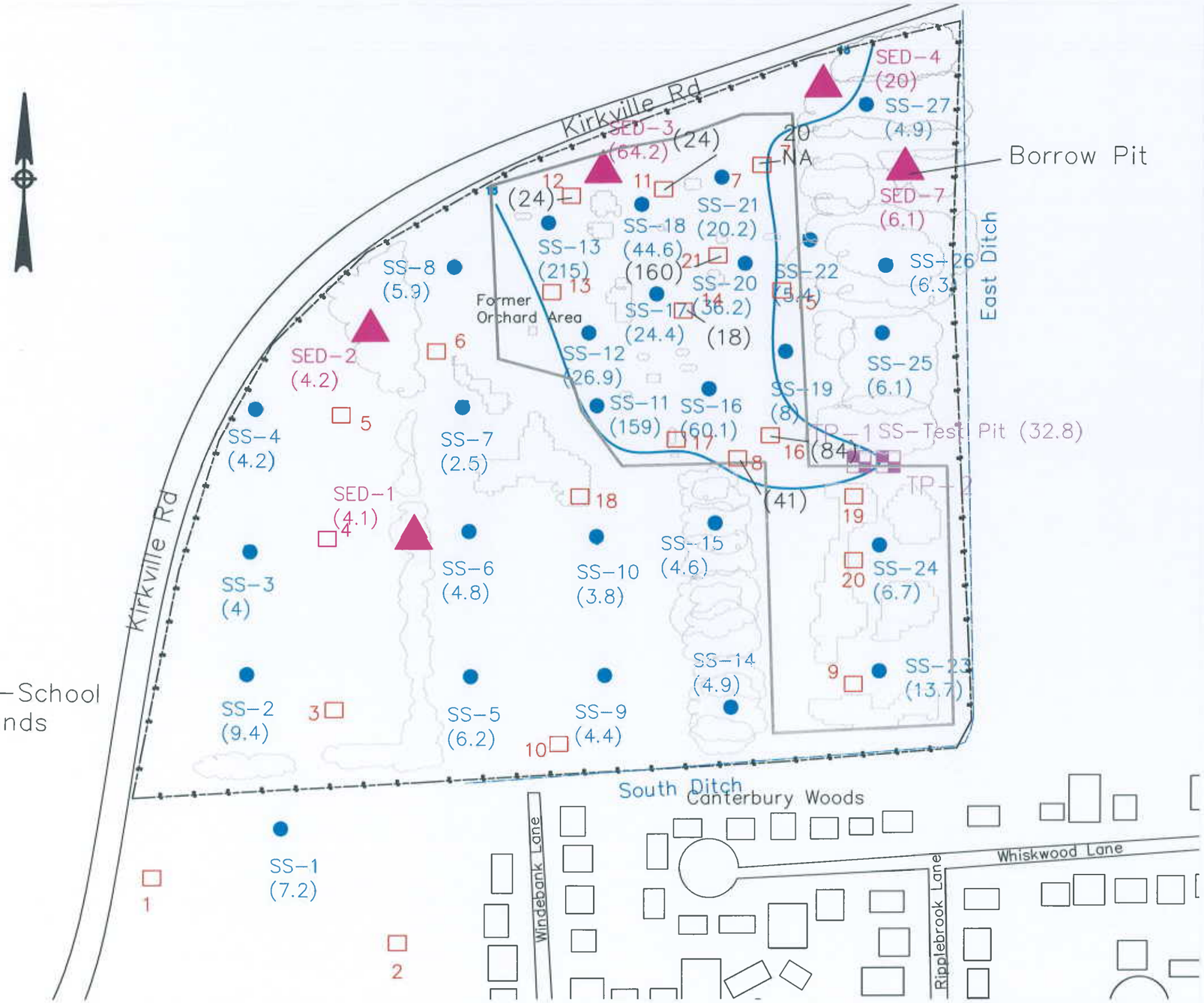
of North America, LLC.
Syracuse, NY
DATE: 11/2011 JOB No: N6005

Alternatives Analysis Report
East Syracuse-Minoa Central School District
Greiner Orchards
East Syracuse, NY

FIGURE 2
Site Plan & RI Sample Locations



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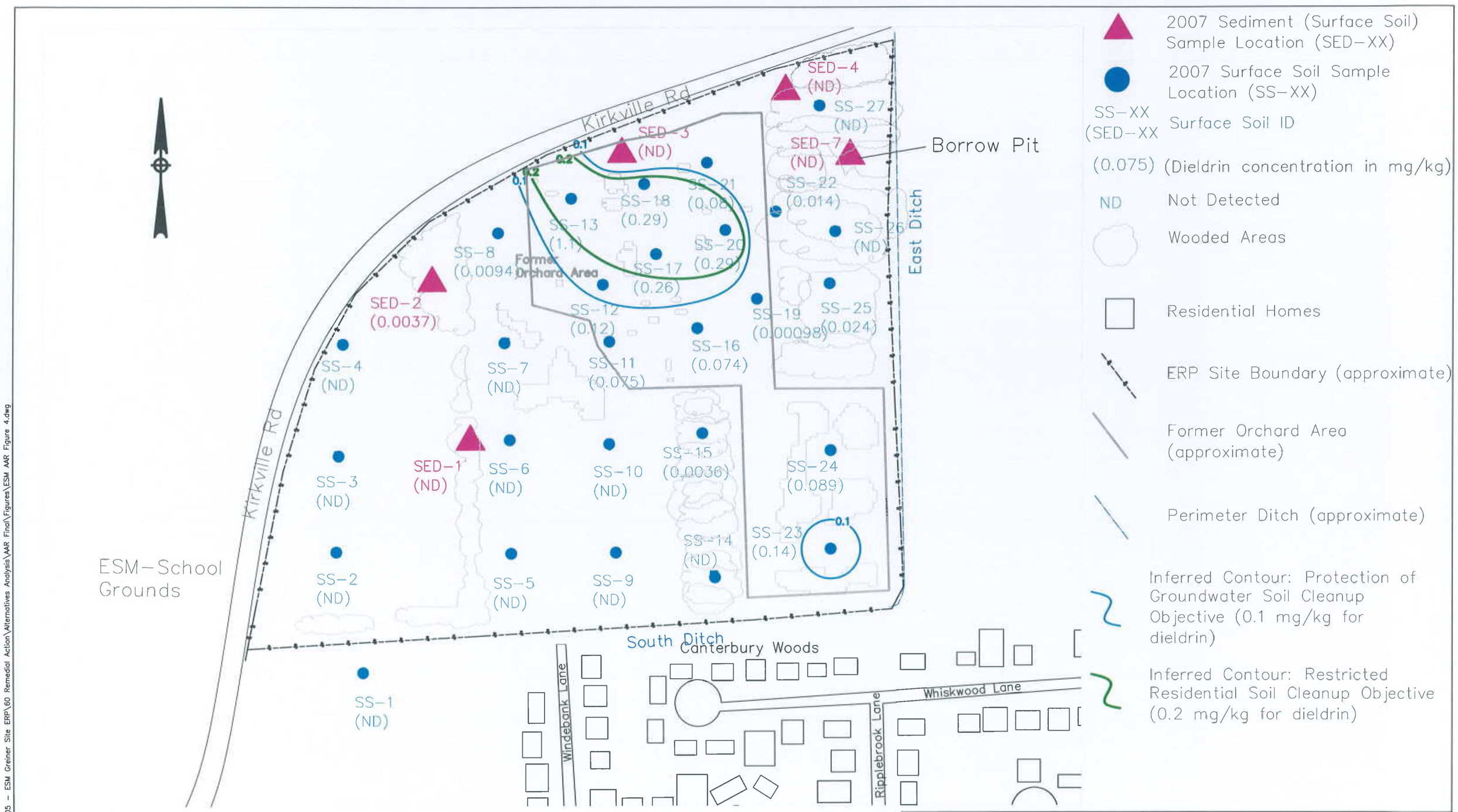
Syracuse, NY
DATE: 11/2011 JOB No: N6005

Alternatives Analysis Report
East Syracuse-Minoa Central School District
Greiner Orchards
East Syracuse, NY

FIGURE 3
Arsenic Concentrations in RI Surface Soil Samples



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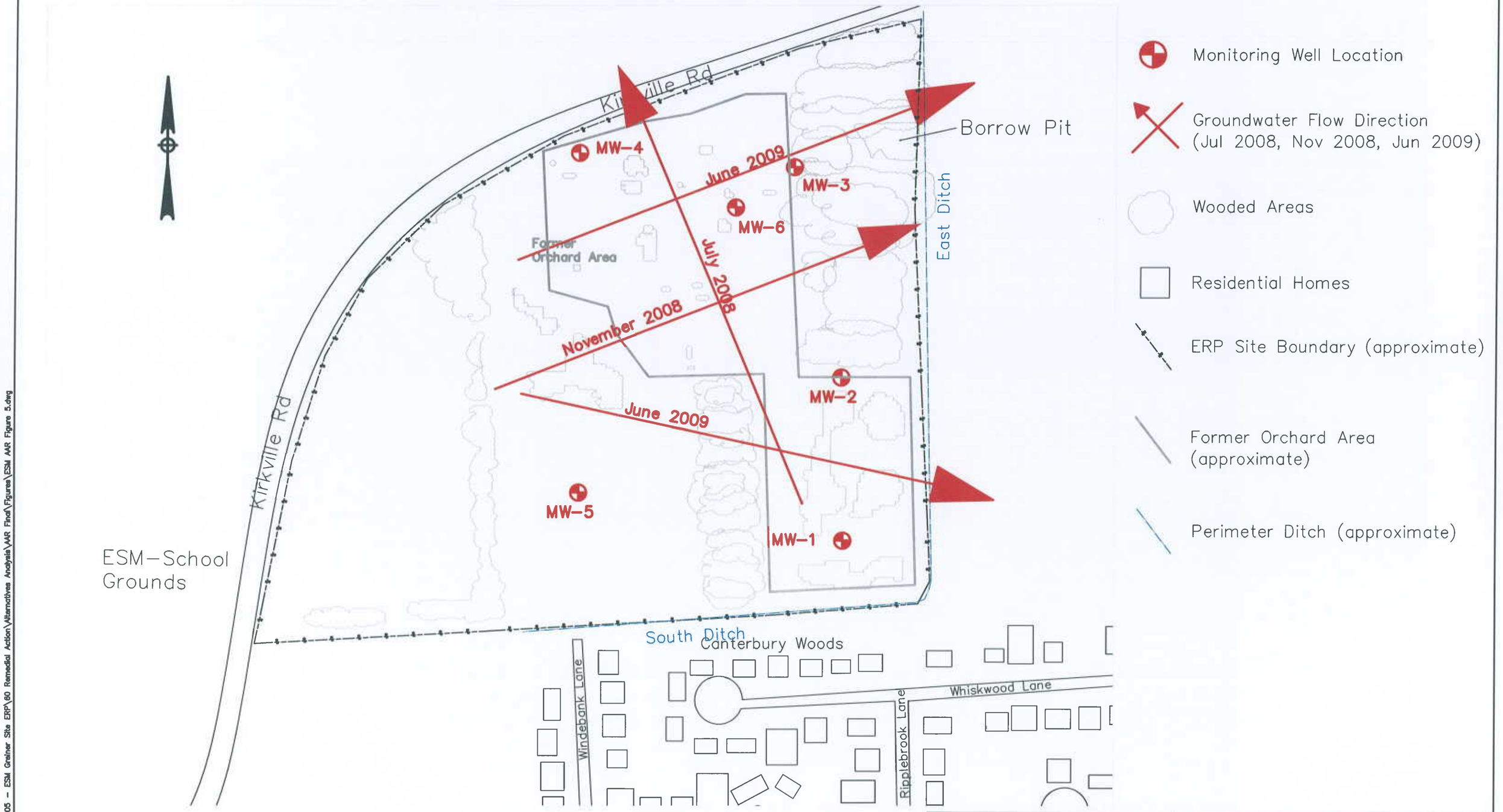
Alternatives Analysis Report
East Syracuse–Minoa Central School District
Greiner Orchards
East Syracuse, NY

FIGURE 4
Dieldrin Concentrations in RI Surface Soil Samples



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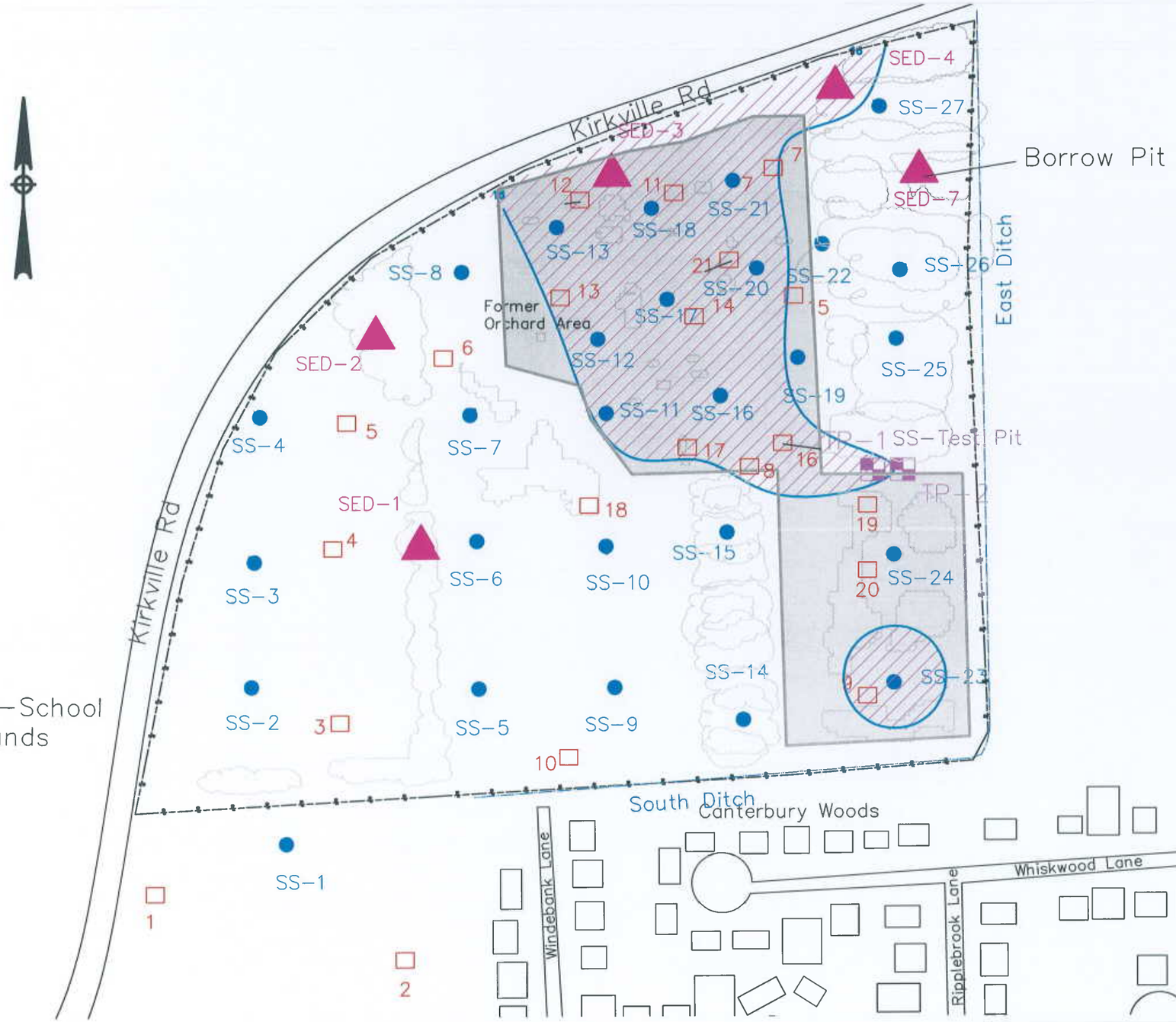
DATE: 11/2011 JOB No: N6005

Alternatives Analysis Report
East Syracuse-Minoa Central School District
Greiner Orchards
East Syracuse, NY

FIGURE 5
Groundwater Monitoring Wells & Flow



2007 Sediment (Surface Soil) Sample Location (approximate)

2007 Surface Soil Sample Location (surveyed)

SS-1 Sample ID
SED-1

2001 Sear Brown Surface Soil sample locations (approximate)

Test Pit Locations (approximate)

Wooded Areas

Area requiring soil remediation (Exceeding Restricted Residential SCOs). Based on analytical data for arsenic (Figure 3) and dieldrin (Figure 4) (Approximate)

Former Orchard Area (approximate)

Perimeter Ditch (approximate)

ERP Site Boundary (approximate)

SCALE IN FEET
100 0 50 100 200 400

X-REF: NAMES?
2007/November/Syracuse/AM
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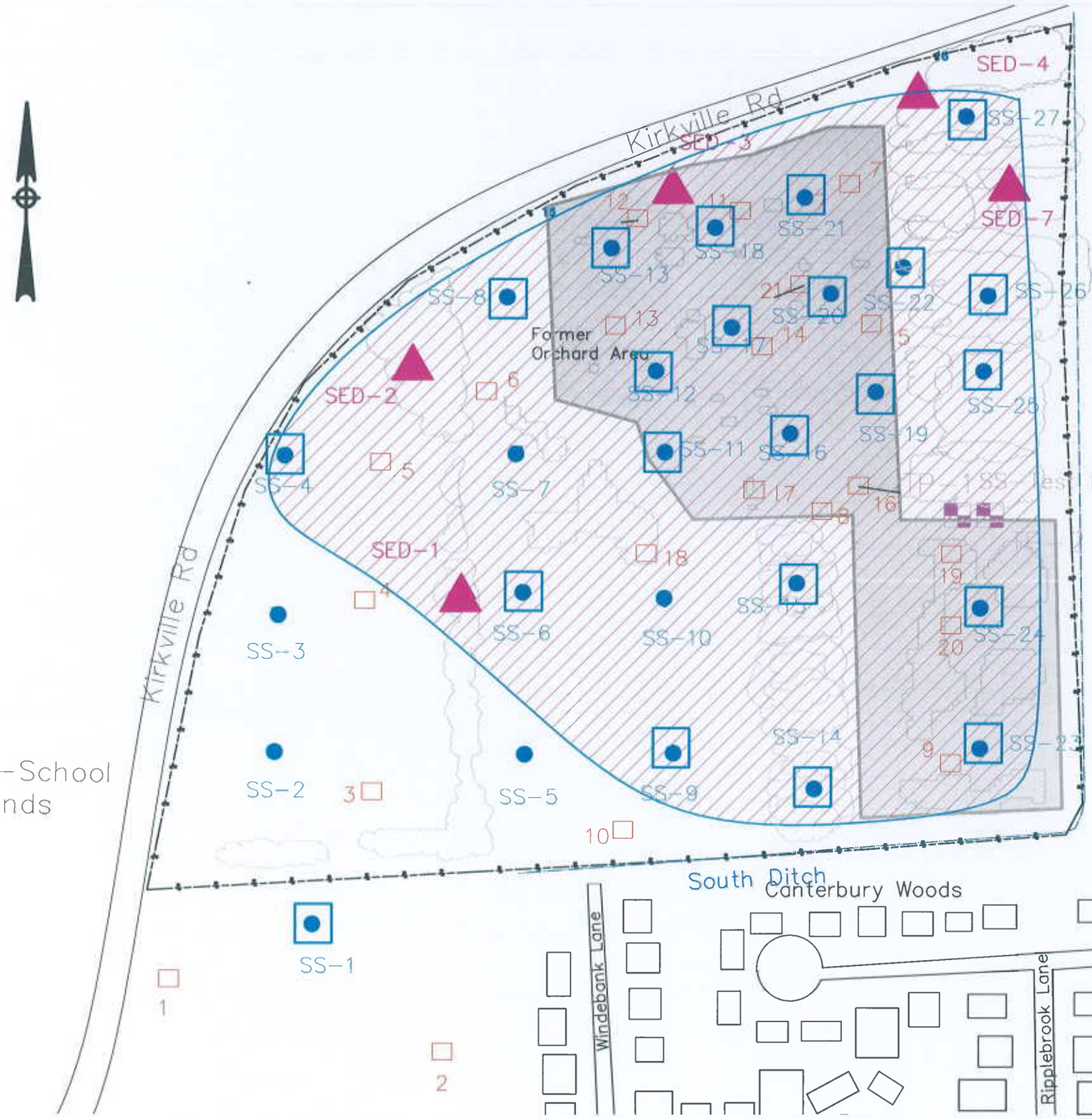
Alternatives Analysis Report
East Syracuse-Minoa Central School District
Greiner Orchards
East Syracuse, NY

FIGURE 6
Areas Exceeding Restrcited Residential SCOs



2007 Sediment (Surface Soil) Sample Location (approximate)

2007 Surface Soil Sample Location (surveyed)

SS-1 / SED-1 Sample ID

2001 Sear Brown Surface Soil sample locations (approximate)

Test Pit Locations (approximate)

Wooded Areas

Sample location with detection exceeding Unrestricted Use SCO

Area requiring soil remediation exceeding Unrestricted SCOs (approximate).

Former Orchard Area (approximate)

Perimeter Ditch (approximate)

ERP Site Boundary (approximate)

SCALE IN FEET
100 0 50 100 200 400

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Alternatives Analysis Report
East Syracuse-Minoa Central School District
Greiner Orchards
East Syracuse, NY

FIGURE 7
Areas Exceeding Unrestrcited SCOs

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